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A TEXT-BOOK ON GONORRHEA
AND ITS COMPLICATIONS

A TEXT-BOOK
ON
GONORRHEA
AND ITS COMPLICATIONS

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BY

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WITH 200 ILLUSTRATIONS AND 3 COLOURED PLATES

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AUTHOR'S PREFACE

GONORRHEA is one of the scourges of humanity which have received so far but slight attention from the general public. Whilst the dangers of syphilis are a matter of common knowledge, gonorrhea is often made light of, and yet this disease is more common, and causes endless misery amongst the innocent. Its sequelæ, which, unfortunately, are insufficiently known, are just as serious, both from the social and from the individual point of view, as those of syphilis, although they are less tragic in appearance.

Gonorrhea is no benign disease which calls for jocular comment; it is a serious illness which may terminate fatally. Badly treated or insufficiently cured, it produces lesions in the male which embitter his best years or his old age; and in both sexes it gives rise to systemic complications, of which those involving the joints and the heart are the most important.

In fact, the gonococcus, the usual cause of the malady, does not always remain within the mucous membrane of the urethra; it enters the blood-stream more frequently than is generally believed, and thus sets up a generalized septicemia and fatal cardiac lesions, which are, unfortunately, by no means as rare as one might expect.

When a man acquires an attack of gonorrhea, sensations of pain and of burning in his urethra soon acquaint him with his misfortune; but once the acute stage has passed off, he undervalues the importance of his "accident." He rapidly forgets that he is contagious, neglects his treatment or postpones it, and finally fails to be cured.

Careless, ignorant, or guilty, he enters upon wedlock, and gives his young spouse in exchange for her virginity a poison which may cripple or kill her. The great danger at this moment is the absence of acute symptoms, and thus the unfortunate wife has no suspicion of the true nature of her illness—an illness which ruins so many young women between eighteen and twenty. It is pitiful to see the pale faces, the anxious and worn looks, the hollow eyes of these poor young women who suffer permanently from internal pains, until they submit to a surgical operation which gives them the desired relief, but also condemns them to complete sterility.

Such are the disasters brought on by gonorrhea. Its victims amongst both sexes are so numerous that it must be the duty of medical men to point out its dangers to public resentment. It is one of the most frequent

causes of depopulation, and it is responsible for the "wrecking" of so many men, and for the sterility of so many women.

Owing to the slow, but sure havoc which it causes in the individual, and to Society, gonorrhea deserves the fullest attention of medical men and of public bodies. To aid and to guide them in their campaign against this plague is the object of this book.

Our therapy is nowadays so perfect that it is not permissible for a medical man to allow a case of gonorrheal urethritis to go on without curing it. Modern science has made such conquests that one can say without exaggerating that there is no inflammation of the urethra which cannot be cured completely by appropriate treatment. But it should not be forgotten that this result is only obtained by means of prolonged and painstaking observations, and that urethroscopy alone enables us to diagnose the local lesions with accuracy, and to apply the sovereign remedy correctly. Without the control of his eye, it is impossible for the medical man to select the best and the most efficacious treatment.

It does not follow from the fact that urethroscopy is a wonderful and indispensable means of diagnosis in expert hands that it is a universal panacea for inflamed urethræ. The truth is far from this, and hence it is necessary to study the treatment of urethral inflammation in all its details.

On the whole, the therapeutic measures recommended in this book have little in common with the routine treatment of former days.

An experience of twelve years devoted to the study of these interesting diseases has convinced me of the absolute efficiency of certain remedies, and of their superiority over others which fortunately have become obsolete nowadays. I have therefore avoided a tiresome enumeration of the old methods which prolonged the urethritis instead of curing it, and given a very full description of our modern accurate therapeutic measures which lead to a certain cure.

This book contains twelve chapters.

The history of gonorrhea I considered of interest. It shows the evolution of our knowledge of the etiology and of the therapy of the disease; how gradually in the course of centuries a state of chaos and darkness was replaced by accuracy and clearness.

The following chapters deal with the etiology of gonorrhea, and give a full description of the gonococcus, the usual cause of the malady. They also point out its dangers, and refer to the social struggle against gonorrhea, and to certain legal questions connected with it.

As the gonococcus is not the only micro-organism capable of producing an inflammation of the urethra, a further chapter is devoted to these non-gonococcal urethrites.

The basis of all rational treatment is the pathological finding, and thus a special chapter deals with the pathology of gonorrhea.

In the next chapter the clinical picture and the symptomatology are described.

The diagnosis of urethral inflammation has received special attention, as it guides the treatment, and as the success of the latter depends on the accuracy and completeness of the former.

The following chapter gives a full description of urethroscopy, and completes the previous chapter. Without this powerful means of diagnosis, the localizations of chronic urethritis cannot be made out, and therefore remain untreated.

The numerous complications of gonorrhea are then reviewed, a special chapter being devoted to gonorrhea in women and children.

The later two chapters, which are the most important ones, give a full description of the treatment of acute and of chronic gonorrhea. They contain the methods which have stood the tests, and lead to a certain cure if properly applied.

This book has been illustrated with special care, most of the figures being original. They are intended to render the reader familiar with the various therapeutic interventions, and to give him the impression that he is operating himself.

Lastly, I have to discharge the pleasant duty of thanking my publishers, Messrs. O. Doin et Fils, for the admirable way in which they have published this book.

GEORGES LUYS.

TRANSLATOR'S PREFACE

In recent years a greater interest has been taken in venereal diseases, and it would seem as if the days in which it was permissible to treat these maladies with contempt and in a careless manner belonged to the past. It is being more and more realized that the fact of contracting a venereal disease is purely and simply a misfortune, and in itself no proof of immorality, calling for disapproval and punishment. It is gratifying to find leading journals, like the *Times*, devoting their columns occasionally to important advances in venereology.

Syphilis has been a good field for medical research in recent years. Valuable discoveries have followed each other in rapid succession, and thus the attention of the public and of the medical profession has been concentrated on this malady, which in the past hall-marked the majority of its victims, and could not fail to impress even the most hard-hearted. Much has been done of late for the syphilitics, and an enormous literature has sprung which, it is to be feared, is already too extensive.

The other venereal diseases have thus dropped into the background, and it seems timely to bring their principal member, gonorrhea, to the front again. Its frequency and its dangers, which are dealt with in this work, would be in themselves an ample justification. There can be no doubt that its victims deserve our fullest sympathy, and that they require the same care and attention as patients suffering from other diseases, were it only for the sake of their surroundings and of their offspring. As far as "guilt" and "sin" are concerned, it would be well to cast off the cloak of hypocrisy and to adopt charitable feelings. The cirrhotic who has deliberately ruined his health, to quote an example, and an enormous percentage of those who meet with accidents or injuries, are just as "guilty," and their lesions are to the same extent "self-inflicted" as any venereal disease.

The victims of their passions suffer enough as it is. The long duration of their illness, the restrictions they have to impose upon themselves, and the knowledge of being "unclean," as Moses termed it, and of being put out of action, lead to endless mental suffering, which often inspires one with pity. To inflict upon these sufferers religious treatment, as some seem to

think fit, in preference to a proper medical therapy, verges on barbarism, and is not in harmony with our times.

In the case of gonorrhea in particular, our medico-surgical measures are excellent and practically guarantee a cure. They appear, however, to be inadequately known, and even amongst medical men a certain uncertainty appears to exist, as far as the treatment of gonorrhea is concerned. This state of affairs is not astonishing, considering that for a number of years no book has been published in the English language on this subject. It is true that several valuable works on urinary diseases have been written of late, and that they allude to gonorrhea. But these references are scanty, suitable, perhaps, for experts who do not require them. Those who are less familiar with this malady and seek detailed information will find little assistance in consulting these books. There is thus a gap in our literature, and I have attempted to fill it by this translation of a treatise which has already made its reputation and contains all the information one could desire.

Its author, Dr. Georges Luys, is a recognized authority, and so well known by his numerous writings and inventions, that all his communications deserve attention. His "Traité de la Blennorragie," of which the present volume is a translation, deals exclusively with that malady, and is the most complete book so far published on this subject. The first edition appeared only in 1912. Within a year a second edition became necessary; an abridged Spanish translation has already been published, and a Russian version is about to appear.

The text of the present English edition embodies all the additions and corrections of the second French edition, although it differs here and there from the latter. We have also been able to insert all the important new figures, owing to the efforts of my publishers, Messrs. Baillière, Tindall and Cox, to whom my thanks are due for the care which they have bestowed upon this work. On the other hand, we have omitted some of those figures which appear twice in the original, and a few of minor interest.

Some of our readers will regret that the references to vaccine treatment are brief; but as neither Dr. Luys nor myself are greatly impressed by its achievements, we decided not to enlarge the paragraph relating to it.

It has been the aim to lay stress upon such methods only which are reliable, and which should be employed by those whose lot it is to cure gonorrhea and to alleviate the terrible martyrdom of the sexual organs.

A. FOERSTER.

LONDON, W.
July, 1913.

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GONORRHEA

CHAPTER I

THE HISTORY OF GONORRHEA[1]

GONORRHEA is as old as mankind, and urethral discharges have, no doubt, been known at all times. In the primitive ages, before medical science had originated, the wise legislator gave legal sanction to suitable hygienic measures, and thus we find Moses laying down laws for the conduct of those who suffered from a discharge from their urethra.

This oldest description of gonorrhea dates back to the fifteenth century B.C., and runs as follows (Lev. xv. 2, 3):

"Speak unto the children of Israel, and say unto them, When any man hath a running issue out of his flesh, because of his issue he is unclean.

"And this shall be the uncleanness in his issue: whether his flesh run with his issue, or his flesh be stopped from his issue, it is his uncleanness."

In the following verses Moses adds that the uncleanness is not confined to the person of the patient. His bed, his seat, the articles he uses, and the people with whom he comes into actual contact, share his uncleanness. Moses was thus perfectly aware of the contagious nature of gonorrhea, and he desired that the patient should allow a full week to elapse after his cure before he attended to his sacrifice of atonement and resumed his social functions.

Anglada[2] states that gonorrhea was one of the most important diseases which prevailed amongst the Jews, and this is not astonishing, considering their unhygienic mode of living and their sexual incontinence, of which history gives many examples. It may be mentioned, by the way, that circumcision was invented for the purpose of guarding against balano-posthitis, one of the commonest complications of gonorrhea.

The first scientific document dealing with this disease was written fully twelve centuries later (300 B.C.). In the Lectures of Hippocrates, which

[1] Dr. Roucayrol has made a special study of the history of gonorrhea. The facts mentioned in this chapter are largely taken from his most interesting thesis: *Considérations Historiques sur la Blennorragie*, Paris (Steinheil), 1907.

[2] Anglada, *Étude sur les Maladies Éteintes et les Maladies Nouvelles*, Paris, 1869.

have been handed down and enlarged by his pupils, we have the first scientific observation.

"No disease," says Hippocrates, "has more varied symptoms than strangury. [This is his term for acute gonorrhea, and perhaps also for cystitis.] It is most commonly found in youths and in old men. In the latter it is always more rebellious, but nobody dies from it (*De Locis Affectis*, c. xxix.). Its usual causes are renal suppuration, and inflammation of the bladder, urethra, rectum, and womb, constipation, and excessive indulgence in the pleasures of Venus.

Hippocrates had dissected urethræ affected with discharge, and had, no doubt, seen polypi, for he attributed the origin of the disease to tubercles and fleshy proliferations. He therefore taught, in accordance with his ideas on inflammation, that "*those suffering from tubercles and carnosities in their pipe will get well by suppuration and the flow of pus*"—an unhappy idea which misled humanity for many centuries.

All the great thinkers of those days took a keen interest in medicine, and allude to gonorrhea in their writings. Aristotle, Plato, Seneca, etc., were well acquainted with this disease, and Epicurus, the gay philosopher, suffered from it all his life. After having struggled for fourteen days against an attack of acute retention which he hoped to relieve by living in a bath, he put an end to his misery, which had been brought on by his numerous strictures, by committing suicide (Seneca, Letters 66 and 92).

Celsus, who lived in the times of Augustus, was the first to attribute the discharge of gonorrhea to an ulceration of the urethra (*De Medicina*, lib. v.), and, influenced by Hippocrates' teaching, he said that "those whose urethræ have become the seat of little tumours are restored to health as soon as the pus is evacuated from the canal." Celsus catheterized his patients, the women as well as the men, and gave descriptions of his instruments and of his *modus operandi*.

The beginning of the Second Century of our era is marked by two great names—Galen and Aretæus of Cappadocia. Galen is the inventor of the term "gonorrhea" (from γονή, semen, and ῥεῖν, to flow), his opinion being that the disease was merely an involuntary loss of sperma, unaccompanied by erection.

Aretæus, on the other hand, distinguished clearly between spermatorrhea and urethral discharges in his treatise *De Signis et Causis Diuturnorum Morborum*.

In the chapter dealing with vesical affections, he speaks of a thick white discharge which accompanies acute cystitis. He describes this ailment at length, and attributes the sharpness of the pain to the peculiar anatomical formation of the bladder which he considers to be a "flat nerve."

For the treatment of the discharge, he applied astringents to the bladder,

placed cooling substances in the loins, and wrapped the genitals and neighbouring parts in wool. He used embrocations made of rose-oil, or oil of dill, or of aromatic white wine. He was also fond of ordering poultices composed of barley flour, erymum seeds, a small amount of nitre, and sufficient honey to make a paste. Sexual abstinence and prolonged cold baths completed these prescriptions, which were supposed to cure.

Paul of Egina, in the Fourth Century, devotes a special chapter in his *Surgery* to paraphimosis. "Paraphimosis (*παραφιμοσις*)," he says, "occurs with inflammation of the privates; when the skin is drawn back, the swollen glans can no longer receive the prepuce."

In the Sixth Century, Cœlius Aurelianus (*De Morbis Chronicis et Acutis*) regarded purulent discharges from the urethra as *a flow of watery semen*, due to errors of diet, fatigue, and sexual excess.

Amongst the Orientals, Susruta is one of the oldest Hindu writers on medicine. In one of his works, which was probably written long before the Ninth Century, he deals with *Diseases of the Urinary Passages* (Utiara St'Hana), and devotes a chapter to dysuria, for which he advises medical treatment.

Rhases, in the Ninth Century, gave a fuller account of gonorrhea than his predecessors. His description of urethral discharges is not without interest, and he is the first author to point out the occurrence of hematuria in cases in which the bladder becomes involved. His treatment was chiefly antiphlogistic in the beginning. Later on he injected the urethra with honeyed water, psillum mucilage, or decoction of quince seeds, and finally he healed it with white of lead or antimony. The pain on making water was relieved by him with injections of warm vinegar, which apparently gave prompt relief, or by means of rose-water containing opium, which he injected into the bladder. He also gave large doses of the last-mentioned anodyne by the mouth (Roucayrol, *loc. cit.*, p. 26).

Mesue, in the Tenth Century, was familiar with the works of Hippocrates, and was under his influence: "All inflammatory tumours formed in the passage and channel of the urine produce, at first, pain accompanied by strangury; then pus is formed, and as it flows the inflammatory tumours and the strangury are dispersed." Farther on he speaks of the erections which accompany the discharge.

Avicenna, in his *Canons*, mentions retention of urine due to ulcerations of the neck of the bladder, or due to vegetations. He passed catheters on his patients, and irrigated their bladders with a silver syringe. Strangely enough, he combined this rational therapy with weird and outrageous prescriptions, such as the introduction of a *flea into the meatus* (Roucayrol, *loc. cit.*, p. 30).

Constantinus Africanus (1015-1087) used human milk, oil, and barley-water, for urethral injections.

The excellent dietic prescriptions of the school of Salerno contained an aphorism which indicates a very true and useful prophylactic measure:

> " Post coitum si mingas
> Apte servabis urethras."

In the Middle Ages, Roger (Thirteenth Century) taught in his *Surgery* that gonorrhea is characterized by pain, burning, redness, and swelling of the penis, and by difficulty in making water. His therapy was a fairly active one; he bled his patients from the saphenous vein, and applied leeches. He also practised injections *per algariam*. His aim was to produce suppuration, because Hippocrates had said that those who have pustules in their penis get well by suppuration. He was also acquainted with gonorrheal orchitis, but did not leave any details about his treatment of this complaint.

His contemporary, Guillaume de Salicet, attributed the discharge to filth retained under the prepuce after connection with a dirty woman. He treated the ulcers formed by means of the cautery, in order to " separate the corrupt from the healthy." He stands out amongst the people of his time by being the first to study the question of prophylaxis; he advises washings with water after every suspicious connection.

Lanfranc, his pupil (Thirteenth Century), deals in his *Surgery* with the *apostumes of the generative organs*, which he attributes to hot or to cold humours. Painful erections are, in his opinion, due to the fact that " the penis is full of flatus surmounted by great pain." He treated by letting blood, on the first day from the arm, and on the second from the ankle. He forbade wine, meat, and " sweet things." He also prescribed a number of salves which he considered very wonderful. Orchitis, or " l'apostume froict," as he called it, was treated by him with suppositories. For indurations he had a special salve which had given him good results; and painful erections were dealt with by anointing the penis with a special ointment, which had proved " very profitable " in his experience.

He did not confine himself to curing; he also advised certain prophylactic measures. Those who had run the risk of contamination were recommended to wash with equal parts of water and of vinegar. He even went farther, and advised, on the strength of his personal experience, " to wash the part of its own urine."

Gordon's *Lilium Medicine* (Thirteenth Century) contains but rudimentary information. Gonorrhea is explained as a flow of semen, unaccompanied by pleasant sensations, which may be caused by sexual excesses or by " having sat on a cold stone " ! Gordon treated his patients by blood-

letting, by making them vomit, and by giving them a rose syrup. He also recommended a diet consisting of gruel, lentils, etc., and advocated bathing of the loins and of the genitals with cold water. For patients suffering from retention he ordered baths, and completed their beneficial effect by putting living or powdered fleas on the penis (Roucayrol, *loc. cit.*, p. 44).

John of Gaddesden, Professor at Oxford, and a contemporary, followed in his footsteps. He also recommends prophylactic washings after every suspicious intercourse, in his book *Rosa Anglica Practica Medicæ.* These washings were to be made with acidulated water, or with urine if no water was obtainable. Gaddesden is the first to mention suspensory bandages: *Ne suspensio noceat fascondo currere materiam ad locum.*

Guy de Chauliac, at the end of the Fourteenth Century, took over the suspensory bandage from John of Gaddesden: "And the bandages for support shall be made in the shape of a sachet, with the truss arranged in such a way that they hold and support without causing any pain." Like Avicenna, he treated the discharge with antiphlogistics. In priapism he saw a symptom of the disease, but he described it in a special chapter, and explained it in accordance with Galen's teachings. Erections he believed to be due to a "vaporous flatus," but added that they are "also very often caused by dilatation of the arteries of the penis."

He treated painful erections by means of camphor, Galen's wax salve, and by placing a sheet of lead on the organ.

Following Galen and Rhases, the first step of his treatment for retention was to prescribe cantharides. Then came "baths with embrocations, plasters, salves, and lotions, which were applied to the mons Veneris, the penis, and the perineum." He also advocated Master Gordon's practice, "who gave injections and syringations into the bladder with balsams." His prescriptions were largely of a disgusting and revolting character. He believed the excreta of pigeons to be an excellent drug, and considered the application of a flea or louse to the meatus of great importance (Roucayrol, *loc. cit.*, p. 48).

Valescus of Tarentum, in the beginning of the Fifteenth Century, attributed urethral discharge to intercourse with a dirty, vile, or chancrous woman, or to too frequent intercourse (*Philonium Pharmaceutium et Chirurgicum*). He also held that "the sharpness of the urine leads to the formation of ulcers, if it lasts long enough," and believed it to be due to ulcerations present in the bladder and in the glans (Roucayrol, *loc. cit.*, p. 53).

Peter of Argelata speaks in his *Surgery* (Fifteenth Century) of pustules which break out on the penis after intercourse with diseased women, and recommends to wash the patient with water in the summer, and with urine in the winter. Restrictions in the diet, purgation, soothing applications of olive-oil, poplar-tree ointment, or barley poultice, and a salve composed

of breadcrumbs soaked in milk and mixed with yolk of egg, complete his therapy, not to mention the inevitable fumigations and embrocations.

About the same time Marcellus Cumanus claimed to have cured many patients by his method, which consisted of purgation, low diet, and inunctions with olive-oil. He also advocated to inject cow's or goat's milk, or, better still, human milk, into the urethra—an advice which he considered to be marvellous.

His contemporary, Antonius Guainer, recommended, in his chapter on Retention of Urine, the introduction of a small wax bougie, or of a little sound made of silver or tin, into the urethra. He appears to have been very familiar with this method, and is the first to mention treatment by dilatation, and thus his name deserves to be handed down to posterity.

Arculanus (Fifteenth Century) laid down some extremely interesting remarks in his *Treatise on Surgery*. His prognosis of acute gonorrhea is curious; he points out the gravity of the illness in the aged. He was the first to describe the properties of *silver* in the treatment of cystitis, and ordered irrigations of the bladder with silver. He forbade sexual intercourse, advised antiphlogistic treatment, and gave lengthy directions about the diet to be followed. In his chapter on Difficult Micturition he gives definitions of *dysuria* and *ischuria*, the former denoting difficulty, the latter impossibility, of micturition. He speaks of voluntary retention caused by the pain experienced with ulcerations of the penis, and teaches that retention of urine may be due to a wart, or to formation of flesh within the pipe causing "a fleshy obstruction." He recommends to investigate the origin of the retention by passing a sound, and gives some very interesting details about his instrumental outfit.

Vigo's book (beginning of the Sixteenth Century) marks an important date in the history of gonorrhea. Vigo made a clear distinction between gonorrhea and syphilis. The latter disease made its first appearance in 1494, according to him. "In the year in which King Charles VIII. wished to recover the kingdom of Naples, appeared in the month of December," etc.

His pupil Marianus Sanctus deals in the last part of his work *De Lapide Rennum et Vesicæ* with the history of strictures, and mentions cases which did not even admit a sound "syringam." He advocated for their treatment an instrument (Fig. 1) which he appears to have invented, and which he calls "terlinum" or "rostrum arcuatum." This instrument was to be of sufficient length to reach the neck of the bladder, and deserves to be compared with Oberländer's dilator (Fig. 2).

Rabelais, in the Sixteenth Century, was also well acquainted with gonorrhea, and many of our readers will remember the doleful paragraph in which he refers to it : "Poor old Pantagruel fell ill, and his stomach got so out of order that he could neither eat nor drink. And as no evil comes alone, he

also caught the clap, which tormented him more than you would believe. But his doctors stood by him gallantly, and with many emollient and diuretic drugs made him piss away his misfortune" (lib. ii., cap. 28).

Up to this time all the authors were perfectly aware that gonorrhea and syphilis are two distinct diseases. The confusion was started by Brassavole, whose book *Examen Omnium Loch de Morbo Gallico Tractus*

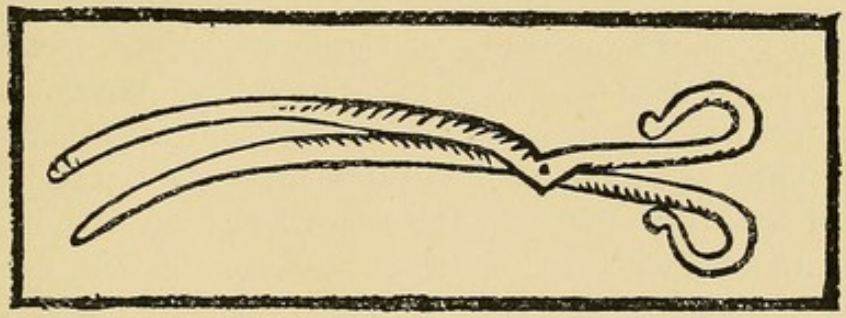

FIG. 1.—MARIANUS SANCTUS' TERLINUM OR ROSTRUM ARCUATUM. (Roucayrol.)

appeared in 1551. Like his predecessors, he dated the outbreak of syphilis back to the siege of Naples, but he considered gonorrhea to be merely a manifestation of syphilis.

Alphonso Ferri wrote in 1548 a special work on strictures, which was a great improvement on the former writings on this subject. It resumes the experience which he acquired during his long professorship of surgery in Italy, and is entitled *De Caruncula sive Callo quæ Cervici Vesciæ innascuntur liber.*

Amongst the conditions which give rise to caruncles, he mentions gonorrhea. This disease may produce ulcerations anywhere in the urethra,

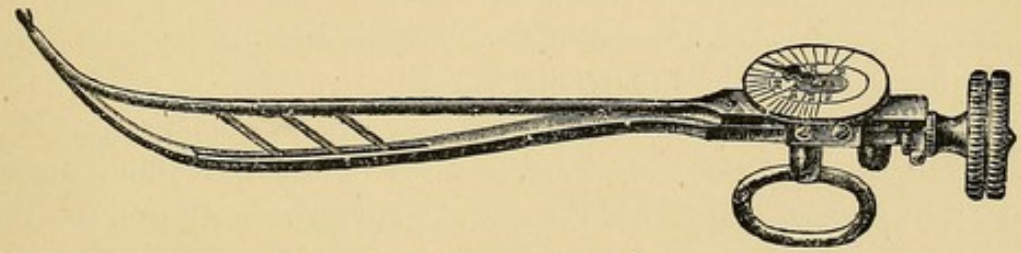

FIG. 2.—OBERLÄNDER'S DILATOR.

and thus caruncles may be present in any of its parts. The caruncle can be softened by means of medicines, fomentations, poultices, salves, and emollient injections. Then a bougie is passed, after it has been lubricated with "cow's butter or buffalo butter, almond, sesam, or ordinary oil, or goose or duck fat." The operator selects a suitable bougie, covers it by means of his finger with one of the substances indicated, and introduces it. Ferri warns against the use of corrosive remedies in a liquid or soft form, because they affect the healthy parts as well as the diseased focus; and as the

former are of a weak constitution, they would suffer. A preparation of sufficient hardness is required which can be applied to the caruncle without damaging any other part over which it has to pass. "One should, however, not forget," says Ferri, "that the older the caruncle, the more difficult it is to cure, and, therefore, gradually stronger remedies have to be tried if the milder ones have failed. If topics be insufficient to destroy the caruncle, one has to resort to the use of an argaly, or of a pointed and cutting sound, in order to penetrate more readily. The flow of blood caused by these instruments should not cause alarm; it is even most beneficial, providing the blood comes from the caruncle, and not from any other part. Whether this is so can always be made out easily, because one can feel if the point of the argaly or of the sound is in contact with the caruncle, in which case the operation is most successful. The subsequent flow of urine cleanses and dries the tissues, and thus leads to cicatrization, no further intervention being required."

In the Sixteenth Century, Lacuna wrote a treatise on the same subject—*Methodus Cognoscendi, extirpandique in Vesicæ Collo Carunculas.* He describes bougies which melt after they have been introduced. He says that they are beyond praise, and that they consume all ulcers and carnosities without causing much pain. He also gives a list of the cases of venereal strangury which he cured with his bougies.

Ambroise Paré's celebrated work *Des Chaudes-pisses et Carnositez engendrées au Méat Urinal* appeared in 1564.

It deals mainly with syphilis, but the causes of gonorrhea are mentioned: "The clap is due to three causes—overeating, starvation, and infection. It comes on after intercourse with a woman who has had some ulcer about her privates, some syphilitic matter."

Paré thus confounded gonorrhea and syphilis, and this mistake prevailed until the beginning of the Nineteenth Century.

Ambroise Paré resumed his treatment of gonorrhea as follows: "A learned doctor should be called in, and he should bleed and purge the patient, if necessary, and direct the diet." He forbade all rich food, wine, and the company of women, "even to see them in paintings or otherwise." Cold baths, as little sleep as possible, and a certain refreshing plaster which was to be applied to the loins and to the genitals, he considered useful. He recommended the use of turpentine with emphasis, as he believed it to be an excellent drug for gonorrhea. Apart from turpentine, he ordered his patients to avoid "all things which heat the blood," and violent exercise. They had to sleep on a hard bed, and to drink lemon-juice or barley-water.

He alleviated the pain on micturition during the acute stage by recommending the patient to micturate "into a vessel containing warm milk, in which he dips his penis whilst he makes water. If no milk is at hand,

warm water shall be used instead." After the acute stage had subsided, Paré advised injections containing aromatic wine, aloes, hydromel, and absinth.

For chronic urethritis he recommended urethral dressings consisting of an ointment, which was applied with a little wax candle or sound wrapped in a piece of linen.

Ambroise Paré made large use of dilatation treatment for chronic inflammation of the urethra. He was the first to dwell upon the necessity of using the "biggest sounds which the patient can endure" in order to obtain a good result.

Loyseau, in the Sixteenth Century, followed Ambroise Paré. He treated Henry IV. of France for stricture, and gave his royal patient great relief by introducing an ointment into his urethra by means of a bougie. The victor of Ivry was so delighted that he bought it for him, and raised him to the rank of a Count.

Fabricius d'Aquapendente published in 1649 an important work in which he deals with "urethral ulcer due to gonorrhea." He was chiefly concerned with the treatment of strictures, and the same may be said of Van Helmont, François Tolet, Van Solingen, Dionis, in the Seventeenth Century.

The knowledge of the pathology of urethral inflammation made great strides under Morgagni. He was the first to show that the discharge was not caused by ulcerations in the urethra, and he put an end to the old fallacy which dated from Galen, by proving the discharge to take its origin from the urethral mucous membrane, and not from the seminal vesicles. He discovered the "lacunæ of Morgagni," and pointed out the importance of their inflammation in chronic gonorrhea.

To Cardanus (Eighteenth Century) we owe a good description of gonorrhea. He discusses acute retention under the term of "dry clap." Orchitis is, in his opinion, due to the fact that "the clap has fallen into the scrotum." Like all his contemporaries, he was unable to distinguish between gonorrhea and syphilis, and therefore treated the former with mercury, chiefly by internal administration of the perchloride. For gonorrheal epididymitis he resorted to castration.

John Hunter, in the same century, was the first to undertake inoculation experiments for the purpose of studying the evolution of the malady. His disastrous auto-inoculation, through which he acquired gonorrhea and syphilis simultaneously, led him to proclaim the identity of these two diseases, and he remained a passionate defender of this error until his death.

Towards the very end of the century, in 1793, Benjamin Bell established the distinction between gonorrhea and syphilis. According to him, the former was a purely local infection caused by some special contamination which differed from syphilitic infection.

His views were taken up in France by Bosquillon.

Swediaur invented the term "blennorrhagie" (from βλέννα, mucus), now adopted in France, and produced urethral discharges experimentally by injecting irritating chemicals, such as ammonia, into the urethra.

Hernandez of Toulon undertook his famous inoculation experiments in 1812. He inoculated seventeen convicts, and demonstrated thus that inoculation of gonorrheal material produces gonorrhea, and is never followed by syphilitic lesions.

The definite separation of the two diseases, however, dates from Ricord (1831), who in his lucid and vigorous writings and lectures spread the new truth. He was the first to show that the manifestations of syphilis are ushered in by the appearance of a chancre, Ricord's "accident primitif," and grouped the subsequent symptoms into "secondary" and "tertiary." He demonstrated over and over again the characteristic differences between these two diseases, and proved conclusively that an attack of gonorrhea cannot develop into syphilis.

In Ricord's opinion, gonorrhea was a simple inflammation of the urethral mucous membrane which could be brought on by various ill-defined causes. His non-specific phlogogenic theory of its origin was widely accepted by his contemporaries.

Rollet of Lyons, however, opposed him, and proclaimed the disease to be caused by a specific virus. He held that every case of gonorrhea owed its existence to another case of gonorrhea from which it had received the virus, which was still unknown.

Whilst the war was still waging between the followers of Ricord and those of Rollet, bacteriological research had made sufficient progress to tackle the problem.

In 1872 Hallier discovered the presence of micro-organisms in the pus cells of gonorrheal discharge, and in 1879 Albert Neisser, then assistant in the Breslau Dermatological Clinique, discovered the gonococcus.

To Neisser belongs, not only the credit of having discovered the specific organism, and of having described it fully and accurately, but he also proved it to be the pathogenic factor in all cases of ocular and urethral gonorrhea.

Neisser's researches were confirmed by Bakei and Finkelstein, Watson-Cheyne, Haab, and others. In 1884 Bumm succeeded in making pure cultures of Neisser's gonococcus, and Wertheim invented a practical method of cultivation shortly afterwards.

Amongst the great men associated with the study of gonorrhea, Désormeaux deserves a special mention. As far back as 1854, the "Father of Endoscopy," as he is rightly called, realized that the treatment of urethral inflammation should be based on an exact knowledge of the lesions, and he invented for this purpose the first urethroscope. Although primitive, this

instrument was a remarkable invention, and represented the first step to the truly scientific treatment which we have at our disposal nowadays.

Beniqué was the first to use the metal sounds which bear his name, for the treatment of urethral stricture. His discovery was made more than seventy years ago, and we still use his instruments.

Civiale also believed in dilatation, practised and taught it.

The treatment of gonorrhea, such as it was, in the middle of the Nineteenth Century has been well summed up by Voillemier. It consisted—(1) in aborting the inflammation, if the case comes under treatment in its early stage; (2) in fighting it, once it is well established; and (3) in drying up the discharge by modifying the secreting surface by means of topics.

To give a full account of all the modern work on gonorrhea in this chapter would lead to repetition. Reference to recent writers is constantly made in the following chapters. May it suffice here to express our admiration for the great work done by the German school, headed by Professor Oberländer of Dresden. Thanks to him, the urethroscopic method has been widely adopted for the diagnosis of the foci which keep up chronic discharges, and his teachings have been made widely known through the important works of Professor Kollmann of Leipzig, and of Wossidlo and Franck of Berlin. I have devoted more than twelve years to the study of their work, and I have become a passionate partisan of their doctrines.

CHAPTER II

THE DANGERS OF GONORRHEA

CASES of gonorrhea are seen every day in general practice, so great is their frequency, and hence their great interest from a social point of view.

Despite its apparent benignity, gonorrhea is a formidable malady because of its immediate and remote sequelæ. It is a great mistake to think that "gleet," as it is usually called, is an insignificant local trouble which calls for jocular comment. One should not forget that an attack of gonorrhea may terminate in death!

Unfortunately, even medical men are to be found who regard "gleet" as a benign disease, and who are unaware of the fact that *gonococci* are very frequently present in these cases. It is true that these gonococci are latent, and inconvenience their owners, who enjoy towards them a relative immunity, but little, if at all; but they are virulent to others. The proof of this statement is to be found in the endless number of cases of gonorrhea which were infected by women who showed no trace of disease. In these cases one is confronted with a special adaptation of the urethral soil—with a temporary local immunity which is entirely relative. It only requires a certain amount of fatigue or sexual excess, connection during the menstrual period, or an immoderate quantity of pure wine, liqueurs, or beer, to render the soil again favourable, and to allow the gonococcus to resume its activity. There can be no question of fresh infection in these cases; they are genuine relapses.

Another very common prejudice, which is not only prevalent amongst the laity, but also amongst medical men, is the belief that only a purulent discharge, the "morning drop," is worthy of consideration, and that the disease is cured once this symptom has disappeared. This is a very serious mistake; for only too often are big, heavy filaments present in the urine after the discharge has ceased, and these filaments are apt to be carried along with the sperma during ejaculation into the genito-urinary organs of the woman. Apart from the possibility of infecting her, these filaments are a danger to the man himself. They are the products of lesions which evolve insidiously and continuously for months and months, before they become obvious in the shape of serious complications.

Gonorrhea is thus a true social scourge which affects the individual, the family, and the community, and therefore deserves to rank with syphilis from this point of view.

To begin with, it is a source of disasters to the infected individual. Strictures of the urethra and all their sequelæ, double epididymo-orchitis leading to sterility, prostatitis often complicated by retention of urine, cystitis, and pyelonephritis, are some of the dangers which threaten the ignorant or careless patient. Then there are the systemic complications, which should never be lost sight of, such as gonorrheal rheumatism, which is present in 2 per cent. of all cases, periostitis, osteopathy, and muscular troubles of gonococcal origin. The cardiac, vascular, pleuro-pulmonary, peritoneal, and meningitic complications observed by so many authors prove conclusively the existence of a general systemic infection caused by the gonococcus.

The male transmits his gonorrhea to the woman, and it has been established beyond doubt nowadays that about 70 per cent. of the bartholinites, cystites, metrites, and salpingites, met with in married women, are due to the gleet of their careless, ignorant, or unscrupulous husbands. Jullien's words[1] are only too true: "Generally, morbid conditions arise which are of a persistent character, and show no tendency to cure. The generative organs become gradually involved to their whole extent; the general health suffers; all the functions of the body become slack; the women merely drag along, and have to pay for every minute of exertion, for the slightest error in their diet, and for a walk of any distance, with weeks of invalidity. The home is childless, there is no happiness, and this state of affairs may last for years!"

The wife is an invalid or sterile, whilst the husband goes about unconscious of his guilt, and unaware of the fact that he is still contagious owing to the discharge which he neglected in his youth, say eight, ten, or even fifteen years previously. Ricord treated in 1840 a patient whose illness dated from the year 1800. Désormeaux attended in 1863 an officer who had not been free from urethritis since 1813. Hartmann has also had occasion to convince himself of the longevity of the gonococcus: one of his patients had a chronic discharge for ten years, which had been treated without success in all the capitals of Europe. On one occasion only this patient had intercourse with a woman without a preservative: five days later she developed acute gonorrhea, characterized by violent urethritis, hemorrhagic cystitis, and metritis. Finally a double pyosalpinx supervened, which required a mutilating operation.[2]

How often do we not hear this doleful statement repeated by young

[1] Jullien, *Blennorragie et Mariage*, Paris (Baillière), 1898, p. 138.

[2] Hartmann, *Organes Génito-Urinaires de l'Homme* (Steinheil), 1904, p. 79.

wives: "As a girl I was very strong and well; *since my marriage* my health has left me"!

An alarmingly great number of young women are confined for months, or even for years, to their bed or their sofa, and pass their days in worrying over their shattered health. The gravity of their lesions condemns them incessantly to all sorts of precautions, which may allow them to lead a life of misery for some time, but cannot cure. Their only hope is a serious operation, which deprives them of their diseased organs, and renders them sterile for ever. And those who suffer thus are not only prostitutes and ladies of easy virtue, who, as Verchère puts it, "merely run the risks of the trade," but also married women who are absolutely straight and faithful, and have nothing to reproach themselves except a mistake in the choice of their husbands. One cannot close one's eyes to the fact that very often the parents are guilty of negligence or ignorance in these instances, and that, unfortunately, also the medical adviser is not always free from the blame of having reported favourably on the fiancé's health without having examined him with sufficient care.

Then, again, the disease, brought into the family by the husband, may affect the children in the form of purulent ophthalmia of the new-born, condemning these poor little creatures to complete blindness, and rendering them a burden to society. Gonorrheal urethritis, and especially vulvo-vaginitis, are not infrequently met with in little girls, chiefly amongst the poor, whose miserable hygienic conditions (lack of cleanliness, overcrowding, etc.) favour the development of this affection. Apart from those cases of vulvo-vaginitis in which rape, criminal intercourse, etc., are responsible, there are plenty of instances in which girls of tender age were contaminated through the contact with soiled linen, infected sponges and bed clothes, or dirty thermometers,[1] etc.

The seriousness of this disease lies in its tenacity, and in the difficulty of eradicating it, once it has gained a footing in a family, or in a hospital, or in a school.

The husband brings the germ home, gives it to his wife, who becomes as contagious as he is—Verchère's "gonorrhea of the innocent."

The pathological cycle observable is, then, one of the following: The husband seeks treatment, once he finds his disease persisting or becoming worse. When he is cured, he cohabits again with his wife, and reinfects himself. Or it is the wife who, having had since her marriage a cystitis or a severe metritis, consults a doctor and obtains relief. The first intercourse with her diseased husband leads to reinfection. Thus alternate reinfections *ad infinitum* take place, and it becomes impossible to fix any date for the

[1] Veil et Bayon, "Epidémie de Vulvite à Gonocoques; Transmission par un Thermomètre," *Semaine Médicale*, 1904.

duration of the man's gleet or for the wife's metritis. It is not uncommon for this state of things to last ten years or longer.

In cases of this type the infection is seldom acute, and rarely produces alarming symptoms. Bad cases are, however, met with, although they are very uncommon, and then they convert the honeymoon of the young couple into a *gallmoon*, as Callari puts it.

In the vast majority of cases the infection is attenuated, or very attenuated even, and merely causes a urethritis or a slight metritis, which, nevertheless, often renders the wife sterile.

Paul Delbet has quoted two cases of this nature,[1] in which the simultaneous disinfection of husband and wife was followed by fertilization.

A general outcry has been raised by all those who have studied the question, and they have pointed out with emphasis the great danger of infection connected with chronic gonorrhea. But the terrible consequences of gleet, as far as they concern married life, are inadequately known.

Noeggerath,[2] who was one of the first to look into the matter, maintained that in New York no less than 800 out of 1,000 husbands had suffered from gonorrhea, and that 90 per cent. of them had not been cured. Their disease, although it had become latent, remained infectious, and thus nearly all married women were infected.[3]

Von Schaick[4] undertook systematic researches in order to ascertain to what extent married women suffering from leucorrhea harboured gonococci, and found, amongst sixty-five women examined in the course of three years, the gonococcus seventeen times—*i.e.*, in 26 per cent.

A striking example which I had occasion to observe is the following:

A young man of twenty-nine had had two attacks of gonorrhea—one when he was twenty-one, and the second one at the age of twenty-six. On both occasions the treatment had been insufficient; but in January, 1904, he was free from discharge, as he assured me. He, however, never troubled about his water, as he did not understand the importance of the presence of heavy filaments in the urine, and married with a clear conscience. Six months after his marriage his wife had a profuse white discharge, which was treated with permanganate and silver nitrate douches. At the same time he noticed, to his amazement, a big flow of pus from his urethra. Injections of zinc sulphate, and cubebs taken internally removed his discharge very quickly, and this apparent cure lasted about five months. In the beginning of December, 1904, the running suddenly came on again, and now his doctor, Dr. Paul Roger, sent him to the author.

On examination his discharge was found to contain typical gonococci. Under repeated irrigations with potassium permanganate the discharge disappeared rapidly and the urine became clear, but some heavy filaments were still present in the first glass. Urethroscopy was now resorted to (middle of January, 1905) after previous

[1] Paul Delbet, *Comptes Rendus de l'Association Française d'Urologie*, 1902, p. 228.

[2] Noeggerath, *Die latente Gonorrhoe*, Bonn, 1872.

[3] Pierre Delbet, in *Traité de Chirurgie* de Duplay-Reclus, vol. viii., p. 118.

[4] Van Schaick, *New York Medical Journal*, October 30, 1897, p. 598.

dilatation. It was thus ascertained that the posterior urethra was healthy; but the penile urethra showed at the peno-scrotal angle a patch, about 2 centimetres in length, of typical infiltrative lesions. Methodical dilatation with Kollmann's straight dilator was now resorted to, with the result that this well-defined lesion and the heavy filaments disappeared.

At the same time I examined the wife, who was eight months pregnant, and suffered from a very free white discharge. Dr. Rudaux, who attended her, had examined the secretions of her urethra, and had found gonococci. As her pregnancy did not allow more active measures, she was treated by means of vaginal douches with permanganate, and local applications to the outer surface of the cervix. A complete cure could only be effected after her confinement, when it was permissible to treat the cavity of the cervix.

From the foregoing remarks a clear picture can be gained of the disasters which a neglected urethritis is apt to cause. It is in the interest of the public to point out these facts to its resentment. There can be no question that uncured gonorrhea is one of the most frequent causes of a declining birth-rate, that it cripples an endless number of men, and that it renders legions of women sterile.

Everywhere in France and abroad the statists dwell upon the danger of a decline in the birth-rate, and the Boards of Health respond by the call: "Protect childhood!" Would it not be equally justified and to the point if one proclaimed: "Protect the future mothers"?

The public has not sufficient respect for gonorrhea; many see in it a simple cold in the pipe. They treat it with contempt, and leave its cure to time. "Gleet, that is nothing," they say, and yet the victims of neglected or unsuspected gonorrhea are countless in both sexes. It is the duty of medical men to point out these dangers.

The attitude to adopt has been well outlined by Dr. Jullien, who says:[1] "It is high time that this heartbreaking state of affairs should cease. It is the duty of us doctors to start a crusade against the latent enemy which is a hundred times more terrible than syphilis, as Noeggerath rightly claimed. Let us be clear that we cannot point out too often nor too strongly the final consequences of gonorrhea. Both the working classes and the gentry should understand how it poisons the home and compromises the offspring. Let us teach them the means of recognizing this evil; let us keep them away from marriage by reason, by interest; and, above everything, let us learn to cure them. This duty is incumbent upon us both for the sake of the individual and for the benefit of society."

It is not irrational, as has been done lately in America, to propose legislative measures which compel all those who wish to marry to submit to a thorough medical examination.[2] For further information on this subject

[1] Jullien, *Blennorragie et Mariage*, Paris (Baillière), 1898.

[2] The State of Michigan considers all those who attempt to marry, and are suffering at the time from gonorrhea or syphilis, as criminals liable to imprisonment (up to five years), or to a fine of $500 to $1,000 (A. F.).

the reader may be referred to Paul Bru's interesting study, *L'Insexuée ou l'Autre Avarie.*

One should also consider the unpleasant position of the medical man in these cases. Thus, a patient may consult him, and say: "Doctor, I am getting married in a week, and I cannot possibly put it off, as they would otherwise break off the engagement. I should like your advice for a little trouble which I have, and which I want you to cure at once." The examination shows this fiancé to be contagious, and his disease to be of such a character that it could not possibly be cured in the short time allotted. The doctor explains to him his condition and its dangers, and informs him that he is on the point of committing an abominable action by contaminating deliberately an innocent girl. However, he merely gets the reply: "I would not dream of giving up this marriage; it saves me from ruin. The future can look after itself." The patient thus goes away, and commits his crime, without there being any means of restraining him.

Two conclusions have to be drawn from the above remarks: firstly, a certificate of health and of the completeness of the cure is indispensable before entering upon wedlock, and, secondly, the young men should be informed of the perils which await them. Not only should the necessary instruction be given in the upper forms at school, but also in the barracks and at home. They will then be in a better position to avoid the danger.

The Social Struggle against Gonorrhea.

We have seen above the dangers with which gonorrhea threatens both the individual and society.

With reference to the campaign against this evil, two important factors deserve attention: firstly, the *ignorance of the danger prevailing amongst young people*, and, secondly, *excessive confidence.*

Amongst the victims of *ignorance* we find firstly the sons who grew up in the bosom of their family, and know nothing about sexual life. The others, who have been to a public school, are usually full of wrong ideas, as it is extremely difficult to give proper instruction on this subject, which most masters and principals are loath to discuss.

In the barracks conditions are better. In France special lectures are given in the various regiments in order to warn the soldiers against the dangers of venereal diseases.

Very generally, the young man who has just acquired his first attack of gonorrhea has but vague notions of his disease. He may have heard of violent pains "like a razor," but he seldom thinks of the possibility of having been infected; and once he realizes what has happened, he is usually hopelessly helpless. Instead of going to a medical man, who would attend to his

illness properly, and confirm the diagnosis by microscopy, he runs to the first chemist. Any drug warmly recommended is readily accepted, or else the choice is guided by advertisements seen in the daily papers or by a kind friend.

This state of affairs is largely due to the deplorable fallacy that gonorrhea is but a trifling ailment.

Excessive confidence is another cardinal factor in the dissemination of the illness. Many men of sufficient knowledge and experience, who have a good general notion of venereal diseases and of their mode of dissemination, neglect the most elementary precautions at the right moment.

The woman is quite healthy, they say, when they consult their doctor. But what do they know about it ? Even a medical certificate is no guarantee. After having acquired gonorrhea, a woman has obviously a few symptoms; but they soon pass off, and the late effects are often so insignificant that she becomes convinced of her recovery, and manages to persuade her surroundings, including her doctor, to that effect.

In fact, often these women who appear to be cured are still contagious; their virulence is dormant, but it regains its full power now and then, when circumstances are favourable, such as the periods, a strong orgasm, and temporary lack of cleanliness about the genitals.

We have frequently come across cases in which young men acquired gonorrhea after several months' cohabitation, both parties being faithful to each other.

An interesting example has been published by Dr. Carle of Lyons, which may be quoted:[1] " A young man had attached himself to a little lady who once had suffered from gonorrhea, but had given up her former life, and he enjoyed two years of uninterrupted happiness with her. One day, as the couple were on a cycle tour in the Alps, the solitude and the bracing air revived their evil desires, which they satisfied on the spot, surrounded by magnificent scenery. There being no water near, all washings had to be omitted, and six days later the young man had a typical discharge."

On other occasions the patients say that " they cannot have the clap, because their sweethearts are true to them, or because their mistress is a married woman, or because they have been to a brothel."

It is obvious that the faith which underlies these statements is totally ill-founded.

The Legal Aspect of Gonorrhea.

As the subject of this paragraph is beyond the province of medicine, I have sought the advice of some of the most distinguished members of the Bar in Paris. Men like Henry Aubépin, Duhil, Touret-Pialat, and others,

[1] M. Carle, *La Blennorragie Urétrale* (O. Doin), 1910, p. 12.

have kindly supplied me with valuable and interesting matter for this paragraph, for which I wish to tender them my best thanks.

Although legal proceedings against a person who infects a healthy person with gonorrhea are just, and appeal forcibly to the mind of the public, yet there is no special law to that effect, and those in force leave a number of loopholes which allow the culprit to escape prosecution.

In French law it is generally admitted as a point of law that the transmission of venereal disease by one consort to the other does not *necessarily and of itself* constitute a ground for divorce or separation. It only becomes such if it is accompanied by accessory facts and circumstances which give it the character of "cruelty."[1]

Such "cruelty" is present if the contaminating party did so *knowingly* —*i.e.*, if he (or she) knew at the time that he (or she) was suffering from a venereal disease. "The fact of having *knowingly* exposed his wife (or her husband) to the dangers of contamination . . . implies undoubtedly, if it can be proved, cruelty, and is therefore a ground for an application for divorce."[2]

Thus, all depends on this point: the guilty party is only punishable if he (or she) contaminated the other party *knowingly*.

If a husband infects his wife with gonorrhea, and if it can be proved that he knew that he was ill, and that he exposed her to infection despite this knowledge, then he has committed an act of gross cruelty. His wife could under these conditions not be compelled to live with him again, as she could not have any other feelings towards him than amply justified aversion and profound contempt.[3]

The *Gazette des Tribunaux* of October 6, 1897, states definitely:[4] "A wife has no right to demand a divorce because her husband gave her a venereal disease, unless it be proved that she was infected *knowingly* by her husband."

If the contamination took place *unknowingly*—if the infecting party was unaware of his illness, or believed himself to be cured—then neither divorce nor separation can be granted.[5]

The contamination itself is thus of little importance compared with the intention. "The mere fact of a husband having infected his wife with a venereal disease is not a sufficiently serious cruelty to justify an application for divorce or separation, providing he had reason to believe himself cured, and providing he thus did not consider himself any longer contagious" (Nancy, January 26, 1901).

[1] Courts: Toulouse, January 30, 1821; Rennes, July 14, 1866 (D. 68.2.163); Paris, April 13, 1897 (D. 97.2.137); Aubry and Rau; Demolonde, t. 4., No. 389.

[2] Courts: Vouziers, July 18, 1907, *Gaz. du Pal.*, September 24, 1907.

[3] Courts: Lille, December 15, 1898.

[4] Courts: Seine, June 4, 1897.

[5] Courts: St. Quentin, January 24, 1907 (*Gaz. du Pal.*, May 4, 1907).

The court in Douai (January 7, 1908), and the *Droit* (April 11, 1908), have developed this view further: "The fact that a husband, when informed by a medical prescription of his wife's illness, shows no surprise, continues to live with her, casts no doubts upon her moral conduct, and fails to bring a counter-action when divorce proceedings are pending against him, may be interpreted as a tacit admission of his guilt, as far as the contamination which he was accused of is concerned."

The infected wife must be treated as soon as possible. This duty has been clearly established by the Bordeaux Courts: "A husband who has given his wife a venereal disease, be it even without his knowledge, is guilty of a cruelty which would be a sufficient ground for separation, if he sacrificed his wife's health to a false sense of shame, and failed to take the promptest measures to check the havoc of the malady" (Bordeaux, February 18, 1857).

TRANSLATOR'S NOTE.—As the legal position of those who infect others with gonorrhea is somewhat different in England, a few notes for which I am indebted to Mr. H. Morse Hewitt may here find room.

Generally speaking, if a man infects a woman, or *vice versa*, with gonorrhea, the infected party has *no* legal remedy in damages, or otherwise, against the infecting party.

In the case of husband and wife, there are, however, statutory enactments which have to be considered.

One should imagine that the communication of gonorrhea from one consort to the other would be in itself sufficient evidence of adultery having been committed by the infecting party. *But this is not so.* The law-courts hold that gonorrhea (or any other venereal disease) is uncertain evidence; for, regarded strictly, such disease would be consistent with the adultery of either party, and, moreover, it would also be consistent with accidental, non-venereal transmission of the disease.

It is therefore always necessary to bring special proof, supported by other facts, that adultery has been committed, if one wishes to obtain a divorce or a judicial separation, as the case may be. Proof of adultery alone would suffice in the case of the husband's suit to obtain his divorce.

In the case of the wife's suit, both adultery and "legal cruelty"—of which there are many kinds, the communication of a venereal disease being only one variety—have to be proved, unless, and until, the present laws be altered, as recommended by the Majority Report of the Royal Commission.

In order to prove "legal cruelty" by the communication of gonorrhea, this communication must be shown to have been *wilful*.

If a married man infects his wife wilfully with gonorrhea (or any other venereal disease), or *vice versa*, without additional marital offence, the injured party is only entitled to apply for a judicial separation, for the reason already mentioned, that the communication of a venereal disease is no proof of adultery.

The courts of law cannot compel the guilty husband to have his wife treated and cured of the illness he gave her. But she may seek treatment of her own accord, and at her husband's expense; for the medical man in attendance would be entitled to recover his fees directly from the husband, on the ground that his advice and attendance come under the designation of "necessaries" for which a husband is responsible.

In the United States there is no uniform legislation concerning divorce and communication of a venereal disease. Each State has its own laws, and hence it is impossible to discuss this subject here.

CHAPTER III

THE ETIOLOGY OF GONORRHEA

INFLAMMATION of the urethral mucous membrane which shows itself by a discharge is always caused by some irritant which acts upon it.

In 1782 Swediaur proved experimentally that urethral inflammation can be produced by the injection of irritating chemicals. He injected ammonia into his own urethra, with the result that he developed a violent urethritis, which in its course and in its clinical symptoms closely imitated a typical attack of acute gonorrhea.

Later, Cullerier and others took up these experiments, and obtained similar results.

It is nowadays well known, thanks to Neisser's discovery of the gonococcus in 1879, that the most frequent cause of gonorrhea is a specific organism—namely, *Neisser's gonococcus.*

One should, however, not forget that there are a number of other organisms capable of producing urethral discharges, and that this type of urethritis is very common. We will consider them later (*vide* Chapter IV.), and devote our attention at present to the gonococcus.

The Gonococcus.

This organism was discovered by Neisser in the year 1879 in discharges from the urethra. It is the best-known specific cause of gonorrhea, and is never found as a saprophyte in healthy organs.

Frequency.—Gonorrhea is a very common complaint, so much so that but few men reach their prime without having had it once, or more often. It is only contracted in one way—namely, by contagion.

Ways in which the Contagion is brought about.—The infection of the urethra by the gonococcus during coitus may take place in various ways.

Those, for instance, who are slow run great risks, and, as Baumès tells us, also those who, without erection or connection, allow the tip of their penis to touch the external genitals or the inner surface of the upper part of the thighs of the woman, for these structures are only too often soiled with gonococcal material.

Indirect contagion from one man, who has the disease, to another,

through a vagina which has escaped infection, is also possible. Diday[1] has mentioned such a case: On an excursion, six young men had successively intercourse with the same woman, who was stated to be healthy. The first actor of this scene had an inveterate attack of gonorrheal folliculitis. His immediate successor was the only one to be infected. Diday follows from this that " he had been infected by the fluid of the follicle deposited in the vagina of the woman an instant previously."

Such indirect contamination is also possible if the gonococcus has been recently deposited on a mucous surface which is an unsuitable medium for its growth, providing the urinary meatus comes into contact with this surface. This is the mechanism of certain infections *per os* (vide *Gonorrhea Buccalis*, Chapter IX.).

Gonorrheal urethritis in man is thus always derived from a gonococcal infection present in the contaminating woman at the time of intercourse. It must, however, be conceded that certain adjuvant factors, which are well summed up in Ricord's famous recipe for getting the clap, are sometimes necessary.

" Do you wish to get the clap ?" he used to say. " This is the way to do it: Take a lymphatic, pale, and preferably blond woman who suffers from as profuse a whitish discharge as you can find. Dine with her; begin with oysters, continue with asparagus, drink heavily white wine, champagne, and liqueurs. You will be well on the way then. To expedite matters, dance together after dinner till you get hot. Then take plenty of beer, and, once the night has come on, set to work energetically; two or three connections are by no means too much—the more the better. Next morning remain in a hot bath for some time, and take a urethral injection. If you live up to this programme, and do not get ill, you must be under the special protection of a god."

Excitement is thus an important predisposing factor. Amongst the various conditions which favour infection, abuse of spicy dishes, of drinks and of champagne, sexual excess, and prolonged connections, especially in a state of inebriety, deserve special mention.

The lazy or " refined " intercourses, as well as those to which there is no end, are the most dangerous, and are most often followed by infection. " Oportet non morari in coitu," said Nicolas Massa : " Wise lovers are quick."

Further congestive phenomena which favour infection are those which precede, accompany, or follow upon menstruation and pregnancy. Latent gonococcal infections tend to flare up under their influence, and to become virulent again.

This phenomenon explains certain observations, such as the following: A woman yields successively to several men, and only contaminates one,

[1] Diday, *Gazette Hebdom. de Médecine et de Chirurgie*, 1860, p. 727.

whilst the others remain unaffected. It seems a fact that a man with whom the intercourse is "indifferent" does not elicit the particular secretion which accompanies the orgasm in woman, and that he thus has a much better chance of escaping infection than the man who "pleases," and causes a copious secretion during the height of pleasure. This profuse flow empties the infected glands, mobilizes the gonoccoci, and brings them into contact with the male urethra.

How often do we not hear patients say, who come to us after they have acquired gonorrhea: "Doctor, I have a slight discharge, but I am certain that the woman from whom I got it has not got the clap"! Such statements should be received with suspicion, once the microscope has revealed the presence of Neisser's organism; and even if the examination of the woman fails to show any gonococci—a rare occurrence—one should suspect her, unless other sources of infection are probable (*vide* Chapter VII.).

Others, again, still more reckless, say: "I know for certain that my sweetheart has no disease. She is the wife, or the mistress, as the case may be, of my best friend, and there is nothing wrong with him." This, again, is a mistaken theory, which finds its explanation in the facts mentioned above.

Herewith a case in point: A youth suffering from gonorrhea assured me that his mistress, the wife of his best friend, could not be ill, because her husband was free from disease. I went into the matter, and discovered the following characteristic facts: The woman was "indifferent" to her husband, and only had intercourse with him after careful douching, and she also used the douche afterwards. Her relations with my patient were, however, not "indifferent," and the two were in the habit of satisfying their desires hastily, irregularly, and without taking any precautions.

This mechanism is typical for a good number of infections.

The following story may also serve as example to show how little importance is to be attached to the statements of certain women:

In September, 1909, a young man consulted me for a discharge which contained, as the microscope showed, a great number of typical gonococci. He was very astonished, and assured me that his sweetheart, to whom he had always been true, could not be ill, because she had only recently been examined by a doctor, who had certified her as having no lesions about her generative organs. I thereupon asked to be allowed to examine the lady, and she consented. The most careful search failed to reveal any lesion about the urethra, vagina, cervix, and Bartholin's glands, and I was on the point of sending her away, when I once more cross-questioned her. I now managed to extract the following information: Under normal conditions their relations had never given rise to any trouble. But once, during his military service, cohabitation *a posteriori* had taken place, in order to avoid the douching, which would have been very inconvenient at the time.

In former days she had had another lover, who suffered from gleet, and was addicted to this unnatural practice. The case was thus explained; and when I examined her rectum with my rectoscope a few days later, I found a markedly inflamed, easily bleeding mucous membrane—typical proctitis.

As Finger[1] has pointed out, a *slightly alkaline medium* is most suitable for the development of micro-organisms, and in particular of the gonococcus. Under ordinary circumstances the urethral mucous membrane is bathed in an acid medium, owing to the few drops of urine which are left behind after micturition. This slight acidity, which is already sufficient to compromise the vitality of the spermatozoa, is neutralized by the urethral glands, which begin to secrete when erection takes place. The clear, viscous, alkaline secretion of these glands, however, not only favours the vitality of the spermatozoa, but also renders the urethral mucosa more apt to be infected by the gonococcus.

As conditions which are unfavourable to infection may be mentioned: connection of short duration, single coitus, and immediate micturition after the act. The urethra thus becomes acid again almost at once, and is freed as far as possible from any gonococci which may be present. This practice is, by the way, well known under the somewhat vulgar term of "l'injection du zuave."

Lastly, the question of *constant recurrences* of gonorrheal urethritis deserves attention. Formerly some doubts existed as to their production, but nowadays only two causes can be admitted for these constant reinfections of the urethra:

1. *Auto-reinoculation* of the urethra from a focus which has not been cured (littritis, cowperitis, prostatitis, vesiculitis, etc.).

2. *Hetero-inoculation* from a fresh, unknown woman, or from one's habitual consort (wife or mistress), who has been previously contaminated, and now returns her lover's or her husband's gift with interest.

In cases of this latter type, the disease is usually most inveterate, and a cure is only possible if both parties allow themselves to be disinfected simultaneously.

Contamination through Inert Objects.—Gonorrhea can be transmitted by soiled towels, by water which has just been used, etc.

Benajmin Bell quoted the case of two students who had never had gonorrhea, and who conceived the brilliant idea of placing a piece of gauze impregnated with gonorrheal pus between their glans and prepuce for twenty-four hours. Both acquired a balanoposthitis, and one of them an acute urethritis as well, which lasted for more than a year.

The vulvo-vaginitis of little girls is often due to contact with towels, sheets, or sponges, which have been soiled by the diseased organs of others (parents, etc.).

[1] Finger, in his textbook on *Gonorrhea and its Complications*.

Guiard observed a case in which a lady was infected through the nozzle of her own douche, which had been used in her absence, and without her knowledge, by her maid, who was suffering from gonorrhea.

Effect of Age.—There is little doubt that age has a certain influence upon the course of gonorrhea. The old man who gets the clap is seriously exposed to complications, especially to a rapid ascending infection, involving his bladder and his kidneys. "If the pox does not care for old men, the clap is also hard on them" (Ricord).

Gonorrhea Vulvitis in Little Girls.—Little girls frequently contract vulvitis, and one of the causes of their malady is the custom of taking them into the bed of their parents, which is often soiled with gonorrheal discharge.

Very generally these children are badly looked after, and it is not rare to find much later in life innocent girls suffering from rebellious chronic discharges which contain the gonococcus, and thus reveal their origin, which lies far back. A case of this kind which has come under my personal observation is the following:

In October, 1909, Professor Pozzi sent me a man of thirty-six who was in a state of despair. He had contracted gonorrhea when nineteen, had been insufficiently treated, and had never got rid of his disease. He believed, however, that the virulence ought to have subsided after a number of years, and thus he married at the age of twenty-six. Shortly afterwards his wife became ill, and she was put under the care of Professor Pozzi, who first curetted her, and later found it necessary to remove the uterus and its appendages by the abdominal route. This, however, was only part of the disaster. Their issue, a little girl, acquired gonorrheal vulvo-vaginitis at the age of eight by being taken into her parents' bed, the sheets of which were soiled with gonococcal pus.

On examination, the man was found to be suffering from a chronic inflammation of Littre's glands, which had been in this condition for nineteen years, and which were certainly responsible for the illness of his wife and of his child!

On being acquainted with this truth, the unfortunate husband was in a state of frenzy, but the damage was done.

Influence of Fever.—An intercurrent fever has a marked effect upon urethral discharges. Vidal de Cassis had already noted that discharges cease during attacks of rheumatism, and reappear when the joint trouble subsides. Bogdan[1] quotes a case in which the gonorrheal discharge disappeared in pneumonia, and returned once the lungs were normal again. Guiard observed a young man who developed scarlet fever whilst he was suffering from a rebellious chronic urethritis; in this case the discharge disappeared during the fever, and remained cured.

It is a matter of common knowledge that in cases of epididymo-orchitis which are accompanied by high fever the discharge diminishes, or even disappears for the time being.

I have seen a young man who developed mumps whilst suffering from

[1] Bogdan, *Annales de Dermatologie*, 1893, p. 253.

gonorrhea. His temperature was very high (40° C. = 104° F.), and with the fever the discharge disappeared completely. But once the intercurrent illness had left him, the flow came on again, and had to be treated in the usual way. This coincidence of fever and improvement induced me to make use of heat therapeutically, and for a time I hoped to obtain a rapid general destruction of the gonococci by heat (*vide* Chapter XII.).

But if the discharge diminishes or disappears for a time, whilst an intercurrent illness produces high fever (up to 104° F.), it yet remains true that the gonococcus resists for a considerable time.

Nobl[1] has published five cases of gonorrhea, complicated by various febrile affections (pneumonia, pulmonary tuberculosis), in which the gonococcus was in no way influenced, as far as its virulence and resisting powers were concerned, although there was prolonged high fever of 104° F.

On the other hand, Noguès has published two cases of gonorrhea in which high fever led to a spontaneous cure.[2]

The gonococcus can remain in the latent state for a very long time within the urethral mucous membrane. It is not rare to find patients who have had no trace of moisture about their urethra suddenly develop some local or general complication caused by the gonococcus.

The Morphology of the Gonococcus.

A knowledge of the gonococcus is indispensable for the clinical appreciation of gonorrhea. The characteristic and pathognomonic features which are essential are the following:

Shape.—The gonococcus[3] is not, as its name would indicate, a true coccus. Its outlines are not round, and it is always found in the diplococcus form, consisting of two parts of ovoid shape which are darker than the background, and are separated by a light line. Each member has the shape of a coffee bean or of a French bean; the straight or concave surfaces are in apposition (Enschbaum's notch). The organism is 1 μ long, and 0·6 to 0·7 μ wide.

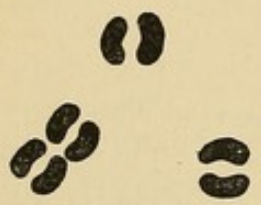

FIG. 3.—GONOCOCCI (DIAGRAMMATIC). (After J. Courmont.)

Grouping.—The gonococci are always present in clusters and in clumps, but they never form chains. The two-and-two arrangement is always present.

Movements.—These movements are not easily seen, as they are only visible in unstained preparations. One has, however, noted a slow oscillatory

[1] Nobl, "Klinischer Beitrag zur Biologie der Gonokkoken," *Wiener Klin. Rundschau*, 1901, Nos. 46 and 47.

[2] *Annales Génito-Urinaires*, 1907, p. 1288.

[3] V. Marcel. See *Le Gonocoque*, (Thesis, Paris, 1896).

translation movement and a rotatory movement, one of the two members of a diplococcus being on top of the other alternately.

Lately Dr. Comandon, who has applied with such success the cinematograph to the study of the movements of microbes, has investigated those of the gonococcus, and found the translation movement to be limited. This organism is sluggish, and its movements are, in his opinion, simply Brownian. Its colonies only advance by their development and their increase in size. It therefore requires a considerable time for Neisser's coccus to reach the posterior urethra by its own means. This interesting fact is of capital importance: it shows the dangers of clumsy injections—how they dislodge the gonococcus from its original focus, and carry it to distant parts.

Staining Properties.—The organism is readily stained by the aniline dyes, especially methylene-blue; it is Gram-negative, being easily decolorized by this method.

Technique of Searching for Gonococci—*Examination of the Discharge.*—The simplest method is the following: By means of a platinum loop which has been passed through the flame and allowed to cool, a bead of pus is taken from the meatus, which has been previously cleansed with a piece of wool

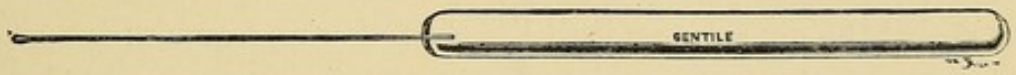

FIG. 4.—MOUNTED PLATINUM LOOP FOR COLLECTING THE DISCHARGE FROM THE MEATUS.

soaked in boric lotion. This bead of pus is *gently* squeezed out of the urethra; this precaution is of importance, because brutal squeezing is apt to injure the urethral glands. This "milking" should not only involve the tip of the penis, but the entire anterior urethra, starting at the perineum and scrotum, and working gradually forwards.

The bead of pus is then spread out by means of the loop, or of an ordinary steel needle, on the surface of a slide to form a thin and even layer, and allowed to dry. This is the most satisfactory way; compression of the discharge between two slides often gives bad preparations.

The smear is then fixed by passing it three times through a spirit or Bunsen flame, and is ready for staining.

Microscopic Examination of the Filaments.—The filaments contained in the urine should also be examined bacteriologically. For this purpose, the patient is asked to make water into a glass, from which one tries to recover the filaments. This fishing is often tedious and troublesome, but one finally manages to seize them with forceps or to roll them on to the platinum wire. They are then spread out on a slide. Owing to their viscous nature, they are not easily fixed, and tend to slip off. By passing a current of air over them this process can be much facilitated.

These filaments are stained in the same way as the discharge.

Staining.—Kühne's carbol-methylene-blue gives the best results, and has the following formula:

Absolute alcohol	10 c.c.
Methylene-blue	1·5 grammes.
Dissolve, and add after twenty-four hours:	
5 per cent. solution of carbolic acid	100 c.c.

The stain is allowed to act for a few minutes, and is then washed off in running water. The slide is now dried and ready for examination. The whole process takes takes less than five minutes.

Nicolle's Method for staining Gonococci.—Another method for staining gonococci has been devised by Nicolle:[1] The pus is spread out on a slide, and rapidly dried by passing it through the flame of a lamp. The smear is then deprived of its fat by dipping it for a few seconds in a mixture of equal parts of 90 per cent. alcohol and sulphuric ether. It is then dried in the air, and a few drops of carbol-thionin are poured on to the slide.

After a minute the slide is stained; the excess of colouring matter being washed off in running water, the preparation is dried and put under the microscope.

The carbol-thionin solution used has the following formula:

Saturated solution of thionin in 50 per cent. alcohol	10 c.c.
1 per cent. solution of carbolic acid	100 ,,

Or one may use the following process:[2] The dried slide is stained with a few drops of the following solution:

Thionin solution	10 c.c.
Distilled water	88 ,,
Liquid phenol	2 ,,

washed with water, and treated for a minute with a mixture consisting of—

Saturated aqueous solution of picric acid	50 grammes.
0·1 per cent. aqueous solution of caustic soda ..	50 ,,

The slide is then passed through alcohol, washed with water, dried, and examined.

In specimens which are stained by this method the protoplasm of the leucocytes is straw yellow, and the nuclei are reddish-violet; the protoplasm of the epithelial cells is pale yellow, and their nuclei are paler than those of the leucocytes. The gonococci are black, and therefore easy to recognize.

Various stains in aqueous solution have been recommended (fuchsin, Bumm, Welander; methyl-violet, Bockhardt and Wolf; Bismarck-brown,

[1] Nicolle, "Pratique des Colorations Microbiennes," *Annales Pasteur*, 1895, p. 964.

[2] Roman von Leszynski, *Ann. de Thérap. de Dermatol. et de Syphil.; Rev. Pratique des Mal. des Organes Génito-Urinaires*, Lille, January 1, 1906, No. 12, p. 419.

etc.). We are, however, not convinced that they present any marked advantage over Kühne's blue.

Double Staining.—Some authors prefer differential staining of the gonococci and the other elements.

Fraenkel stains, to begin with, the leucocytes and cells with eosin, a dye which does not affect the gonococcus, and then he uses a concentrated aqueous solution of methylene-blue. The gonococci appear blue on a red background by this process.

These differential staining methods are more complicated, and give prettier specimens. They are, however, of no special value, as far as diagnosis is concerned.

Gram's Method.—An experienced eye can tell very quickly if the organisms seen are gonococci or not.

Beginners, however, should give preference to Gram's method, which is based on the fact that the gonococcus is decolorized by this process, whilst the other organisms retain their dye.

One proceeds thus:

Once the preparation has been dried and fixed, it is coloured for a few seconds with a gentian violet solution of the following formula:

Gentian violet	1 gramme.
Absolute alcohol	10 c.c.
Dissolve, and add after twenty-four hours:	
1 per cent. solution of carbolic acid	100 ,,

The violet is then poured off without washing, and is replaced by an iodine solution:

Iodine	1 gramme.
Potassium iodide	2 grammes.
Distilled water	200 c.c.

This mixture is allowed to remain on the slide for a few seconds, being twice renewed whilst on the slide. The preparation is then decolorized in absolute alcohol, until no more violet comes away. The background is stained by means of a few drops of an alcoholic solution of eosin, which is left on for a minute, and has the following composition:

Saturated solution of eosin in 95 per cent. alcohol ..	1 vol.
95 per cent. alcohol	2 vols.

Then come the usual steps of washing, drying, and microscoping. The gonococci assume a pale pink by this method, and are hardly visible, whilst the ordinary organisms are dark violet.

Instead of counter-staining with eosin, Bismarck-brown, according to Weinrich's formula, may be used:

Warm distilled water	70 c.c.
Bismarck-brown	3 grammes.
96 per cent. alcohol	30 c.c.

Staining of Sections.—For staining the gonococcus in sections, Wertheim adopts the following method:

The section is left for three to five minutes in a saturated solution of gentian violet.

It is then washed and dipped into Lugol's solution for a minute.

One now decolorizes with 95 per cent. alcohol. The preparation must retain a definitely violet tint.

After having transferred it to a solution of methylene-blue for a few minutes, one washes the excess of stain away, dehydrates in absolute alcohol, clears with oil, and mounts in Canada balsam.

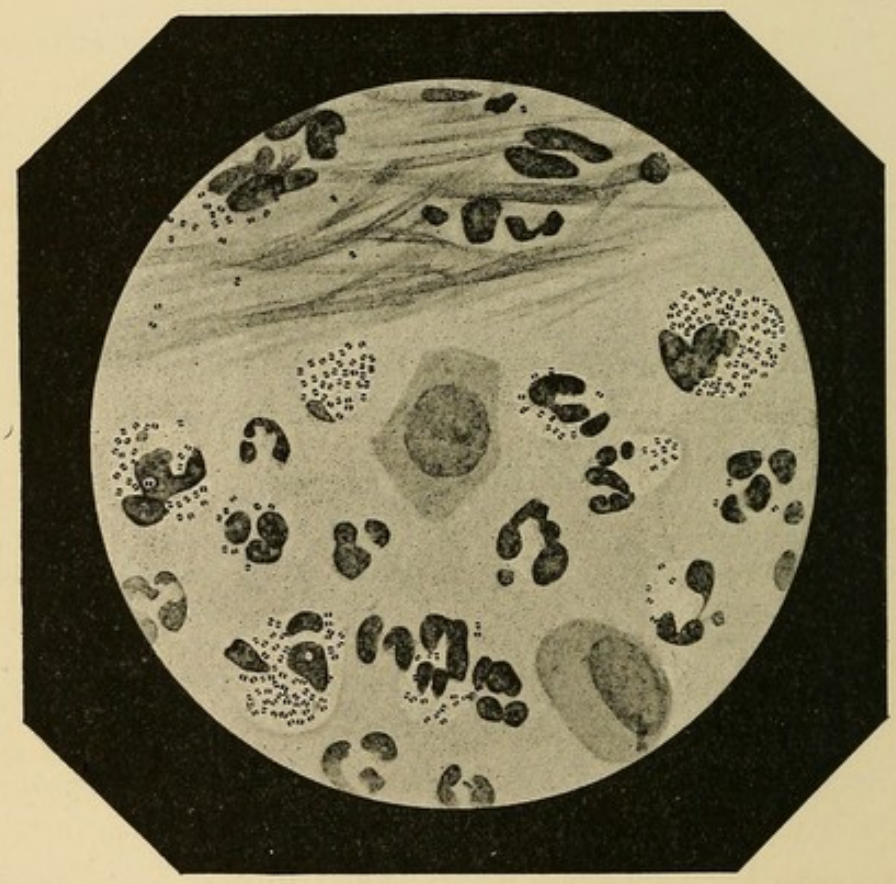

FIG. 5.—TYPICAL ASPECT OF GONOCOCCI UNDER THE MICROSCOPE.

Microscopic Examination.—The gonococcus is readily seen with a magnification of 400 diameters. One usually uses an oil immersion lens $\frac{1}{12}$ with an eyepiece No. 1, which is quite sufficient.

Distribution.—The gonococci are to be found either between or *within the polymorphonuclear leucocytes. This intracellular position is one of the characteristic features of the gonococcus.*

Some leucocytes contain only a few heaps of gonococci, whilst others are full of them, almost choked with them. The organisms never penetrate into the nucleus of a cell; they surround the nuclei, and may even touch them, but they are never within their substance.

Number.—In pus which is definitely gonorrheal the gonococcus is found in large numbers. According to Finger, the presence of a few diplococci only, even if they be intracellular, is not conclusive evidence of gonorrheal infection.

Cultivation of the Gonococcus.—The usual media, such as agar, gelatin, and broth, are not suitable for cultivating the gonococcus. Different media had therefore to be invented which fulfilled the necessary biological conditions better.[1]

1. *Coagulated Human Blood-Serum.*—Bumm was the first to obtain cultures of the gonococcus on this medium in 1885. He used a serum of placental origin, but the cultures were not always a success.

2. *Serum-Agar.*—Wertheim in 1893 prepared tubes with 2 per cent. agar, and allowed them to cool after sterilization. He then added to each tube one-half or one-third of its volume of liquid and sterile human serum, and allowed the tubes to solidify in a sloping position. The composition of his medium was as follows:

Agar..	2 grammes.
Pepton	1 gramme.
Sodium chloride	0·05 ,,
Broth	100 grammes.

3. *Ascites-Agar.*—As it is not always easy to obtain sufficient human serum, attempts have been made to replace it by the fluid removed from hydroceles, pleural effusions, or ascites, and with success.

Ordinary melted agar is put into test-tubes, each tube receiving 1 c.c., and, at the moment when the agar begins to set, $\frac{1}{3}$ c.c. of ascitic fluid is added to each tube. One shakes the tubes well, and allows them to set on the slope.

This is an excellent method which gives well-developed cultures in twenty-four to forty-eight hours after inoculation, when incubated at 37° C.

4. *Ascites Broth.*—The gonococcus grows well on a mixture of equal parts of ordinary broth and ascites fluid.

5. *Coagulated Rabbit Serum.*—This medium has been recommended by De Christmas.[2] Unfortunately, it is difficult to prepare, for technical reasons.

6. *Pig's Serum : Wassermann's Medium.*[3]—Wassermann uses the following medium, which is said to give colonies after twenty-four hours:

Pig's serum, hemoglobin-free	15 c.c.
Water	30-35 ,,
Glycerine	2-3 ,,
Nutrose	80-90 centigrammes.

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[1] *Vide* Lefalher, *Les Milieux de Culture du Gonocoque* (Thesis, Paris, 1900).

[2] *Annal. d. l'Inst. Pasteur*, 1897-1900.

[3] Wassermann, *Zeits. f. Hyg.*, 1898, vol. xxvii., p. 298.

This mixture is shaken, boiled for twenty minutes, and then mixed with an equal part of 2 per cent. pepton containing agar which has been liquefied at 50° C. The mixture is poured into Petri dishes, and is ready for the cultivation of the gonococcus as soon as it has set.

7. *Blood-Agar.*—Bezançon and Griffon have found a very convenient medium for cultivating the gonococcus. It is composed of blood-agar, and is prepared thus:[1]

By means of a trocar introduced into the carotid of a rabbit, blood is abstracted, and allowed to flow into previously prepared tubes which contain melted agar, and have been kept at 50° on the water-bath. One part of blood is mixed with 2 parts of agar per tube as intimately as possible, without, however, shaking the tubes. The tubes are then placed on the slope, and allowed to cool.[2]

Bezançon and Griffon's blood-agar gives characteristic colonies, and is an excellent medium which keeps the gonococci alive for several months.

8. *Henry Heiman's Medium.*—Heiman[3] advises to inoculate the gonococcus on a medium composed of pleural effusion mixed with 2 per cent. agar to which 1 per cent. pepton and 0·5 per cent. salt have been added. Sterilization is obtained by discontinued heating to 65°. The liquid is kept at this temperature for six days. It is then left in the room for three days, and then again heated for three days, as before.

9. *Yolk of Egg Agar.*[4]—This medium is made in the following way: The yolk of a hen's egg is taken, and one adds to it three times its volume of sterilized water. This mixture is thoroughly shaken, and for every 20 grammes one adds 10 grammes of a 20 per cent. solution of sodium biphosphate and 90 grammes of 3 per cent. agar. This final mixture is put into tubes and allowed to cool.

When inoculated with gonococci, and incubated at 37°, typical rich colonies develop after twenty-four to forty-eight hours.

Occasionally it is of great advantage to be able to demonstrate the presence of gonococci in the urethra at a very early date—for instance, if one wishes to attempt abortive treatment, the success of which depends on its immediate application. Griffon[5] has given us a method by which the presence of the gonococcus can be ascertained in less than sixteen hours. This method (Griffon's method) consists in the inoculation of a

[1] Bezançon and Griffon, "Culture du Gonocoque sur le Sang Gélosé," *Soc. de Biol.*, June 30, 1900.

[2] Bezançon and Griffon, "Le Sang Gélosé, ou Milieu de Culture pour les Microbes qui ne se développent pas sur les Milieux Usuels," *International Medical Congress*, Paris, 1900.

[3] Heiman, *Medical Record*, 1896, p. 897.

[4] Steinschneider, *Berl. Klin. Woch.*, 1897, p. 379.

[5] Vide *Annal. Génito-Urin.*, 1907, p. 261.

blood-agar tube with a drop of moisture from the urethra. By means of a platinum loop which has been previously passed through the flame, one removes a little moisture from the lips of the meatus, and inoculates the blood-agar. The tube is then capped, and put into the incubator for fifteen to sixteen hours at 37°. Abundant round colonies are found in the case of a positive result. The characteristics of the colonies are: they are round, flat, glistening, transparent, and of a slight whitish or greyish-white tint. As the urethra contains no saprophytic organisms which are capable of giving such rich cultures in so short a time (fifteen to sixteen hours), this method is of the greatest diagnostic value. Moreover, it can be controlled by microscopic examination.

Inoculation.—The inoculation of healthy urethræ with pure cultures of the gonococcus has been carried out by Bumm, Aufuso, Wertheim, Schlagenhauser, Finger, etc. These savants succeeded in reproducing experimentally a typical gonorrhea, and proved thus conclusively the specific nature of the gonococcus. It is, however, not advisable to imitate these experiments, because the results are too positive. As evidence, the case of Ashara may be mentioned, who injected the organism which he had isolated from the blood of a patient into a willing healthy subject, with the result that the latter acquired a gonorrheal septicemia of great gravity.

Bockhardt in 1882 used a fourth generation grown on gelatin, and inoculated it into the healthy urethra of a patient who was suffering from general paralysis, and about to die. A urethritis in which the gonococcus was found resulted, and ten days later, after the patient had died of pneumonia, abscesses were found post mortem in the right kidney.

Inoculation of the conjunctiva of a rabbit with gonorrheal pus has been carried out successfully by Heller, the animal developing a purulent conjunctivitis.

Finger infected the joints of rabbits with gonorrheal discharge, and obtained a slight inflammation of these joints.

The intraperitoneal inoculation of a young rabbit is, however, the only method which gives certain results in animals.

The inoculation of the urethra of an animal with gonorrheal pus has *never* been followed by a positive result. Such experiments have been tried on horses, dogs, monkeys, and rabbits, without success.

The Toxin of the Gonococcus.—The researches of Christmas, Wassermann, Nicolaysen, Schaeffer, Scholtz, have shown that the gonococcus secretes a poison which, when injected intraperitoneally into guinea-pigs or white mice, kills these animals under characteristic symptoms.

According to Nicolaysen,[1] the gonococcal toxin is an endotoxin. His

[1] Nicolaysen, *Centralblatt f. Bakteriol.*, September, 1897, No. 12, p. 305.

experiments show that the poison is contained in the body of the organism, and resists both drying and heating to 120° C.

Wassermann thinks that the gonotoxin is contained in the body of the organism, and that it is set free by the death or the destruction of the coccus. Young cultures contain less toxin than those which are at least two weeks old. When applied to the urethral mucous membrane, this toxin produces a violent purulent inflammation which requires five days to subside, and differs in its clinical aspect from true gonorrhea only by the absence of the gonococcus.

The urethra is not immunized by the toxin, as the experiment can be repeated several times with success.

Biology of the Gonococcus.—Neisser's organism is very susceptible to changes in the temperature. It can grow between 32° and 38° C., the optimum temperature being between 36° and 38°. Twelve hours at 39°, or six hours at 40°, are sufficient to kill it. This fact explains the disappearance of the discharge in patients who suffer from a fever in which the temperature rises to 40° (104° F.). Below 30° the colonies show practically no growth, which ceases completely below 20°. Below 18° the organism dies.

Gonorrheal pus retains its virulence for some time at room temperature. Linen soiled with gonorrheal discharge may transmit the disease, even after a considerable time, and this is a fact of great importance. In hot water the organism is killed very rapidly.

Relationship between Gonococcus and Meningococcus.—Pinto[1] has studied the relationship of these two organisms, which have certain morphological and physiological features in common. Their staining properties and their behaviour when cultivated also offer points of similarity.

According to Pinto, the gonococcus is merely an attenuated meningococcus; the two organisms should be classed as two closely-allied varieties of one species. Their different pathogenic effect upon man is largely due to adaptation, each having inhabited different organs for generations and generations.

Localization of the Gonococcus in the Human Body.—The urethra of man contains no gonococci under normal circumstances.

Although a parasite of mucous surfaces, this coccus can enter the deeper tissues, and be conveyed by the blood-streams to distant parts, thus producing metastases and a generalized infection. This condition is called *gonococcal septicemia.*

[1] Pinto, *Journal de Phys. et de Path. Générale*, November 15, 1904, p. 1058.

Gonococcal Septicemia.

Faure-Beaulieu[1] and Lautier[2] have given an excellent account of gonococcal septicemia. The latter author describes in his interesting thesis three early and uncomplicated cases of gonorrhea in which the gonococcus was present in the blood, and was cultivated by him. Apart from these typical and carefully-studied cases, there are quite a number of examples of gonococcemia which have been proved such by the examination of the blood. The micro-organism reaches the general circulation through the veins, and most often when the primary lesions involve the posterior urethra or the glands connected with it (prostate, seminal vesicles, testis).

Gonococcal septicemia is seldom a pure septicemia. In most cases it produces a variety of terrible lesions, such as those of gonorrheal rheumatism; in others it settles upon certain organs, producing meningitis, pneumonia, skin lesions, etc. Recovery takes place in about 70 per cent. In all fatal cases, with two exceptions, endocarditis was present, whilst in those who recovered a certain diagnosis of endocarditis could only be made in three instances. *Gonococcal septicemia thus owes its gravity chiefly to the cardiac complications which it is apt to produce.*

In its manifestations, gonococcal septicemia shares the characteristics of general microbic infections; *i.e.*, it begins with fever, which may be of an intermittent, or remittent, or continuous type.[3] At the same time, an eruption, composed of pinkish lenticular spots, often appears, which is not unlike that of typhoid fever. The general health is affected, but to so variable an extent that it does not constitute a typical symptom. Marked pallor and a sallow tint of the skin in general are constant features. General weakness and lassitude, lack of refreshing sleep, and inability to work are the rule. The relation between this state of fatigue and the gonococcus and its toxins is proved by the astonishing relief which these patients obtain when one manages to check the discharge by means of irrigations with permanganate.

Although fever is the simplest expression of generalized gonorrhea, it is barely noticeable in ordinary uncomplicated cases. Thus, amongst twelve cases affected with acute gonorrhea which came under Noguès' observation, only one had a slight rise of temperature. Yet it is true that attacks of fever, strongly resembling those of typhoid,[4] occur in general gonococcal septicemia, and that a hyperacute and hypertoxic form which

[1] Marcel Faure-Beaulieu, *La Septicémie Gonococcique* (Thesis, Paris, 1906).

[2] Lautier, *De l' Utilisation des Procédés de Laboratoire pour la Recherche des Gonocoques dans le Sang des Blennorragiques* (Thesis, Bordeaux, 1907).

[3] *Vide* Dieulafoy, *Bull. Acad. de Méd.*, May 18, 1909, p. 602.

[4] *Vide* Dieulafoy, *loc. cit.*

takes a very rapid course exists. This galloping form might very well be termed *malignant gonorrhea.*

Dieulafoy quotes an instance which was brought to his notice by Cherrer, a military surgeon: A young soldier, suffering from gonorrhea for a fortnight, was admitted to the Military Hospital because he felt seedy. His temperature soon rose to 38°, 39°, and even 40° C. A provisional diagnosis of typhoid fever was made, and the Widal test was done; but the result was negative. A few days later a pleural effusion was diagnosed, and on aspiration a turbid fluid, full of gonococci, was withdrawn. The patient collapsed, and died soon afterwards. At the autopsy the disease was found to be generalized gonorrhea. There was no trace of any typhoid lesions. The patient had died of gonococcal septicemia; his peritoneum was inflamed, and covered with an exudate which contained gonococci.

Thayer has published a similar case: A young man who had had gonorrhea for three months, was suddenly taken ill with general malaise, and fever rising to 104° F. The Widal test was negative, and thus the original diagnosis of typhoid fever was discarded. The blood was then examined, and gonococci were cultivated from it.

These examples prove clearly that the gonococcus can reach the general circulation, and they show the value of a bacteriological examination of the blood for clinching the diagnosis.

For this purpose, a considerable quantity of blood (10 to 20 c.c.) should be taken during a febrile attack. The best culture media are, according to Faure-Beaulieu, the liquid media of the ascites-broth type. Faure-Beaulieu incubates these media, once they have been inoculated, for twenty-four hours, and then makes subcultures on ascites-agar. In forty-eight hours this method yields typical colonies of the gonococcus.

The isolation and cultivation of the organism is, however, not easy, and even under the best conditions one meets occasionally with failures. Thus, Harris and Johnson failed to find the gonococcus on two out of five occasions on which they examined the blood of the same patient. Faure-Beaulieu was also unsuccessful in three out of four attempts under similar circumstances.

It seems as if the fever did not progress in a steady, continuous manner, but that discharges of microbes into the circulation took place at odd times; clinically, the intermittent or remittent attacks of fever would correspond to them.

Courtois-Suffit and Beaufumé[1] have reported a fatal case of generalized gonorrhea in which this condition followed upon a benign intervention on the urethra, and on the repeated passing of catheters. A severe infection supervened which was characterized by multiple abscesses, and ended fatally. In all the abscesses and in the blood typical gonococci were found

[1] Courtois-Suffit and Beaufumé, *Soc. Med. des Hôpitaux de Paris*, April 14, 1905.

—namely, in the pus taken from the right brachial and sural triceps muscles, the posterior surface of the sternum, the left thigh, and the left testicle and epididymis.

As long as there are gonococci in the urethra, general infection is liable to occur. Even when the disease is confined to the anterior portion, or if it has assumed a torpid form, the local trouble may spread, and cause general havoc. This may occur spontaneously or without any cause which we are able to account for.

Thévenot and Michel have published quite recently a case of hemorrhagic septicemia which came on during an attack of gonorrhea, and killed the patient. A man of thirty-one, who had been suffering for sixteen months from a neglected attack of gonorrhea, was suddenly taken seriously ill. Apart from his bad general condition, he showed an eruption of purpura on his neck and his abdomen, and developed hemorrhages from his nose and mouth, dying shortly afterwards.[1]

Weitz of Hamburg had about the same time a fatal case of gonococcal septicemia, in which severe icterus, cutaneous hemorrhages, stupor, fever, and albuminuria, were observed. Cultivation of the patient's blood—a youth of nineteen—yielded typical gonococci.[2]

Ulmann has also met with a case of gonorrheal endocarditis which dedeloped severe jaundice when the end was near.

We owe to Colombini[3] the history of a remarkable case of gonococcal septicemia: A man of twenty-eight acquired gonorrhea, and was insufficiently treated. After a fortnight a bubo appeared in the left groin, which had to be incised, and with it a left epididymitis, which finally suppurated. The fever rose to 39·8° C., and lasted for two weeks or so. In the meantime the patient wasted away, and developed a metastatic abscess in his right parotid which required incision. The gonococcus was present in the pus from the urethra, and from the abscesses in groin, scrotum, and parotid. The blood which was taken from one of the brachial veins was found sterile on the first occasion. The second attempt yielded a culture, and with the culture of the third bleeding the urethra of another youth was successfully inoculated.

In order to trace cases of gonococcal septicemia, one has recently resorted to the complement-fixation reaction, and thus established for gonorrhea a reaction similar to Wassermann's reaction for syphilis.

Gradwohl[4] has made use of this serum reaction in fifty cases, following the technique indicated by Neil and Schwartz, and Wassermann's method.

[1] Thévenot and Michel, *Province Médicale*, May 18, 1912, No. 20, p. 228.

[2] Weitz, *Medizin. Klinik*, February 4, 1912.

[3] Colombini, *Centralblatt f. Bakteriol.*, vol. xxix., No. 25, p. 955.

[4] Gradwohl, *American Journal of Dermatology and Genito-Urinary Diseases*, June, 1912, vol. xvi., No. 6, pp. 294-299.

His conclusions are favourable, and seem to indicate that this test would be useful for the detection of latent gonococcal septicemia. The reaction only becomes positive when a posterior urethritis of three weeks' duration is present, and does not disappear when only an anterior urethritis is left. For the diagnosis of gonorrhea in the female this reaction would be of great value, as the gonococcus is often very difficult to find in women; moreover, it might help in the differential diagnosis of pelvic inflammations. The change of a positive reaction into a negative one would indicate that the patient has got rid of his disease; the clinical cure, however, precedes the serological cure, as it takes the system about thirty days to eliminate the specific bodies.

CHAPTER IV

INFLAMMATIONS OF THE URETHRA DUE TO OTHER CAUSES THAN THE GONOCOCCUS

THERE are a considerable number of urethral inflammations which are not caused by the gonococcus, and differ in their symptoms from ordinary gonorrhea—namely:

1. Inflammations of the urethra due to common micro-organisms.
2. Inflammations of the urethra said to be "aseptic."
3. Inflammations of the urethra due to chemicals.
4. Inflammations of the urethra due to a special diathesis.
5. Inflammations of the urethra of toxic origin.
6. Inflammations of the urethra of traumatic origin.

1. Inflammations of the Urethra due to Common Micro-Organisms.

One often meets with inflammations of the urethra which are not caused by the gonococcus, and it is a great mistake to think that they are not infectious owing to the absence of Neisser's organism. On the contrary, *these non-gonococcal urethrites are infectious*, and apt to cause serious complications in the male, although they assume as a rule a torpid form in the female (slight metritis). The infectious character of these inflammations is rendered evident by the frequency with which they lead to epididymitis, prostatitis, and vesiculitis. Despite their apparent benignity, they thus deserve to be followed up, and to be treated until they are cured. The complications they expose to are sufficient argument for this line of conduct.

These common non-specific urethrites of bacterial origin occur under two absolutely different conditions, which may be termed *primary* and *secondary*.

1. **Primary Urethritis of Bacterial Origin** is observed after intercourse with a woman who suffers from a profuse discharge, and who takes little care of her person.

Janet[1] has described two instances in which the wives developed inflammatory lesions after having married husbands who suffered from a non-

[1] Janet, *Annal. des Malad. des Organes Génito-Urin.*, 1893, pp. 600 and 601.

specific urethritis. In their utero-vaginal secretions abundant small short bacilli were found which were identical with those present in the urethræ of their husbands.

I have observed several absolutely similar cases. One of them relates to a patient whose exemplary conduct was beyond suspicion. He was forty-one years of age, had been married for fourteen years, and was the father of three children. After the birth of her three children, the wife had had three miscarriages, and subsequently suffered from leucorrhea. She paid no attention to her trouble, and did not even use a vaginal douche. The man had never had gonorrhea, and had also always been true to his wife since his marriage. Two months before he consulted me he developed a profuse discharge. When he came to me I examined his discharge, and found a great number of common microbes, but no gonococci. I resorted to irrigations with oxycyanide of mercury, and obtained a rapid improvement. A complete cure was, however, only effected after a lengthy and methodical dilatation treatment.

Another interesting observation was made on a medical man. Our colleague had a urethritis of streptococcal origin, which, as he assured me, followed upon an intercourse with a woman who had suffered from erysipelas.

Inflammations of the uterus and the appendages may under certain circumstances cause a urethritis, as well-authenticated examples show.

Legrain[1] knew of a medical student who, after having restrained his desires for a fortnight, had connection with a woman who had been treated two months previously for a retro-uterine abscess. This intercourse was followed after twenty-four hours by an abundant greenish discharge, in which bacteriological examination revealed the presence of the *Micrococcus cæruleus albus*.

2. **Secondary Urethritis of Bacterial Origin.**—They are very frequent, and are found in patients who have had repeated attacks of gonorrhea, and from whose urethra the gonococcus has disappeared for some time. They are often most difficult to cure, and require special attention. Sometimes they are kept up by a prepuce of excessive length. In cases of this kind a chronic balanoposthitis is set up, from which the organisms find their way into the urethra.

I have had occasion to examine a young man who had been irrigating himself for over a year with oxycyanide of mercury. He searched every morning for his bead of pus, and sent it to a laboratory for analysis. Invariably the following reply came back: "Ordinary organisms only: staphylococci, streptococci . . ." This induced him to increase the number of his irrigations, and this performance went on for a year or more. When I

[1] Legrain, *Annal. des Malad. des Organes Génito-Urin.*, August, 1888, and June, 1889.

examined him, I found in the first glass a few very light and slender filaments, which contained no bacteria. His infection was confined to his meatus, and was due to common organisms. Washing the meatus with a 1 : 4000 solution of perchloride of mercury, and dusting it, as well as the balano-preputial sulcus, with an inert powder, cured him readily.

Then, again, we find cases of urethritis persisting simply because the urethral epithelium has been so damaged by the gonococcus that it is completely modified, and has become unable to resist the action of the common micro-organisms. It is well known that the normal epithelium of the urethra, which is cylindrical, has a great bactericidal power on ordinary bacteria. Once the mucous membrane loses its cylindrical cells, and has them replaced by a pavement epithelium, its microbicidal power vanishes.

This type of non-gonococcal urethritis is the most common.

All those whose lot it is to treat gonorrhea should bear this point in mind. They often have to advise young men who wish to marry, and desire to get rid of their gonorrhea previously. Once a careful and conscientious treatment has removed all infection, once repeated and thorough examinations allow one to permit the marriage, it is well to warn them that they may develop a discharge after their marriage. This discharge is not due to gonococci which have remained latent, but to common micro-organisms. The young wife is very generally in a state of complete ignorance of sexual hygiene, and has no experience of vaginal injections. Moreover, the lacerations caused by defloration often form wounds, which suppurate slightly. Under these conditions there is sufficient microbic activity to infect the husband's weakened urethra.

I have had many opportunities of verifying these statements. One case, which is of special interest, may be quoted:

A young officer had had a chronic urethritis of very long standing, which I had cured completely by means of appropriate treatment. Not only the discharge, but also all filaments, had completely disappeared. Under observation without treatment for a month before his marriage, he never showed the slightest trace of illness, and his urine was always quite clear and free from filaments. After a final complete urethroscopic examination I gave my consent to his marriage. Only eight days after the wedding, whilst he was away on his honeymoon, anxious telegrams arrived which informed me that his discharge had reappeared, and was as bad as ever. Smear preparations made by the patient came soon after, and allowed me to diagnose his discharge as being due to adventitious organisms. I was thus able to reassure him, and I advised him to give himself a few irrigations with mercury oxycyanide, which had the desired effect.

Quite a number of books have been published on the flora of the urethra. There is thus no need for a lengthy enumeration[1] of all the organisms which have been found in urethral discharges. The most important ones are—Streptococcus, Bacillus coli, pneumococcus, staphylococcus, various sarcinæ,

[1] Rousseau, *Contribution à la Flore des Urétrites*, (Paris, Pharmaceutical Thesis, 1905).

diphtheria bacillus, tubercle bacillus, Micrococcus fallax,[1] and M. cæruleus albus (Legrain). One of the microbes most often found is a small, short, slender bacillus, arranged in chains or clusters, and present in great quantity. This organism, which, according to Finger, is a usual saprophyte of the prepuce, is met with in cases of long standing which have lasted for ages, and have been treated for a considerable period. It is practically never found in a healthy urethra which has never been infected. The accompanying discharge contains but very few leucocytes, or none. One finds, however, the large flat cells of the urethral epithelium, either isolated or in apposition, and around and within them the bacilli (Figs. 6 and 7).[2]

FIG. 6.—SECONDARY INFECTION : NUMEROUS SMALL BACILLI AND EPITHELIAL CELLS. (Wossidlo.)

To this group may be added those urethrites which follow upon systemic infections. Legrain noted a case in which the urethritis came on after typhoid fever. The bacteriological examination revealed the presence of M. pyogenes aureus.[3] Gravis and Stiévenard,[4] Billoir,[5] and Schmitt,[6] observed urethrites following upon mumps. Moscato[7] had a patient of sixty who developed a discharge from his urethra every time he had an attack of intermittent fever, and which invariably disappeared after the attack. Dr. Morisz Porosz, of Budapest, has published an interesting paper on this subject.[8]

[1] *Vide* Géraud, "Saprophytie Urétrale Pseudo-Membraneuse," *C. R. de l'Ass. Française d'Urologie*, 1907, p. 271.
[2] Legrain, Thesis, Nancy, 1888.
[3] *Annal. Génito-Urin.*, 1889.
[4] *Bullet. de Thérap.*, vol. xxix., p. 145.
[5] *Gazette Hebdom.*, 1859, p. 117.
[6] *Arch. de Méd. et de Pharm. Milit.*, 1883.
[7] *Il Morgagni*, November, 1890.
[8] Porosz, *Monatsberichte f. Urologie*, vol. ix., 1904.

2. So-called "Aseptic" Inflammations of the Urethra.

The so-called "aseptic" inflammations of the urethra are characterized by the fact that their discharge never contains any gonococci or other micro-organisms. All one sees under the microscope is a great number of leucocytes and a few epithelial cells. Even if one tests the mucosa by the reaction test, either by an injection of silver nitrate or by giving the patient plenty of beer or champagne, one finds no change in the character of the discharge. No fresh organisms appear which could be shown by the ordinary staining methods.

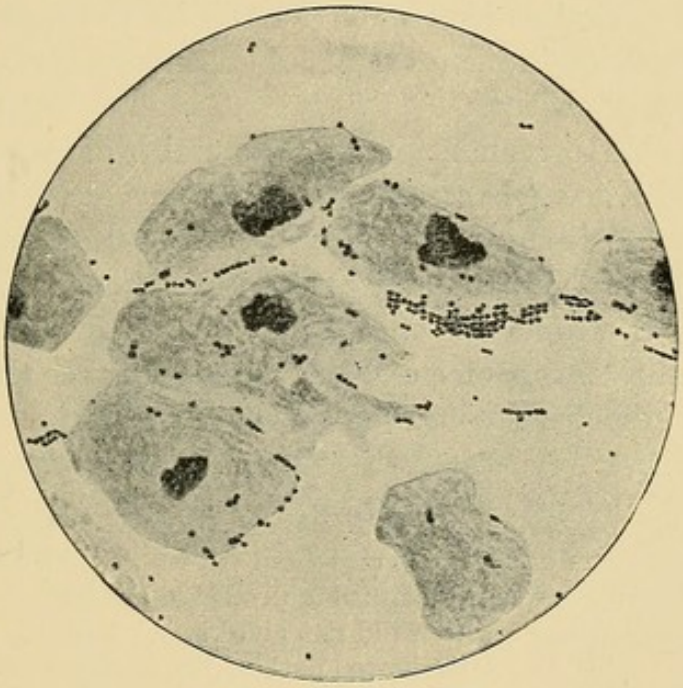


FIG. 7.—SECONDARY INFECTION: ORGANISMS ARRANGED IN CHAINS. (Wossidlo.)[1]

These inflammations deserve thus rightly the name "aseptic" given to them. They correspond fairly well to what is known to the layman as "échauffement."

They have been known for a long time, and have been studied by Noguès, Guiard, and others. Their pathology is, however, not clear.

The following features are peculiar to them: They are always caused by excessive drink and exercise, and, above all, excessive indulgence in sexual intercourse. Connections which last long or take place at the time of the periods are especially dangerous.

Their incubation, if this term may be used, is much longer than that of genuine gonorrhea; it is usually more than eight days. Sometimes three

[1] Figs. 6 and 7 are taken from Wossidlo, *Die Gonorrhoe des Mannes, und ihre Komplicationen*, Berlin, 1903.

weeks elapse after the last intercourse before they appear. The onset is usually torpid, and produces no painful reaction on the part of the urethral mucous membrane.

The aspect of the discharge is the same as that of gonorrhea. It is, however, usually less free. It is yellowish-white or milky, but it never becomes greenish or green. Under the microscope only leucocytes, but no organisms, are seen.

There is no pain worth speaking of on making water, or during an erection. The urine is nearly always clear in both glasses, but it contains a greater or lesser quantity of filaments.

The patient recognizes his trouble usually by the spots on his linen or by a tickling sensation in his urethra. Further inspection then shows him the scanty milky discharge.

I have been able to examine, in a great number of instances, the women who were accused of being the contaminating persons. Repeated examinations never enabled me to discover any gonococci in the urethra, or in the cervix, or elsewhere. I was, however, always able to find some lesion of the genito-urinary organs. Some had a metritis, others a salpingitis, etc. A completely healthy woman has never come under my observation in these instances.

A further characteristic feature of these urethrites is that they are readily cured with silver nitrate, and that they are prone to recur.

I have been able to examine and to follow up a urethritis of this type in a house-surgeon, twenty-six years of age. He consulted me on May 30, 1901, for a urethritis which he had had for three weeks. His urine was clear, but there were filaments in the first glass. Micturition and erection did not give rise to any pain. A careful microscopic examination of his discharge showed nothing but leucocytes. He was put under the reaction test; an injection with 1 : 1,000 silver nitrate solution was given, and he drank beer freely. Next day his discharge was less.

The irrigations with silver nitrate were repeated on the next three days, with the result that the discharge and the filaments disappeared completely. At the end of June, 1901, he had no trace of any discharge, and remained well for six months. Then, on January 9, 1902, he returned with a similar discharge. He assured me that he was still with the same woman, and that he had been true to her. The intercourse which had apparently brought the discharge on again was prolonged, and took place just before her periods came on. Examination of the pus was again negative, only pus cells being found, and the same treatment produced again a rapid recovery.

Some of these aseptic urethral inflammations last very long. Just as they are slow in appearing, they are reluctant to disappear, and if left to themselves they may last for ever.

Usually the anterior urethra is alone affected, and the pathogenic factor seems to be located chiefly in Littre's glands of the penile portion. This is readily seen to be so if one collects the patient's urine in four glasses. The first one only contains a great number of small, light, comma-shaped filaments—a characteristic feature of pronounced littritis.

The best treatment for these inflammations of the urethra is silver nitrate, applied in a 0·1 per cent. solution as irrigations, which should be given daily with an irrigator.

Once the first glass of urine has become perfectly clear, methodical dilatations are resorted to—first with curved sounds, and then with Kollmann's four-bladed dilator. This dilatation treatment is best combined with silver nitrate irrigations, and should be continued until the meatus is perfectly dry, and until there are no more filaments in the urine.

Amongst this group of "aseptic urethrites" may also be placed those secondary inflammations of the urethra which follow upon primary infections of the bladder or of the kidney, or are secondary to such anatomical lesions as strictures, papillomata, polypi, and ulcerations of the urethra; chronic prostatic lesions, and those of the lacunæ of Morgagni and of Littre's glands.

They deserve great attention, because they are often the *first symptom of an infection of the urinary organs of the utmost gravity.* They are not infrequently the sign of a *tuberculous urethritis* which itself is a secondary manifestation of an already existing infection of the genito-urinary tract by Koch's bacillus. Tuffier and Girod have published a case of this kind, Lavaux communicated another one at the Surgical Congress in 1898, and Jamin quotes several interesting examples in his thesis. The pathological changes which give rise to the discharge are nearly always situated at the level of the prostate or of the seminal vesicles. Careful palpation of the epididymis, of the prostate, and of the seminal vesicles allows one to find nodules in one or more of these organs, and thus to clinch the diagnosis.

3. Inflammations of the Urethra due to Chemicals.

Chemical urethrites are usually caused by the injection of irritating substances which produce a desquamation of the urethral epithelium, and thus open a channel of entry for saprophytic organisms.

Many patients are haunted by the long duration of their discharge, and try to remedy the evil by irritating antiseptic injections, which they continue daily for weeks or months. They thus themselves produce a discharge, which they try to get rid of by more injections, and naturally without success, the only way of stopping their discharge being to give up all therapy.

One of the drugs which is most apt to keep up a discharge is oxycyanide of mercury. It is well to inform the patients of this fact, and to advise them, if they are using this substance, not to inject more often than once every three or four days; otherwise their discharge may persist indefinitely.

4. Inflammations of the Urethra due to a Special Diathesis.

This group of urethrites is exceedingly rare. Very few of the cases of urethritis recorded in the past as being due to a special diathesis can withstand the criticism which our advanced knowledge of the disease, and our modern accurate means of diagnosis enable us to make. A "diathesis" can only be regarded as a predisposing factor; the chief cause in these cases is always a microbic infection.

The occurrence of a urethritis due to a special diathesis has been described—

1. In the case of rheumatic fever. Martineau reported in Turbur's thesis (1887) the case of a child of fourteen who suffered from subacute polyarticular rheumatism for three weeks. As long as the disease lasted, this boy had a discharge from his urethra, which disappeared with the attack. Later in life, he had three further attacks of rheumatism, and on each occasion he developed a profuse purulent urethral discharge. The urethritis formed thus part and parcel of his rheumatism, and its onset could be predicted as soon as the first pains were felt in the joints.

2. Arthritism, herpetism, and gout, are also held responsible for urethral inflammation by certain authors. But these cases are very doubtful. At the most, one may concede that these diatheses are predisposing.

3. According to Hamonic,[1] inflammation of the urethra occurs in diabetes without infection. He observed a case of this nature in a young subject affected with glycosuria, and he noticed, to his great astonishment, that the urethritis ceased almost immediately after a suitable diet and treatment had stopped the glycosuria. In the following years the urethritis recurred each time the glycosuria came on again. Hamonic suggests two alternative explanations. In some cases the diabetics have a long prepuce, under which germs develop. The stagnation of a few drops of urine favours their growth, and thus leads to an infection of the urethra. Or one must consider that the urine loaded with sugar has a direct irritant effect upon the urethral mucous membrane. At any rate, a urethritis of this kind depends upon exacerbations of the glycosuria, which therefore should be treated; and the improvement of the urethral trouble will depend upon the influence of appropriate diet and hygiene, and of arsenic and lithium alkali, upon the glycosuria.

5. Inflammations of the Urethra due to Toxins.

Certain inflammations of the urethra have been noted after the intake of certain kinds of food, such as asparagus and strawberries.

Schenck mentions the case of a man who could produce a discharge

[1] Hamonic, "De l'Urétrite chez les Diabétiques," Ass. Française d'Urologie, 1908, p. 129.

from his urethra at will by eating cress. Harrison observed a patient who had a copious urethral discharge, which lasted five days, after having indulged freely in asparagus.

The use of certain drugs is also apt to give rise to a discharge from the urethra. Cantharides inflames the whole urinary system, and thus it may lead to cystitis and urethritis. Nitrate of potash produced an intense urethritis in one of Lallemand's patients, who had taken 30 grammes (about 450 grains) of this drug. Mercier saw a similar case in which potassium iodide had been taken. The arsenical preparations have also been incriminated (Savignac, Delacour, Saint-Philippe).

6. Inflammations of the Urethra of Traumatic Origin.

A traumatic urethritis is caused by the passage or sojourn of foreign bodies in the urethra. It is common knowledge that the use of a permanent catheter is always followed by suppuration of the canal.

In this group one may also include those inflammations which follow upon venereal excesses. Cases of this kind have been reported to occur from masturbation, and Ricord published the case of a doctor who, after a period of six weeks' chastity, had passed a whole day, from 10 a.m. till 7 p.m., in a state of frenzy in the company of a woman whom he loved, and who refused to yield. Three days later he had a violent and painful inflammation of his urethra.

CHAPTER V

THE ANATOMY OF THE URETHRA, AND THE PATHOLOGY OF GONORRHEA

It is only of late that the study of gonorrhea has made great strides. For a very long time all knowledge of this disease was based on the crudest empiricism, and the treatment was purely a matter of routine. Anatomical and pathological studies were practically non-existent.

Since more attention has been paid to anatomical conditions and to pathological findings, such great progress has been made that it has become possible to build up a rational and efficient therapy. A sound knowledge of the anatomical and pathological facts is indispensable for the making of a correct diagnosis and for carrying out a sound treatment; hence the importance of this chapter.

THE ANATOMY OF THE URETHRA.

It is not our intention to give here a complete anatomical description of the urethra. Only those points will be mentioned which we consider essential for the understanding of the persistence of "rebellious gleet," and of certain methods of treatment.

I. The Male Urethra.

The urethra is the channel through which, in both sexes, the urine passes from the bladder, where it has been stored, to the outside. In the male the urethra extends from the neck of the bladder to the tip of the glans penis; into it open the ejaculatory ducts, and thus it also acts as channel for the sperma.

Course.—The urethra describes, on its way from the neck of the bladder to the root of the penis, a curve with a concavity directed upwards and forwards. In front of the symphysis pubis it bends down, and runs along the under-surface of the penis. The urethra thus describes two curves, which form together an italic *S*. Of these two curves, only the posterior one is permanent; the other one disappears when the penis is raised—*e.g.*,

during erection. The urethra then only has one curve, the concavity of which is directed forwards and upwards.

Its Different Parts.—Examination of a median vertical section of the pelvis shows that the most posterior portion of the urethra is almost completely surrounded by the prostate gland. Below the prostate the channel is free for about 10 to 12 millimetres, and perforates the middle aponeurosis of the perineum. Farther forward the urethra enters the upper surface of a column of erectile tissue, which forms a protecting sheath for it. This structure is termed the " corpus spongiosum "; the urethra runs in it up to its termination. Owing to this anatomical arrangement, the urethra can be divided into three portions: a *prostatic*, a *membranous*, and a *spongy* portion.

Anterior and Posterior Urethra.—For clinical and pathological purposes—which are alone of importance to us—the spongy portion, which extends from the tip of the penis to the inferior part of the perineum, is usually called the *anterior urethra*. The remainder, comprising the prostatic and membranous portions, is the *posterior urethra*. This terminology is due to Guyon, who established its clinical importance.

For practical purposes we thus recognize two parts, which are separated from each other at the membranous portion: an anterior urethra, comprising the canal in front of the membranous sphincter; and a posterior urethra, comprising the part behind the sphincter.

This distinction is based upon anatomical, physiological, and developmental considerations. Picard, in 1885, and others have shown that the posterior urethra is formed solely from the genito-urinary sinus, whilst the anterior urethra is derived from a long bud which is an offshoot from the anterior wall of the cloaca. This " anlage " gradually develops into a long gutter which finally closes, and thus forms the anterior urethra.

The membranous sphincter thus forms the barrier between the anterior urethra, which is in free communication with the outside, and the posterior urethra, of which the secretions readily flow back into the bladder.

It has been shown on an endless number of occasions that liquids which are injected under moderate pressure into the anterior urethra by means of an ordinary syringe do not travel beyond the bulb, and that a considerable pressure is required to force the barrier formed by the membranous sphincter.

Thus, all secretions formed in front of the sphincter flow out of the urethra through the meatus, whilst those of the posterior urethra regurgitate into the bladder.

Lumen of the Urethra.—The lumen of the urethra varies in its different parts.

The meatus is situated at the tip of the glans, and is formed by two lateral lips which are joined by two commissures—an inferior and a superior.

These commissures are often membranous, either in their upper or in their lower portions.[1]

Normally, the meatus is directed forwards, but it is, perhaps, more often found to be directed slightly downwards. Its shape varies with different individuals, so much so that it is impossible to describe a typically normal shape.

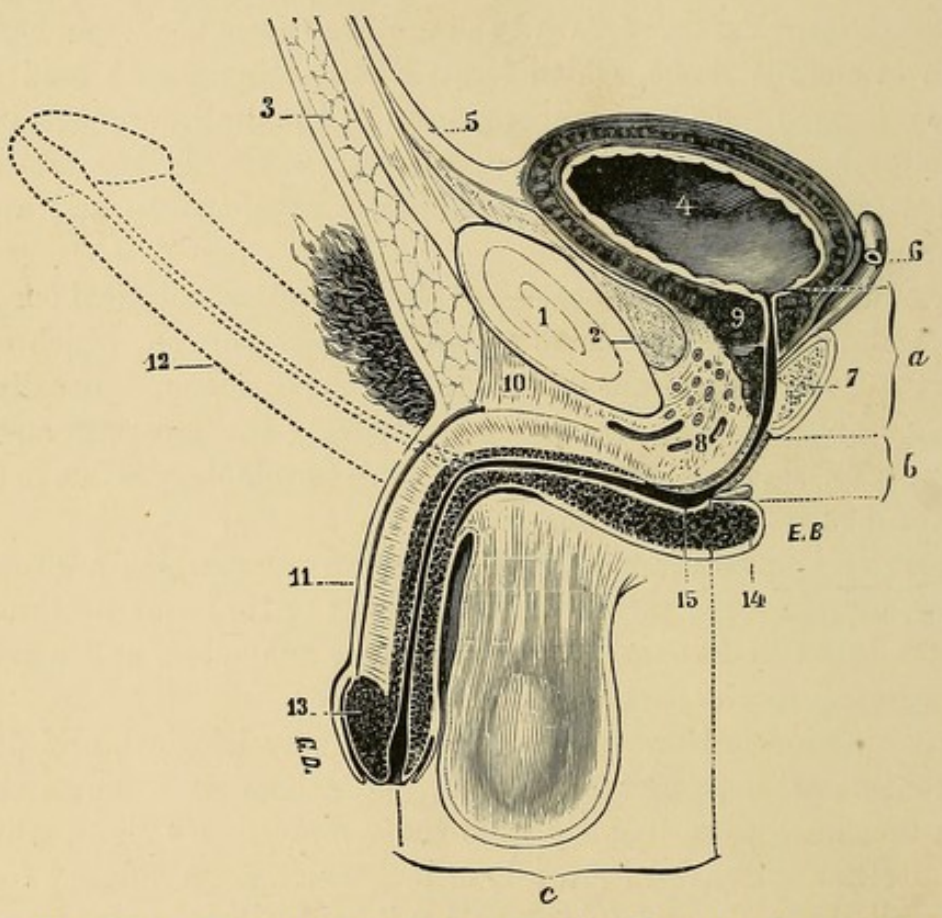


FIG. 8.—THE MALE URETHRA, SEEN IN A MEDIAN VERTICAL SECTION THROUGH THE BODY. (After L. Testut.)

1, Symphysis pubis; 2, pre-vesical space; 3, abdominal wall; 4, bladder; 5, urachus; 6, seminal vesicle and vas deferens; 7, prostate; 8, Santorini's venous plexus; 9, sphincter of the bladder; 10, suspensory ligament of the penis; 11, flaccid penis; 12, penis during erection; 13, glans; 14, bulb of the urethra; 15, cul-de-sac of the bulb.

a, Prostatic urethra; *b*, membranous urethra; *c*, spongy urethra.

Not infrequently the meatus has several orifices, of which the upper one (or ones) is usually imperforate. The lowest of these openings is always the most important; it is the one which constitutes the orifice of the urethra. In all cases of this kind a more or less marked degree of hypospadias is present.

The *meatus* is the narrowest and the least extensible portion of the

[1] Pasteau, "Les Différentes Formes du Méat Urinaire chez l'Homme," *Annal. des Mal. Génito-Urin.*, April, 1897.

urethra. In a healthy organ it is therefore the most difficult part to overcome. Hence it becomes necessary in many cases to split the meatus in order to be able to introduce a sound of sufficient size; or, at any rate, one has to resort to a temporary dilatation of the meatus with appropriate instruments. It should, however, be remembered that it is impossible to widen the lumen of the meatus to any marked degree by mere dilatation.

Immediately behind the meatal narrowing the lumen of the urethra widens out into the *fossa navicularis*, which is about 20 to 25 millimetres long, and is limited behind by the *neck of the fossa navicularis*. At this second narrowing a sound is again apt to stop. This arrangement is therefore not without practical importance, and it is advisable, in cases of congenital atresia of the meatus, not only to open this structure by meatotomy, but also to include the fossa navicularis and its neck in the operation.

The cavernous portion is uniform and cylindrical, and has, for practical purposes, the same width in its entire length.

It ends in a fusiform enlargement—the *bulb*—which is the widest part of the urethra. In it instruments which so far fitted the urethral walls tightly, lose all contact with them.

The wide bulbous portion is limited behind by the membranous isthmus. The lumen of the *membranous portion* is practically uniform.

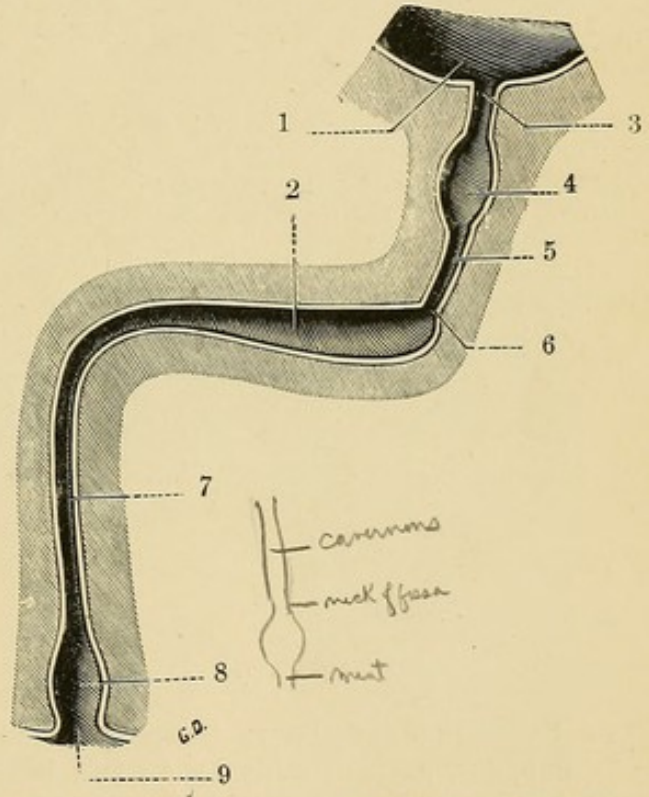


FIG. 9.—THE LUMEN OF THE URETHRA, SEEN IN A SAGITTAL SECTION.

(After L. Testut.)

1, Bladder; 2, cul-de-sac of the bulb; 3, neck of the bladder; 4, prostatic widening; 5, narrowing at the membranous portion; 6, neck of the bulb; 7, penile narrowing; 8, fossa navicularis; 9, meatus.

Once the urethra has passed the uro-genital diaphragm, it widens out into another fusiform enlargement. The greatest width of this enlargement is situated at the level of the verumontanum. The urethra then becomes narrower again, a further constriction being found immediately in front of the opening of the bladder.

To resume : The urethra presents four narrow points: (1) The meatus;

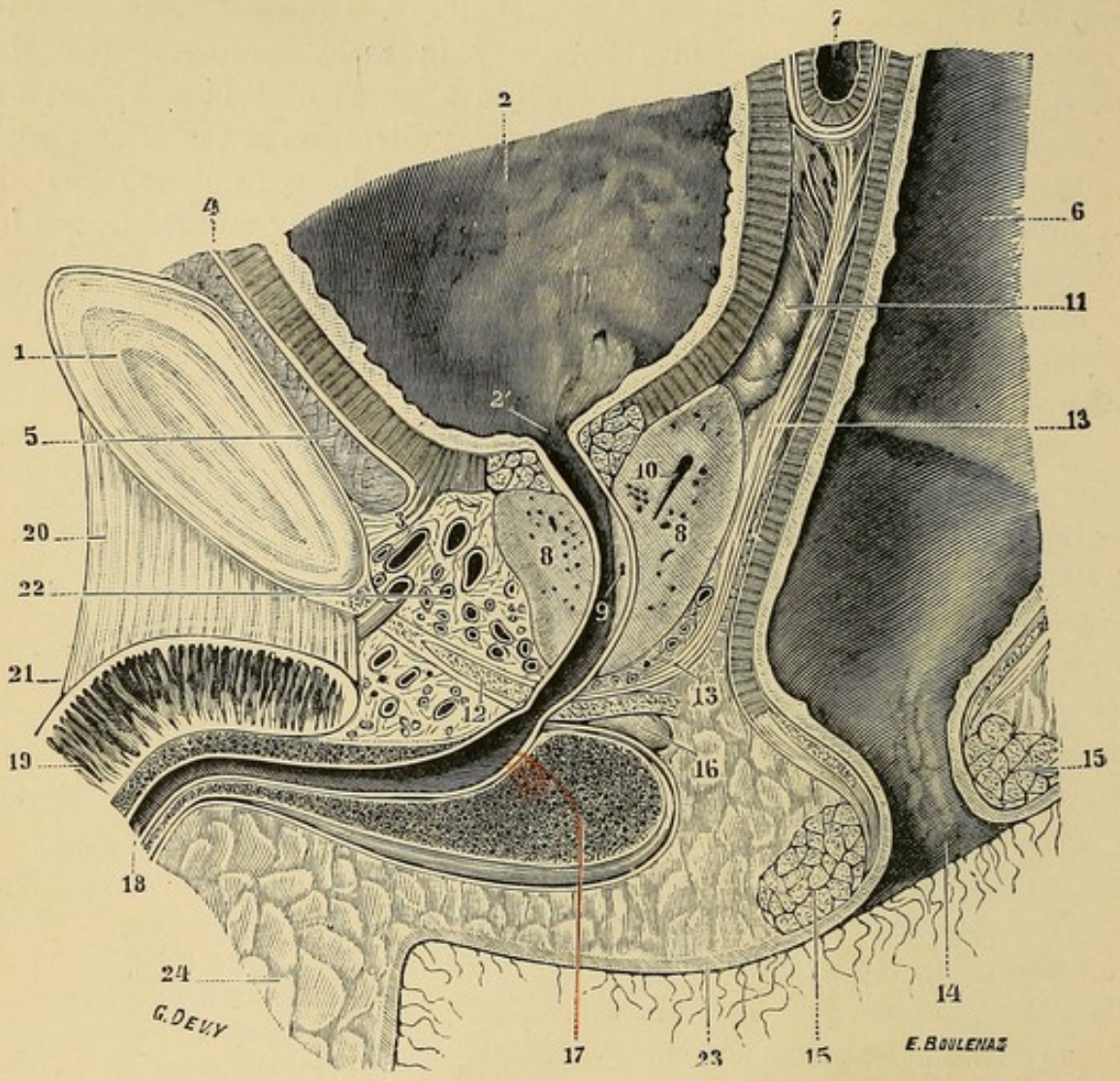


FIG. 10.—THE PROSTATE IN SAGITTAL SECTION. SECTION THROUGH A CONGEALED SUBJECT, PASSING SLIGHTLY TO THE LEFT OF THE MIDDLE LINE; THE FIGURE SHOWS THE RIGHT HALF OF THE SECTION. (After L. Testut.)

1, Symphysis pubis; 2, bladder, with its neck 2'; 3, anterior ligament of the bladder; 4, umbilico-prevesical fascia of Farabœuf; 5, prevesical space; 6, rectum; 7, recto-vesical fold of peritoneum, containing a loop of small intestine; 8, prostate; 9, verumontanum; 10, left ejaculatory duct cut obliquely; 11, right vas deferens; 12, middle aponeurosis of the perineum, with Guthrie's muscle; 13, prostato-peritoneal fascia; 14, anus; 15, external sphincter of the rectum; 16, Cowper's gland; 17, bulb of the urethra; 18, spongy urethra; 19, corpus cavernosum; 20, suspensory ligament of the penis; 21, deep dorsal vein of the penis; 22, Santorini's venous plexus; 23, perineum; 24, scrotum.

(2) the far end, or neck, of the fossa navicularis; (3) the membranous isthmus; (4) the vesical orifice. To these constrictions correspond five fusiform enlargements: (1) The fossa navicularis; (2) the cavernous portion; (3) the bulb; (4) the membranous portion; (5) the prostatic portion.

Of the four narrow points, the first two are the most inelastic; the two

latter are easily dilated. Of the five spindles, the first one is only slightly dilatable, whilst the third can be widened with the greatest ease.

Length.—In the adult the urethra measures about 16 centimetres, of which 2·5 belong to the prostatic portion, 1·5 to the membranous, and 12·0 to the spongy.

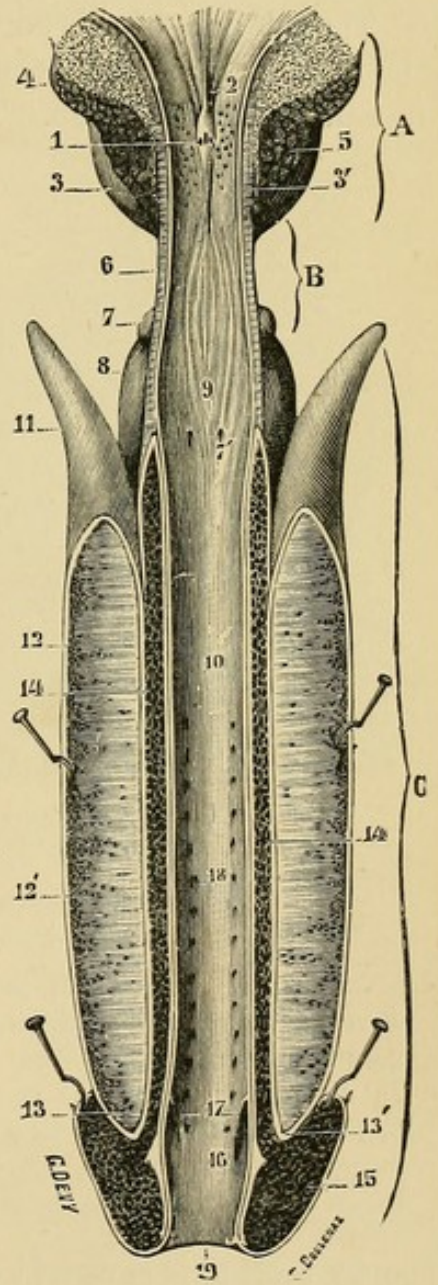


FIG. 11.—THE URETHRA OPENED ALONG ITS UPPER SURFACE, AND SPREAD OUT IN ORDER TO SHOW THE DETAILS OF ITS INFERIOR AND LATERAL SURFACES. (After L. Testut.)

A, Prostatic portion; B, membranous portion; C, spongy portion.

1, Verumontanum, with the orifices of the ejaculatory ducts; 2, frenum of the verumontanum; 3, prostate, with, 3′, the prostatic glandules situated on the antero-superior aspect of the urethra; 4, section through the unstriped sphincter; 5, section through the striped sphincter; 6, wall of the membranous portion; 7, Cowper's glands, with, 7′, the orifices of their ducts; 8, bulb; 9, longitudinal folds of the bulbous and membranous portions of the urethra; 10, posterior wall of the spongy urethra; 11, roots of the corpora cavernosa; 12, septum between the corpora cavernosa, along which the urethra has been opened; 12′, orifice, or lacuna, through which the meshes of the two corpora cavernosa intercommunicate; 13, termination of the corpus cavernosum in an excavation in the glans; 13′, fibrous septum separating corpus cavernosum from glans; 14, section through the anterior part of the corpus cavernosum; 15, glans; 16, fossa navicularis, with, 17, the two halves of Guérin's valve; 18, lacunæ of Morgagni; 19, meatus.

Outer Aspect and Relations.—**1. Prostatic Urethra.**—The prostatic urethra begins immediately at the neck of the bladder, and traverses the substance of the prostate gland at the junction of its anterior one-fifth with its posterior four-fifths.

The prostatic urethra is in relation: in front, with the venous plexus of Santorini and the symphysis pubis; on each side, with the fascia covering the levator ani muscle and the levator ani; behind, with the rectum and the prostato-peritoneal fascia of Denonvilliers. The two ejaculatory ducts enter the prostatic urethra from behind.

Above, the prostatic portion is directly continuous with the neck of the bladder, and below, it joins the membranous urethra.

2. **Membranous Urethra.**—The membranous urethra passes through the middle perineal aponeurosis, which adheres to its walls. This aponeurosis is thus one of its means of fixation.

The relations of this portion are: in front, the symphysis pubis; behind, the rectum. Above, it is continuous with the prostatic portion, and below, it unites with the bulb. The membranous urethra is close to the skin, from which it is separated by unimportant structures only. It was for this reason that surgeons used to approach the bladder through it in former days.

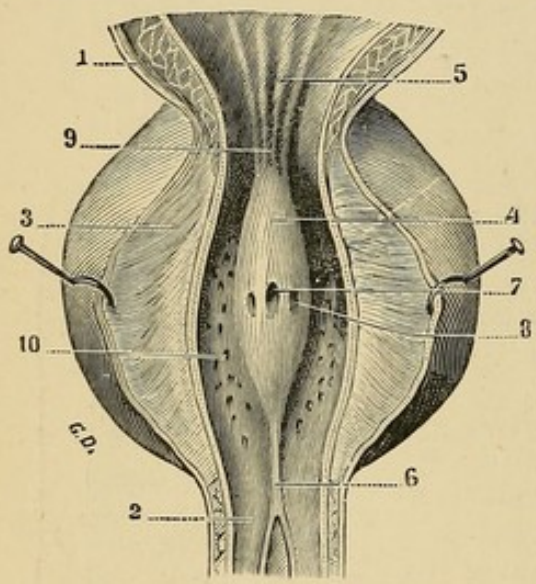


FIG. 12.—FRONT VIEW OF THE VERUMONTANUM. (THE INFERIOR WALL OF THE URETHRA HAS BEEN STRAIGHTENED OUT.)

(After L. Testut.)

1, Bladder; 2, urethra; 3, prostate; 4 verumontanum; 5, frenum of the verumontanum; 6, urethral crest; 7, utriculus, or sinus pocularis; 8, orifices of the ejaculatory ducts; 9, prostatic fossette; 10, openings of the prostatic glands (prostatic sinus).

3. **Spongy Urethra.** — The spongy urethra is surrounded in almost its entire length by an erectile sheath, the "corpus spongiosum," from which its name is derived. It runs in an angular groove formed by the apposition of the two corpora cavernosa. At its posterior extremity the corpus spongiosum expands to form a bulb; in front, it swells out into the glans.

This portion of the urethra is the longest, and may be divided into a *perineal*, *scrotal*, *penile*, and *balanic* part for purposes of description.

The perineo-scrotal portion is in relation laterally with the two ischio-pubic rami, which are each covered by their corpus cavernosum and the corresponding ischio-cavernosus muscle. It is accompanied by the secretory ducts of Cowper's glands. Below, the spongy urethra is covered by skin, subcutaneous tissue, the superficial fascia of the perineum, and the bulbo-cavernosus muscle.

The penile part occupies the inferior aspect of the penis.

Inner Aspect.—The interior of the urethra varies in its different portions, which therefore are described separately.

1. **Prostatic Urethra.**—On the posterior wall of the prostatic urethra is an oblong elevation which occupies its middle. This structure is always well marked, and is called the *verumontanum.*

The verumontanum is usually 12 to 14 millimetres long and 1 millimetre

broad. Its posterior end terminates by a number of folds which run back to the vesical orifice, and form the *frenum* of the verumontanum.

Behind the verumontanum one usually finds a more or less marked depression; this is the *prostatic fossette*, into which the ducts of the middle lobe of the prostate open (*vide* Chapter VIII.).

The anterior extremity of the verumontanum is prolonged forwards by a fold, called the *urethral crest*, which ends in the membranous urethra after bifurcation.

The base of the verumontanum forms part of the urethral wall, from which it is an offshoot.

Its apex presents a slit running in an antero-posterior direction, which occupies the middle line, and leads to a small cul-de-sac—the *prostatic*

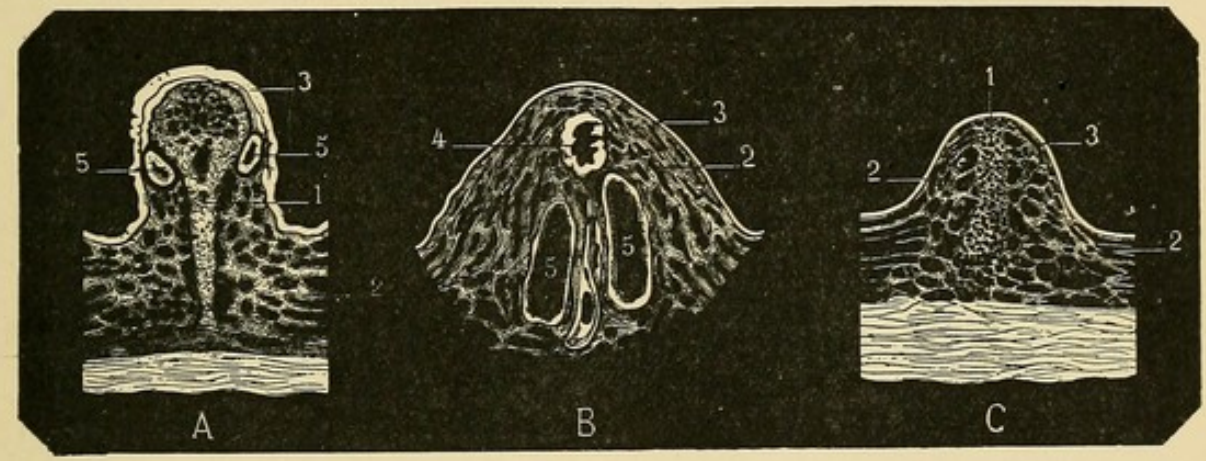


FIG. 13.—TRANSVERSE SECTIONS THROUGH THE VERUMONTANUM: A, THROUGH THE HIGHEST PORTION, BEHIND THE CHIEF EXCRETORY DUCTS OF THE PROSTATE; B, IMMEDIATELY ABOVE THE ORIFICES OF THE UTRICULUS AND THE ORIFICES OF THE EJACULATORY DUCTS; C, BELOW, AND IN FRONT OF, THE ORIFICES OF THE EJACULATORY DUCTS. (After Henle, modified, from L. Testut.)

1, Central column of the verumontanum; 2, cavernous tissue; 3, urethral mucous membrane; 4, utriculus; 5, 5′, ejaculatory ducts.

utriculus, or *sinus pocularis*. This utriculus is developed from the inferior extremity of Müller's ducts, and therefore represents embryologically the *male vagina*, and not the *male uterus*, as Weber taught. To the right and left of the utriculus are the openings of the ejaculatory ducts, which pour the sperma into the urethra.

On each side, the verumontanum is limited by a depression running in an antero-posterior direction. These *lateral grooves of the verumontanum* contain a number of openings for the bulk of the prostatic gland ducts.

Structure of the Verumontanum.—The verumontanum is composed of erectile tissue which is supported by a central column of elastic and muscular tissue. It is covered in by the urethral mucous membrane, which shows at

its level a few fine folds, thus allowing for adaptation to variations in the volume of the verumontanum.

The latter, which is traversed by the ejaculatory ducts, is an erectile organ. It becomes turgid during erection, and thus causes the ejaculatory orifices to gape. At the same time it shuts off the part in immediate proximity of the bladder, and thus plays an important rôle in preventing the flow of urine, or micturition, during erection.

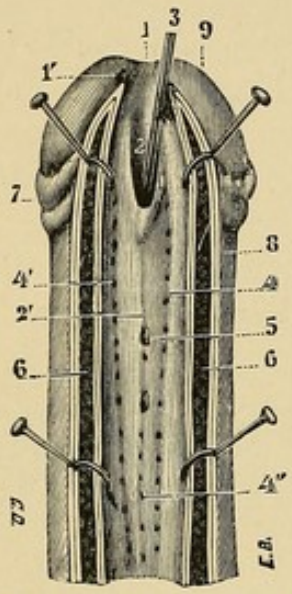


FIG. 14.—THE URETHRA, OPENED IN THE MIDDLE LINE ALONG ITS INFERIOR SURFACE, IN ORDER TO SHOW THE DETAILS OF ITS UPPER WALL.

(Partly after Jarjavay.)

1, Upper angle of meatus, with, 1', its right lip; 2, fossa navicularis; 3, probe entering the sinus of Guérin; 4, lateral borders of the urethra, with, 4', the lateral foraminula; 4'', median foramina; 5, large lacunæ of Morgagni, or foramina; 6, section through the corpus spongiosum; 7, prepuce drawn back; 8, section through the integuments; 9, glans.

2. **Membranous Urethra.**—The membranous urethra presents, normally, on its inferior wall a series of longitudinal folds which continue the urethral crest, and are finally lost in the cul-de-sac of the bulb. On its walls the openings of Littre's glands are visible.

3. **Spongy Urethra.**—In the spongy urethra we find—

(1) *The Orifices of Cowper's Glands.*—They are two in number, and are situated on the inferior wall, to each side of the middle line in the lower part of the bulb.

(2) *The Lacunæ of Morgagni.*—They were discovered by Morgagni in 1706. They are arranged in linear series, and are of various sizes. Morgagni described large ones, or foramina, and small ones, or foraminula. Sappey added an intermediate type. The large ones are found along the middle line on the upper surface. They are constant. The intermediate and small ones are usually on the lateral surfaces. As a rule there is no lacuna on the lower surface. The small lacunæ are only a few millimetres deep; the large ones extend often for a considerable distance (6 to 7 millimetres) submucously. Their fundus is directed backwards towards the bladder, and is usually simple; but sometimes one meets with a double or triple pouch.

One lacuna, which is practically constant, is situated 1 to 2 centimetres behind the meatus. It is larger than the others, and has been specially described by Guérin; hence the name *valve of Guérin* for the fold of mucous membrane, and *sinus of Guérin* for the pouch formed by it.

In the course of my personal researches on the anatomy of the normal

urethral mucous membrane, I have been struck by the number and by the *importance of Morgagni's lacunæ*. These little pouches, which are entirely formed by invaginations of the mucosa, are of variable depth. The deepest and most constant one is *Guérin's valve*, which is situated in the balanic portion, about 1 to 2 centimetres from the meatus. If one spreads out a urethra, after having slit it up on its under surface along the middle line, these lacunæ become easily accessible, and can be explored with a probe. One often finds, then, not only one large lacuna, but as many as three, or even four, in the penile region, and all of them are similar in structure and size to Guérin's valve.

Fig. 15, which has been drawn from nature, shows the anatomical disposition in a man of forty-five; small quantities of suet were injected into the lacunæ in order to show their size and how they gape.

Fig. 15.—Longitudinal Section of the Penis.

Normal aspect of the upper surface of the penile urethra, with its lacunæ of Morgagni and Littre's glands.

I have investigated fourteen cases, varying in age from seventeen to seventy-five years. Only one of them (a man of fifty-five) had a completely smooth mucosa and no lacunæ. In one case only a solitary lacuna was present, which was situated in the middle of the penile, and not in the balanic part (man of sixty-eight).

On four occasions two large lacunæ were found—one in the balanic part (Guérin's valve), and one in the penile (men of thirty-four, forty-five, forty-eight, fifty).

Three valves were found six times, one of them in the balanic portion (Guérin's valve), and the two others in a row in the penile part (men of seventeen, twenty-eight, thirty-nine, fifty-four, sixty, sixty-five).

Two cases had four valves spread along the penile urethra (men of fifty-eight and seventy-five).

The depth of these lacunæ varied from 5 to 12 millimetres. They are, however, sometimes still larger; Cruveilher, for instance, met with some which were 27 millimetres deep.

At all events, the structure of these lacunæ, which reminds one of a pigeon's nest, is responsible for the important rôle which they play both in

acute and chronic gonorrhea. They are regular hampers in the bottom of which the gonococcus can live for a long time, and in which the organism is sheltered against irrigations or injections. The fluid simply passes over these lacunæ, but does not enter them.

When, during an attack of gonorrhea, a lacuna or a group of Littre's glands becomes infected, the inflammation leads to their obstruction. As has been well shown by Keersmaecker and Verhoogen,[1] the mouths of these glands, or the orifice of the lacuna, are gradually obliterated, and thus the gonococci are shut off. A regular little cyst is formed as the gland expands. This cyst may either remain closed or it may burst partially into the urethra. In both instances it remains a hotbed for germs, in which they are not disturbed by any irrigations or injections.

Histologically there is no difference between the walls of these lacunæ and the urethral mucosa. They are not true glands, but merely depressions in the latter.

HISTOLOGY OF THE URETHRA.

The walls of the urethra are formed by three concentric coats, which are, from without inwards :

1. The muscular coat.
2. The vascular coat.
3. The mucous coat.

1. **Muscular Coat.**—The muscular coat is composed of unstriped muscle fibres which are arranged in two layers—an internal longitudinal one, and an external, which is circular. The longitudinal fibres are the continuation of the plexiform layer of the musculature of the bladder; they are well marked in the prostatic region, and gradually become fewer and fewer, there being less in the membranous portion, and still less in the spongy part. The circular fibres are well developed in the posterior urethra, which they surround at its commencement, forming a large ring—*the unstriped sphincter of the bladder*. In the normal state this sphincter keeps the bladder closed, owing to its tonic contraction. It also occludes the part of the urethra behind the ejaculatory ducts, and thus compels the sperma to travel down the urethra instead of flowing back into the bladder. Apart from these unstriped fibres, there are a number of muscles of voluntary contraction: the bulbo-cavernosus, Guthrie's muscle, Wilson's muscle, and the sphincter urethræ.

2. **Vascular Coat.**—This layer is thin, and ill-defined in the prostatic and membranous portions. It is, however, well marked in the spongy urethra, where it forms a kind of bed for this latter structure. This vascular formation—the *corpus spongiosum*—is analogous to the corpora cavernosa, and

[1] De Keersmaecker and Verhoogen, *L'Uréthrite Chronique d'Origine Gonococcique*, Bruxelles, 1898.

participates in the phenomenon of erection. Histologically, it is composed of numerous venous cavities which vary in size, and anastomose freely.

3. Mucous Coat.—The urethral mucosa lines the canal in its whole course. During life its colour is uniformly red, as can be easily seen by means of the urethroscope.

Generally speaking, the mucosa is smooth and presents a uniform lustre. It is rather thin and soft, despite its great elasticity. It is thus capable of resisting traction and distension well, but it is easily damaged and perforated by a metal instrument.

It presents, for descriptive purposes :

A. A structure of its own.
B. A system of glands connected with it.

A. Structure of the Urethral Mucous Membrane.

Thickness.—The thickness of the urethral mucosa varies slightly in its different parts. It is comparatively thick in the prostatic portion—0·3 millimetre—and tapers in the membranous portion to 0·2 millimetre.

Histology. — Two layers can be made out:

1. An epithelial layer, 60 to 80 μ thick, which is composed in its most superficial part by two rows of *cylindrical cells*. The deeper part is formed by replacement cells, which are polygonal or ovoid.

2. A connective - tissue layer, or stroma, which consists of a tough laminar connective tissue, containing a great number of elastic fibres. These elastic fibres form a network which projects between the muscular fibres, and extends into the meshes of the erectile tissue. This arrangement strengthens the mucosa, and prevents the different layers from separating. In the region of the glans the stroma shows well-developed papillæ; behind the fossa navicularis these papillæ are rudimentary.

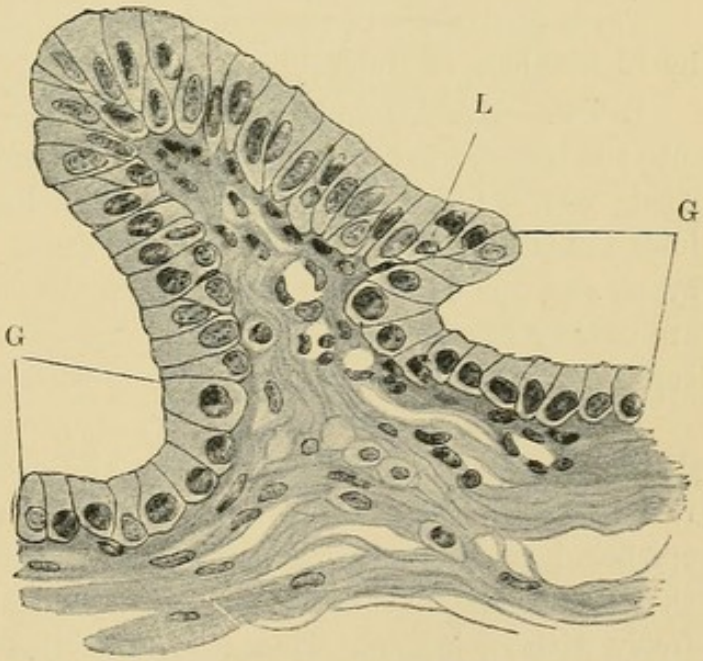


Fig. 16.—Histological Aspect of the Urethral Mucous Membrane (400 Diameters).

(After Lichtenberg.)

G, Glandular sinus; L, leucocytes penetrating into the mucosa.

B. The Glandular Apparatus of the Urethral Mucous Membrane.

In early embryonic life the urethral mucous membrane is quite smooth. About the third month of intra-uterine existence solid epithelial buds are formed on the deep surface of the epithelial layer, and penetrate into the stroma, thus giving rise to various glands, which may be grouped under three headings:

1. The glands of the anterior, cavernous portion of the urethra.
2. The prostate gland.
3. Cowper's glands.

The urethra is thus well supplied with glands, which are destined to lubricate the epithelium, and to protect it, by means of their secretions, against the irritant effect of the urine. A copious flow of the mucus which they produce takes place during erection.

1. The Glands of the Anterior, Cavernous Portion of the Urethra.

These glands are of three different types, which have been well studied by Lichtenberg of Heidelberg:[1]

1. **Tubo-Alveolar Subepithelial Glands.**—These glands are deeply sunk into the tissues, and are fixed between the meshes of the corpus spongiosum. Their young forms are often intra-epithelial, and communicate with the lumen of the urethra by a very narrow duct. Most authors classify them as cysts, and one finds them described in the literature as "follicles." They are usually considered to consist of degenerated epithelium which has been separated off from the lumen of the urethra.

Lichtenberg holds that they are progressive formations which are free during the stage of development in the deep part of the epithelium, but remain small and keep in contact with the epithelium—hence their subepithelial position. Occasionally they increase to such an extent that they rise to the level of the mucous membrane, and then they communicate freely with its lumen. They represent imperfect glands of Littre.

2. **Depressions of Glandular Shape.**—Their structure is irregular. They are covered by an epithelium which is similar to that of the former group, but they are more developed, and exist as true mucous glands in other vertebrates.

3. **Submucous Glands.**—These glands are superficial, and bulge into the submucous part of the mucosa. They are visible if one examines the mucous membrane with a lens. In the spongy part they are noteworthy on account of their situation; they are partly covered in by muscle fibres. Littre was

[1] Lichtenberg, *Beiträge zur Histologie, Mikroskopischen Anatomie, und Entwicklungsgeschichte des Urogenital Kanals de Mannes und seiner Druesen*, **Wiesbaden**, 1906.

the first to describe them, in 1706. As their orifices are in the midst of erectile tissue, they secrete a considerable amount of mucus during erection.

In the prostatic portion Littre's glands are few and rudimentary. They are scattered in the membranous urethra, and present in great numbers in the spongy. They occupy chiefly the upper and lateral surfaces. On the lower surface there are but very few. Their ducts, which vary in length according to the more or less superficial position of the glands, open either directly on the surface of the mucous membrane or into the pouches of the lacunæ of Morgagni.

Histologically, they are composed of a thin membrane and a prismatic epithelium. They secrete a clear, transparent mucus which reaches the

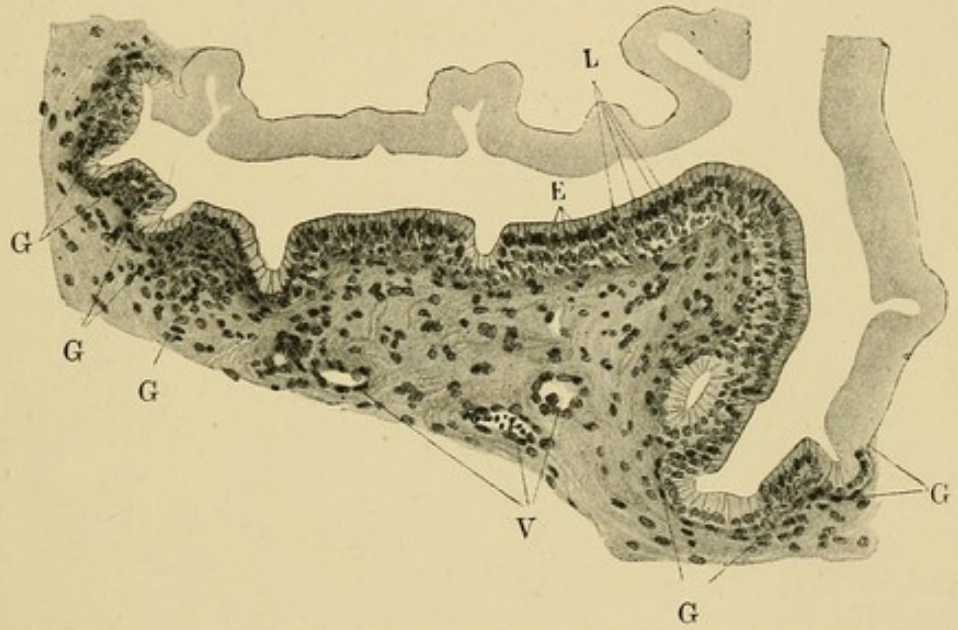


FIG. 17.—HISTOLOGICAL ASPECT OF THE URETHRAL MUCOSA IN THE CAVERNOUS REGION (155 DIAMETERS). (After Lichtenberg.)

E, Epithelial cells; L, leucocytes entering the mucosa; G, glandular sinus; V, bloodvessels.

urethra through their ducts. The latter are directed obliquely towards the meatus, and vary in length from a few millimetres to 2 centimetres. Obstruction of a duct is sufficient to form within the urethral wall a focus which discharges its contents only on and off into the urethra, and will keep up a chronic urethritis.

These glands thus are of considerable importance. When infected, they are, together with the lacunæ of Morgagni, hotbeds for micro-organisms. They are closed by a plug of mucus, and discharge their contents intermittently into the urethra. The organisms within them defy all irrigations, injections, and instillations, as the fluids used fail to reach these recesses.

It is thus easily understood that a focus of this nature may give rise to

a series of reinfections which drive the patient and his surgeon to despair, and to repeated recurrences, even when a properly-conducted irrigation treatment seemed to be on the point of curing the discharge from the urethra.

2. The Prostate.

The prostate is a gland which belongs physiologically to the sexual organs. It is conical in shape, and is situated just below the bladder, above the middle perineal aponeurosis, behind the symphysis pubis, and in front of the rectal ampulla.

Through it runs the urethra from above downwards, with a forward slope. It is also traversed by the two ejaculatory ducts.

Anatomically, the prostate consists of *two lateral lobes*—a right and a left one—and of an intermediate portion—the so-called *middle lobe*.

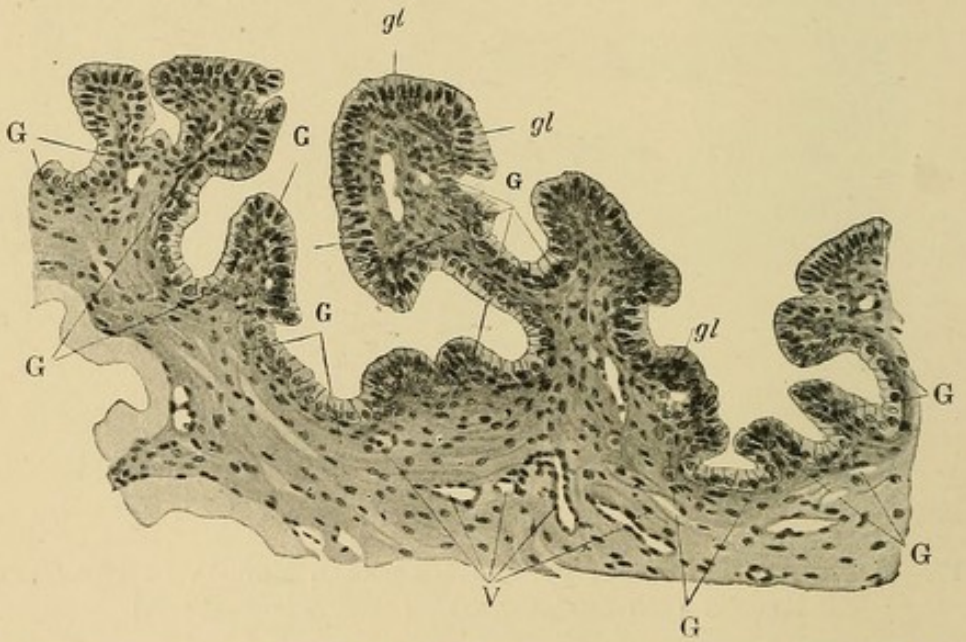


FIG. 18.—HISTOLOGICAL ASPECT OF THE URETHRAL MUCOUS MEMBRANE IN THE CAVERNOUS PORTION (200 DIAMETERS). (After Lichtenberg.)

G, Glandular sinus; *gl*, subepithelial tubo-alveolar glands; V, bloodvessels.

Structure.—One distinguishes a *stroma* and a *gland substance*. The former consists of a mixture of connective tissue and unstriped muscle fibres. Its outer surface is in relation with the walls of the prostatic fossa. Its inner surface sends out septa which radiate towards the centre of the organ, where they form a mass of lesser density—the *central nucleus*. Through the various partitions so formed, the interior is divided into a number of small spaces which are occupied by the glandular substance.

The individual prostatic glands, about thirty to forty in number, are arranged in a radiating fashion around the urethra. Their excretory ducts open on the free surface of the urethral mucous membrane by small round openings which are readily seen with a magnifying-glass.

The glandular elements are composed of a dense stroma of connective tissue which is lined with the secreting epithelium.

Under normal conditions the prostatic secretion is only excreted during ejaculation, and mixes immediately with the sperma.

3. Cowper's Glands.

Cowper's glands are small roundish masses situated behind the base of the bulb, in the angular space formed by it and the membranous portion of the urethra. Their size varies from that of a bean to that of a small hazelnut. They are enclosed in the middle aponeurosis of the perineum.

Structure. — Cowper's glands belong to the grape type of glands, and consist of lobules and acini. The walls of the latter are formed by a single row of pyramidal cells. Their excretory ducts join, and form one single

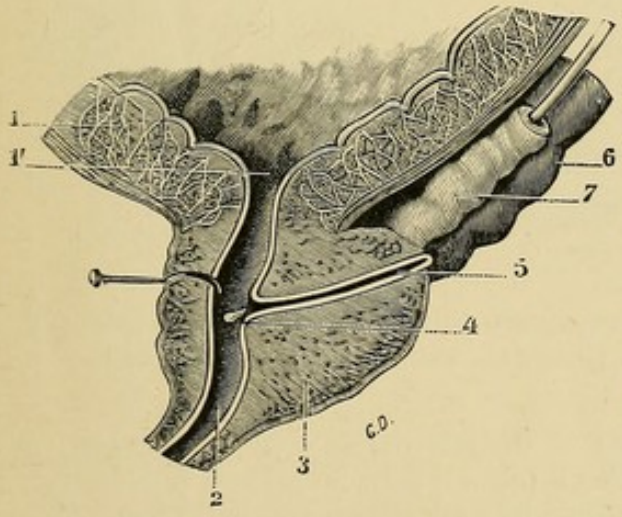


FIG. 19. — THE PROSTATIC UTRICULUS, SEEN IN A SAGITTAL SECTION THROUGH THE PROSTATE. (After L. Testut.)

1, Bladder, with, 1', its neck; 2, urethra; 3, prostate; 4, verumontanum; 5, utriculus; 6, seminal vesicle; 7, vas deferens (a probe, introduced into this duct, is seen to appear in the urethra slightly to the outer side of the utriculus).

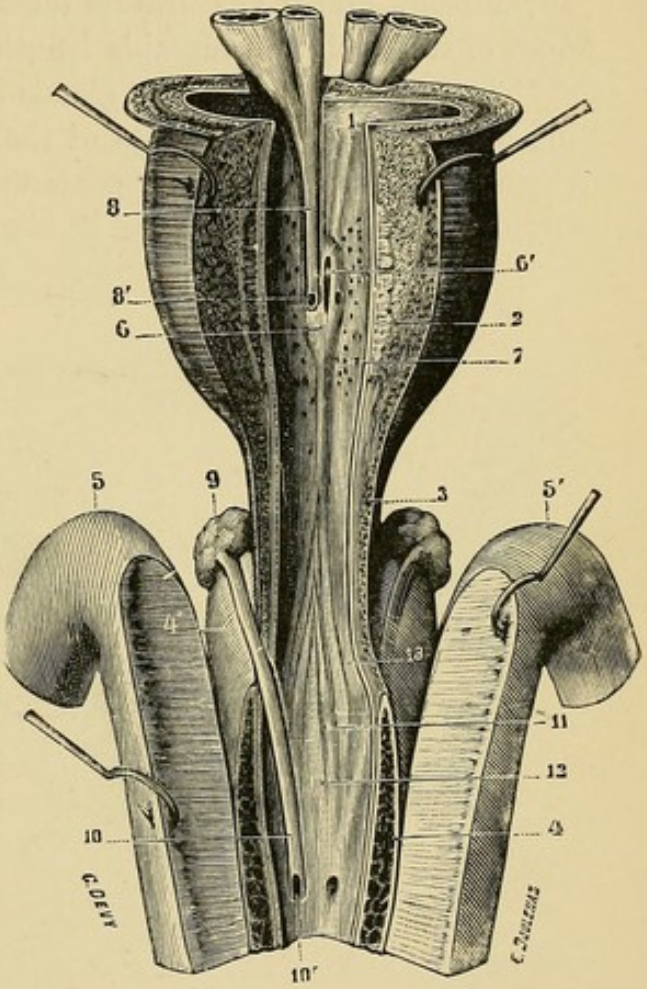


FIG. 20.—THE POSTERIOR PART OF THE URETHRA, AS SEEN AFTER A MEDIAN LONGITUDINAL INCISION OF ITS ANTERIOR WALL. (After L. Testut.)

1, Neck of the bladder; 2, section through prostate and urethral sphincters; 3, section through the membranous urethra; 4, section through the spongy urethra; 4', bulb; 5 and 5', the two corpora cavernosa; 6, verumontanum, with, 6', the orifice of the utriculus; 7, posterior wall of the urethra; 8, ejaculatory ducts, with, 8', their orifices; 9, Cowper's glands; 10, their ducts (dissected out on the right side); 10', orifice of the duct of Cowper's gland; 11, longitudinal folds of the urethral mucosa; 12, cul-de-sac of the bulb; 13, neck of the bulb.

duct which passes through the inferior layer of the middle aponeurosis of the perineum, and enters the substance of the bulb. In this way, the duct on either side of the urethra reaches its under-surface, which it follows as far as the anterior part of the cul-de-sac of the bulb. Here it perforates the urethra and opens into its lumen. Each gland of Cowper has thus a duct of relatively considerable length (30 to 40 millimetres).

The secretion of Cowper's glands is a transparent, viscous fluid, containing albumin. As in the case of the prostate and of the seminal vesicles, these glands discharge their contents at the time of ejaculation, and thus supply the sperma with one of its elements.

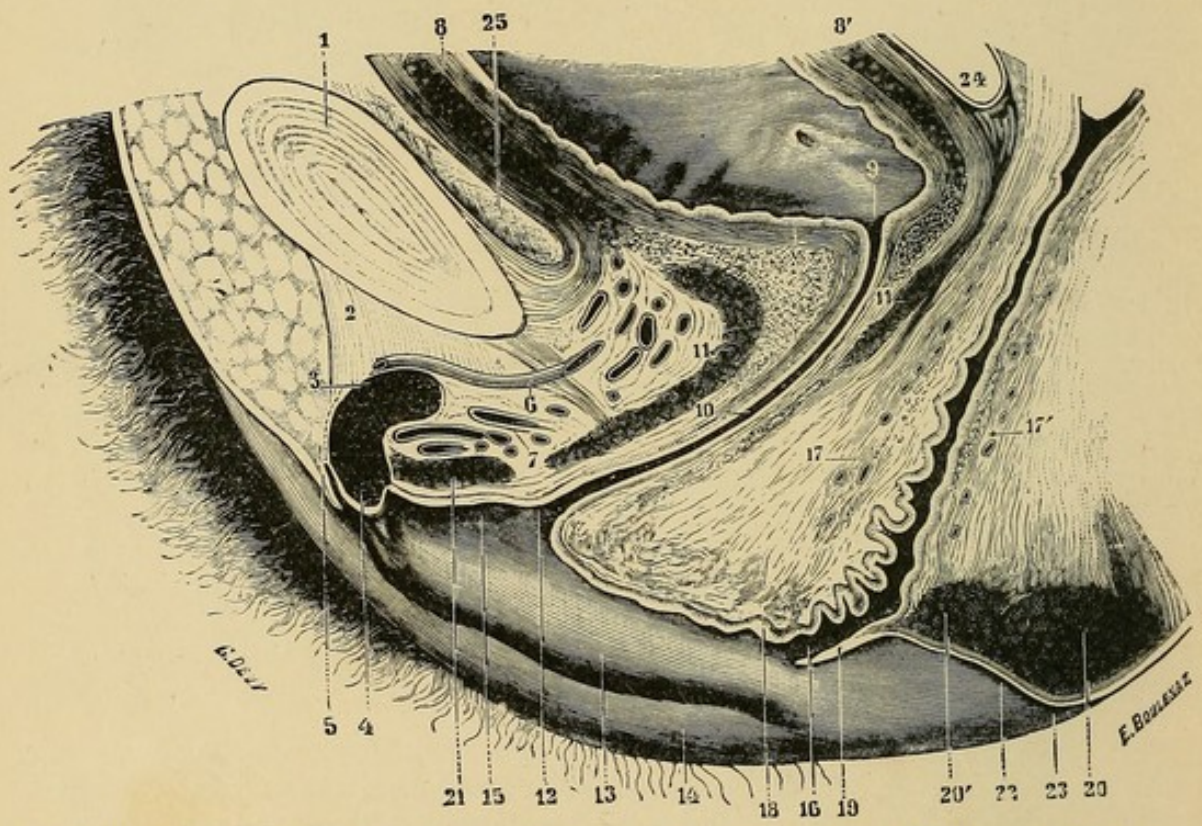


Fig. 21.—Sagittal Section through a Congealed Subject (Virgin of Twenty-four, Natural Size), comprising the Urethra, the Vulva, and the Vagina. (After L. Testut.)

1, Symphysis pubis; 2, suspensory ligament of the clitoris; 3, corpus cavernosum clitoridis; 4, anterior extremity of the clitoris (glans); 5, its prepuce; 6, dorsal vein of the clitoris; 7, intermediate venous plexus between clitoris and bulb; 8 and 8′, anterior and posterior walls of the bladder; 9, neck of the bladder; 10, urethra; 11, external sphincter of the urethra; 12, urinary meatus; 13, labium minus; 14, labium majus; 15, vestibule; 16, inferior orifice of the vagina; 17 and 17′, anterior and posterior columns of the vagina; 18, vaginal tubercle; 19, hymen; 20, external sphincter ani; 20′, constrictor cunni; 21, those fibres of the latter muscle which are situated between urethra and clitoris; 22, fossa navicularis; 23, fourchette; 24, vesico-uterine fold of peritoneum; 25, prevesical space.

II. The Female Urethra.

The urethra of woman is much shorter than the male urethra, and only has one function—namely, to act as a channel for the urine.

Its average length is 35 millimetres. Its width is generally 7 to 8 millimetres; but it can be dilated with ease, and there is no difficulty in passing sounds 10 or 12 millimetres thick. Certain surgeons, like Simon of Heidelberg, have practised dilatations up to 20 millimetres, and Reliquet went as far as 30 millimetres.

The course of the female urethra is directed obliquely downwards and forwards; it describes a slight curve, the concavity of which looks upwards and forwards.

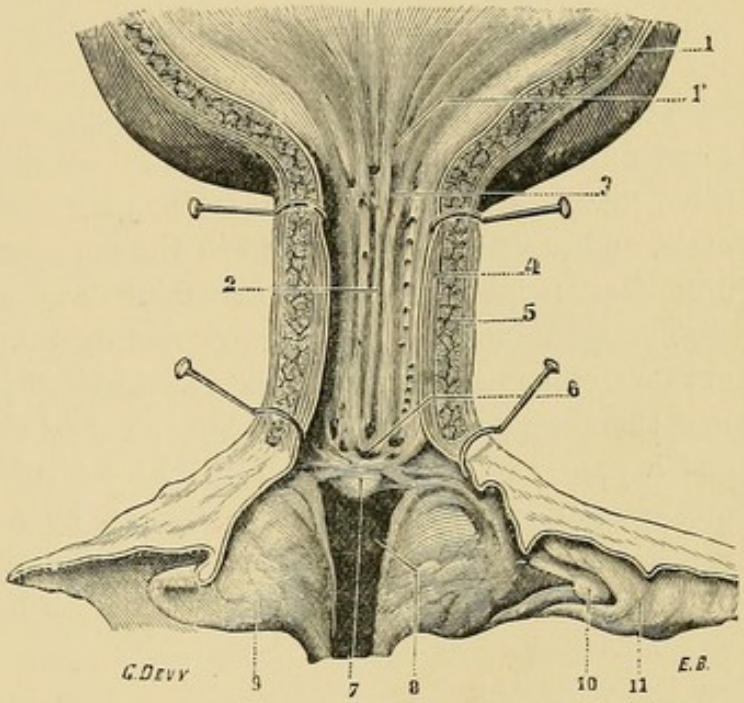


FIG. 22.—THE FEMALE URETHRA, SEEN FROM THE FRONT. (After L. Testut.)

The anterior wall of the urethra has been incised along the middle line, and the urethra has been spread out.

1, Bladder, with its neck, 1'; 2, urethra, with its longitudinal folds and glandular orifices; 3, urethral crest; 4, muscular coat of the urethra; 5, external sphincter of the urethra; 6, urinary meatus; 7, vaginal tubercle; 8, vagina; 9, labia minora; 10, clitoris, with, 11, its prepuce.

Relations.—Behind, the female urethra rests on the anterior vaginal wall, to which it is adherent. In front of it is the venous plexus of Santorini, the constrictor cunni muscle, and the symphysis pubis.

Its lateral relations are the venous plexus of Santorini, Wilson's muscle, the middle aponeurosis of the perineum, Guthrie's muscle, the constrictor cunni, and the root of the corpora cavernosa clitoridis.

Its upper opening corresponds to the anterior angle of the trigone of the bladder. Its lower orifice is the urinary meatus, which is the narrowest and least dilatable part of the canal. It is placed immediately behind the clitoris, and immediately in front of a protrusion called the "vaginal tubercle," the termination of the anterior column of the vagina.

Inner Aspect.—A certain number of little folds run along the urethra from behind forwards. Apart from them, the urethral mucous membrane pre-

sents a number of little openings which correspond partly to the lacunæ of Morgagni, and partly to the orifices of the urethral glands.

Histology.—The female urethra has two coats, an outer muscular coat, and an inner mucous coat. The former is composed of two layers of unstriped muscle fibres. The longitudinal muscle fibres are just external to the mucous coat, whilst the circular ones, which are the more superficial, form in the region of the neck of the bladder a large ring—the unstriped sphincter. This musculature is reinforced by striped fibres which form the sphincter of voluntary contraction.

The mucosa consists also of two layers: (1) A stroma, containing a great number of elastic fibres; and (2) an epithelium, formed by two or three rows of polyhedrical cells. The glands are less numerous than in the male, and are nearly all located in the anterior portion. The region in the immediate neighbourhood of the sphincter is practically free from glands.

The great number of urethroscopic examinations which I have carried out on women has shown me the arrangement just described to be constant. It is therefore permissible, from this point of view, to distinguish an *anterior* and a *posterior urethra*, just as in the case of man. The female posterior urethra is essentially muscular, covered by a smooth mucous membrane, whilst the anterior one is essentially glandular. The infection of its glands by the gonococcus is the chief cause of the long duration of gonorrhea in woman.

THE PATHOLOGY OF GONORRHEA.

Before describing the lesions which the use of the urethroscope has allowed us to discover in chronic gonorrhea, a short résumé of our present knowledge of its pathology may here be given, as it is only in this way that these lesions can be understood.

Histological and urethroscopical researches complete each other, and they should go hand in hand. The pathological changes in chronic urethritis are clearly visible during life by means of the urethroscope, but they become invisible to the naked eye after death, because the local congestion and edema vanishes with the cessation of life.

In the following we will consider the infection from its very beginning, from the moment the gonococcus enters the urethra up to the remotest lesions which it produces.

The cases of acute gonorrhea in which a post-mortem examination has been made, are scarce. Thanks to Finger, who inoculated moribunds with gonorrhea, detailed examinations of the urethra thirty-six and forty-eight hours after the infection have been made, and we thus have an account of the lesions present at that stage.

Amongst the other authors who have studied the morbid histology of

gonorrhea, the important works of Dinklers and Finger, Oberländer and Neelsen, Oberländer and Kollmann, Baraban, Wassermann and Hallé, Bumm, Touton, Jadassohn, Fabry, Rosinsky, Wossidlo, Motz, and others, should be mentioned. These researches complete each other, and give a complete insight into the activity of the gonococcus within the urethral mucous membrane.

The Pathology of Acute Urethritis.

Once the gonococcus has fixed itself on a point of the urethral mucous membrane, it develops on the surface of the epithelial layer. After a very short time, however, it tends to enter the deeper tissues. In the case of a cylindrical epithelium, this penetration takes place readily, less so if the epithelium is of the flat pavement type. The cylindrical epithelium is thus a very favourable soil.

This fact has been well pointed out by Finger, and it explains certain peculiarities of gonorrhea infection.

It is a matter of common knowledge—and all specialists have frequently occasion to corroborate it—that the gonococci penetrate into a normal urethra which has never been infected, and has a healthy cylindrical epithelium, much more easily and readily than into one which has been infected some time or other. This fact explains why abortive treatment by means of immediate irrigations is much more often a failure in fresh cases than in subsequent attacks. One of the consequences of gonorrheal infection of the urethra is destruction of the cylindrical epithelium, and its replacement by pavement epithelium. After a couple of attacks, the urethra has undergone such modifications as to become a bad soil for the gonococcus. The organism finds it difficult to penetrate into the epithelium, and thus the chances of a well-conducted abortive treatment proving successful are infinitely greater.

On the average, thirty-six hours elapse before the gonococcus penetrates into the depth of the urethral mucosa. This period during which the organism remains on the surface is free from symptoms, and is termed the *incubation period.* When the gonococcus enters the epithelium, it passes between the superficial cells wherever there is least resistance. It thus advances as far as the subepithelial connective tissue, and this fact is of the utmost importance therapeutically. The migration of the gonococcus is accompanied by an intense reaction on the part of the tissues, which finds its expression in a severe inflammation which appears usually on the third day. This reaction is an attempt on the part of the body to defend itself against the invasion by a pathogenic irritant, and is characterized by a pronounced diapedesis of leucocytes. These cells leave in large numbers the walls of their capillaries, which are dilated, and advance towards the cocci. The result of the ensuing struggle is the purulent discharge.

To schematize, we observe the following: On one hand, the gonococci penetrate into the mucous membrane, and on the other hand, the leucocytes leave their bloodvessels and attack the invaders. In the struggle which now takes place within the mucosa, the white cells engulf the organisms; but they are killed, and their corpses, laden with the organisms, are brought to the surface of the mucous membrane, and discharged into the lumen of the urethra, thus giving rise to the flow of pus from the meatus.

The urethral mucous membrane is thus a true battle-field, and it will be easily seen that it has to suffer to a considerable extent. It is damaged, not only by the cocci as they penetrate into it, but also by the leucocytes as they pass into the interstices from within outwards. The injured epithelium undergoes mucous degeneration, peels off in flakes, and disappears in places, leaving a denuded mucous surface.

Soon after, the inflammation leads to the mucosa being occupied by embryonic cells. This infiltration is limited in some cases to the superficial layers only; in others it involves the mucosa in its entire thickness. This latter structure is then roughened, thickened, and inelastic, and bleeds readily. Or, again, the inflammation may extend still farther; the subepithelial connective tissue is infiltrated with embryonic cells, and this process may spread to the corpora cavernosa and affect their trabeculæ. The network of the corpora cavernosa begins to swell and to undergo infiltration; phlebitis supervenes, and there is also some endo- and peri-arteritis. The dilated capillaries are full of polymorphonuclear leucocytes. The lymphatics may also be implicated; the lymphatic glands become enlarged and painful, and may even suppurate.

The urethral glands (Morgagni's lacunæ and Littre's glands) have their share in the inflammatory process, and this is of the utmost importance, owing to the rôle which inflammation of these structures plays in chronic gonorrhea. The gonococci are present around the glands. They are not actually on the epithelium which lines the glandular lacunæ, but they are within the leucocytes which cover it. They remain between the cells which line the excretory ducts of Littre's glands, the acini of which contain but leucocytes. The inner surfaces of the gland ducts undergo partial desquamation, and are then invaded by leucocytes. Finally they become the seat of an abundant cell proliferation; the duct walls thus become thickened and infiltrated with embryonic cells. Around the glands this process spreads, and may reach the corpora cavernosa.

The infection of the urethral glands terminates either by sclerosis, or by the obliteration of the ducts, or by their transformation into cysts.

We have so far only considered, from the pathological point of view, the infection inasmuch as it is a *downward spreading process*. We will now turn our attention to its *extension on the surface*.

From the fossa navicularis, where it begins, the gonorrheal inflammation spreads backwards to a variable extent, according to the virulence of the infection, the constitution of the patient, and the treatment applied, which is of the greatest importance in this respect.

If the infection stops in front of the membranous sphincter, we speak of an *anterior urethritis ;* if it passes beyond that muscle, a *posterior urethritis* is present. The involvement of the posterior urethra occurs in 60 or 70 per cent. of all cases (Finger, Jadassohn). A posterior urethritis is always more serious, owing to the possibility of complications arising, such as prostatitis, vesiculitis, cowperitis, pyelonephritis, etc.

The Pathology of Chronic Urethritis.

After a few weeks (usually about the third), the acute stage of gonorrhea has passed its climax. The number of gonococci diminishes; the phago-

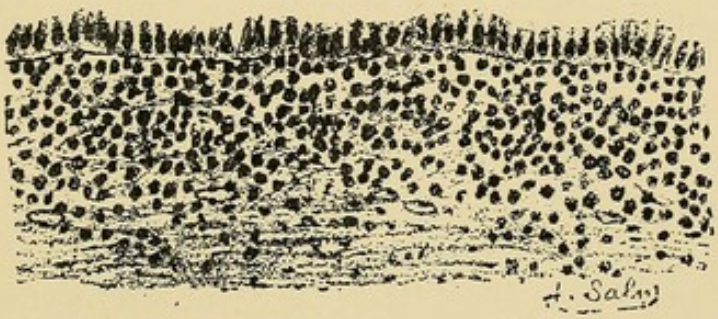


FIG. 23.—SUPERFICIAL INFILTRATION OF THE URETHRA. THE CYLINDRICAL EPITHELIUM IS ALMOST NORMAL. (Motz.)

cytosis is less active; the embryonic infiltrations are resorbed; the vascular changes become less evident, and the destroyed epithelium is gradually

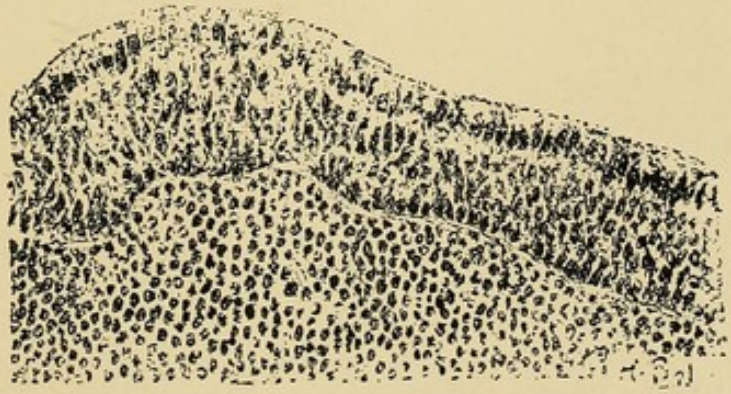


FIG. 24.—SUPERFICIAL INFILTRATION OF THE URETHRA: PROLIFERATED CYLINDRICAL EPITHELIUM. (Motz.)

regenerated. The process of repair begins. It becomes effectual about the fifth or sixth week by the formation of a pavement epithelium composed

of several strata. In no instance do the epithelial cells reassume the character of a cylindrical epithelium.

When this proliferation of embryonic tissue is too active, the foundation for future stenoses and strictures of the urethra is laid.

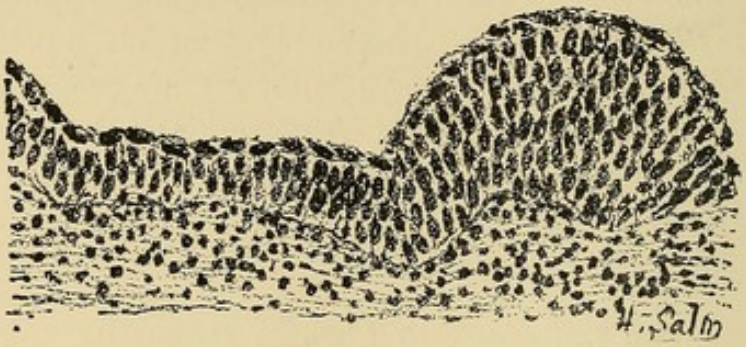


FIG. 25.—SUPERFICIAL INFILTRATION OF THE URETHRA: STRATIFIED CYLINDRICAL EPITHELIUM, COVERED BY A LAYER OF PAVEMENT EPITHELIUM. (Motz.)

This replacement of the cylindrical epithelial cells by pavement epithelium is the rule in gonorrhea. The epithelium thus becomes finally a kind of tough skin which is less permeable to antiseptics than the normal one, and has lost its suppleness.

A *restitutio ad integrum* is thus impossible, and all cases of chronic gonorrhea which are neglected invariably develop strictures.

Lastly, the gonococci which were present in the depth of the tissues and in the caverns of the glands, disappear about the sixth week. This fortunate issue is, however, by no means the rule; usually all the organisms do

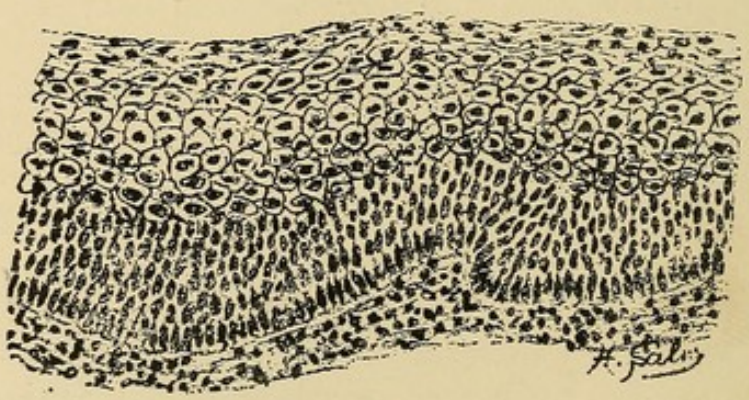


FIG. 26.—SUPERFICIAL INFILTRATION OF THE URETHRA: EPITHELIAL LINING COMPOSED OF MANY LAYERS OF PAVEMENT AND OF CYLINDRICAL EPITHELIUM. (Motz.)

not disappear. A number of them remain somewhere in the tissues or in the glands, and keep up the inflammation of the mucous membrane. The urethritis then becomes chronic.

Changes in the Urethral Epithelium.—In chronic urethritis, the first effect of the inflammation on the epithelium is the stratification of the cylindrical epithelium, which may show as many as seven or eight layers.

The second stage is the evolution of the epithelium towards keratinization. The urethra is covered with a great number of epithelial layers, partly of the cylindrical and partly of the pavement type. Gradually this

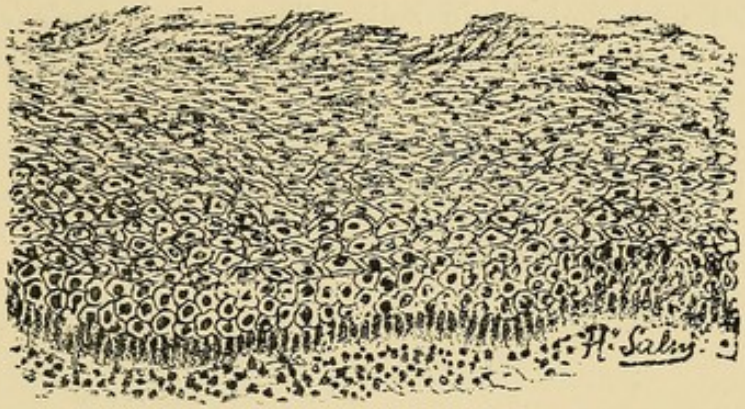


FIG. 27.—SUPERFICIAL INFILTRATION OF THE URETHRA. THE EPITHELIUM IS KERATINIZED. (Motz.)

condition changes, until a number of flat, keratinized epithelial strata are formed which have the greatest analogy with those of the skin. The mucosa thus loses its permeability to a very great extent; drugs applied to it for a short time cannot reach its deeper layers, and therefore remain ineffective.

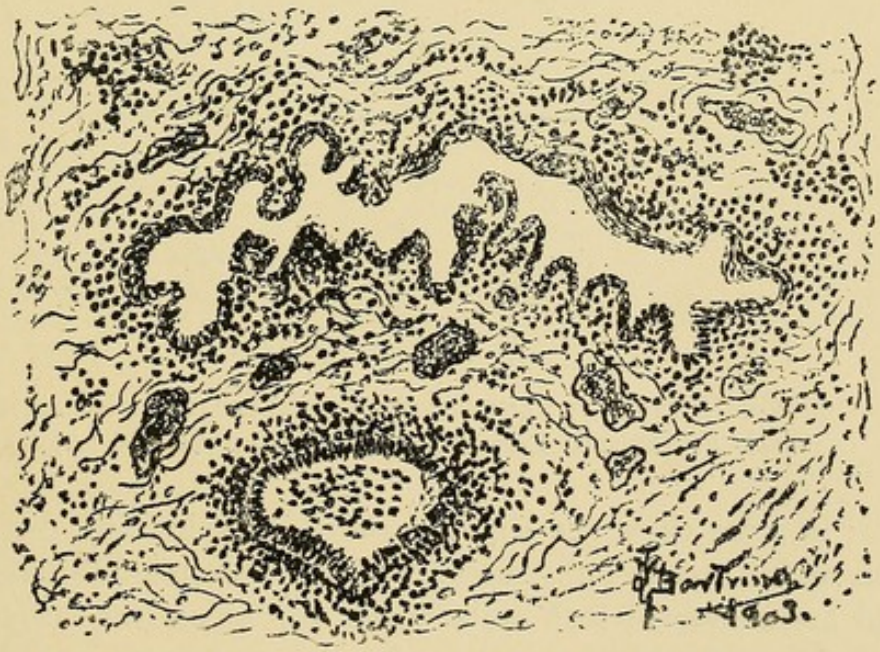


FIG. 28.—CHRONIC URETHRITIS, EPITHELIUM ALMOST NORMAL: SUPERFICIAL AND DEEP INFILTRATIONS; URETHRAL ADENITIS.[1] (Motz.)

The result of this pathological process is "that most chronic infiltrations are protected by a thick shell which is almost impermeable to chemicals. This is the true reason why it is so difficult to disinfect these superficial

[1] "Adenitis" means here, and in the following figures, "inflammation of the glands of the urethra" (A. F.).

infiltrations, which sometimes last twenty or thirty years, as the autopsies on patients who died from stricture show."[1]

The chorion also takes part in the inflammation, and is infiltrated with leucocytes and embryonic cells. These embryonic elements form fibrous tissue which ultimately assumes the character of a true cicatrix.

The lacunæ of Morgagni also participate. They begin to swell, and their orifices take the shape of crater-like elevations. At a later stage, sclerosis

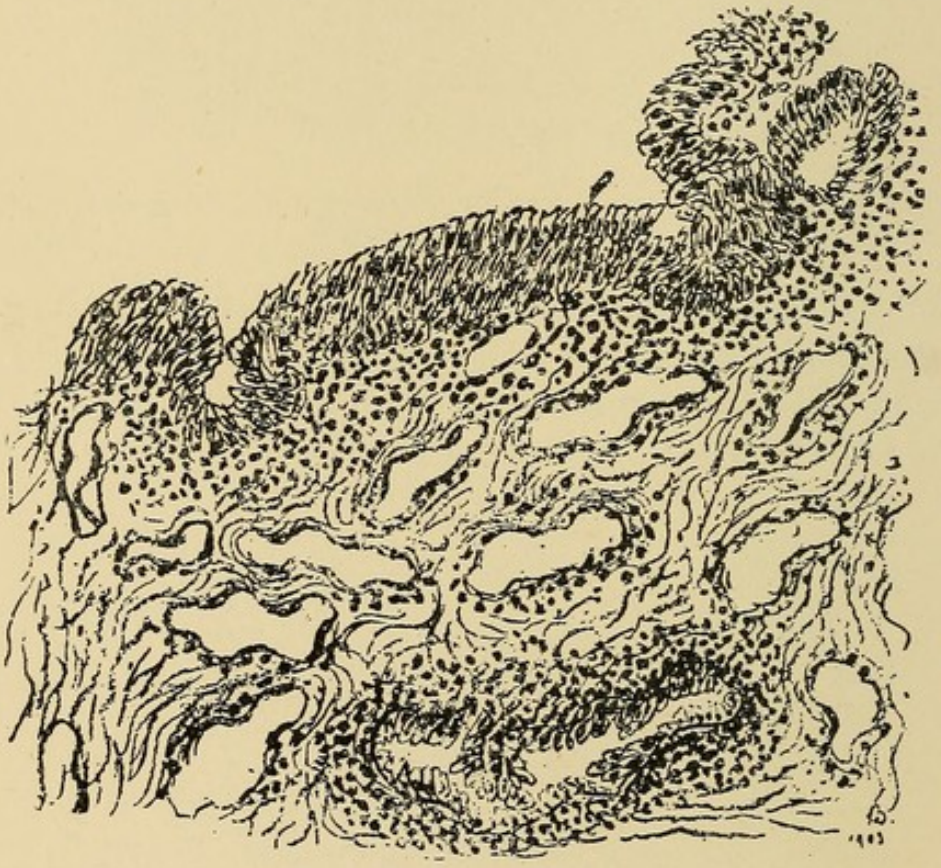


FIG. 29.—CHRONIC URETHRITIS: STRATIFIED CYLINDRICAL EPITHELIUM; SUPERFICIAL EMBRYONIC INFILTRATIONS; ADENITIS. (Motz.)

supervenes: in some cases the lacunæ retract, atrophy, and disappear; in others their orifice becomes obstructed, and they become filled with cellular débris, and are converted into cysts which appear on the surface of the mucous membrane as whitish nodules. Less often they suppurate, and give rise to peri-urethral abscesses and fistulæ.

It is around the glands of Littre that the infiltrative lesions are most marked. Several forms are met with: either the glandular secretion increases, and the glands become swollen; or little cysts, filled with a colloid material, are formed; or the cell proliferation loosens the cylindrical epithelium, destroys the sinus, and fills the gland with epithelial débris; or, lastly, the

[1] Motz, *Annal. des Malad. des Organes Génito-Urin.*, 1903, p 419.

surrounding fibrosis strangulates the glands, as it becomes harder, and contracts, and thus causes them to disappear gradually.

Thus, Littre's glands are liable to three different changes:

1. The periglandular infiltrations lead to a modification in the epithelium which lines the duct of the gland. This epithelial degeneration is similar to the one on the surface of the mucosa, and is characterized by cell proliferation and the formation of pavement epithelium. The gland thus ceases to secrete, and its acini are soon filled with epithelial neo-formations.

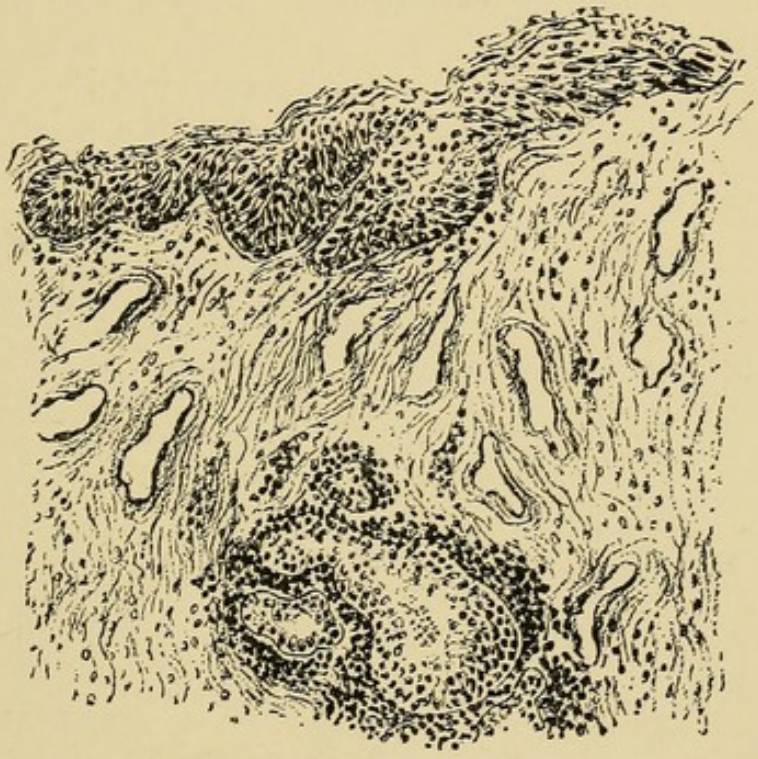


FIG. 30.—CHRONIC GLANDULAR URETHRITIS: STRATIFIED CYLINDRICAL EPITHELIUM COVERED BY SEVERAL LAYERS OF PAVEMENT EPITHELIUM; MUCOSA AND SUBMUCOSA CURED; ADENITIS. (Motz.)

2. The periglandular infiltration retracts, and thus gradually compresses the acini. In this case the alteration of the glandular epithelium is purely passive; it undergoes slowly complete destruction, strangulated by the contracting fibrous tissue around it.

3. The glands are shut off from the lumen of the urethra, and are converted into cysts. If these cysts become the seat of an acute inflammation, they tend to suppurate and to give rise to follicular abscesses.

The urethral glands thus play an important rôle in gonorrheal inflammation; they are largely responsible for the deplorable tenacity of certain urethrites. In the glandular culs-de-sac the gonococcus finds shelter, even when the surface of the mucosa in general has become normal again, and thus it gives rise to repeated recrudescences of the illness. Under the influence of the same factors which produce congestion, either generally or locally, the

glandular secretion increases suddenly, and carries the cocci again to the surface of the mucosa.

The peri-urethral erectile tissue and the corpora cavernosa may be invaded by the same changes as the mucous membrane. The inflammatory process takes a similar course. At first numerous round cells invade the corpora cavernosa; then connective-tissue fibres appear; and finally hard retracted bands are formed, which are often the beginning of a stricture.

In the above pages the primary and secondary changes which are found in the anterior urethra have been described. A few further remarks on the posterior urethra may be useful.

The two common phases of inflammation are also met with in the posterior urethra. They take a similar course: at first there is cell proliferation, and

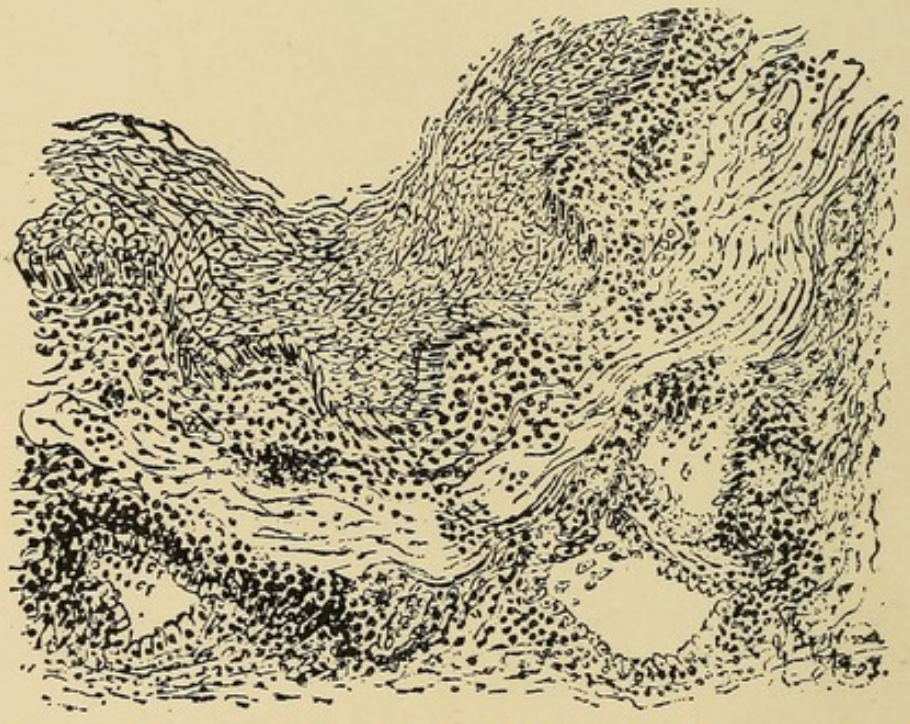


Fig. 31.—Chronic Superficial and Deep Urethritis: Keratinized Epithelium; Superficial Embryonic Infiltrations; Urethral Adenitis. (Motz.)

especially desquamation of the cylindrical epithelium; then regeneration takes place, and conversion of the cylindrical epithelium into pavement epithelium.

The anatomical conditions, however, modify this process to a certain extent. In the membranous urethra the sphincter causes the mucosa to fissure owing to its energetic contractions. Thus, more or less deep rhagades, which present a red base and bleed easily, are formed in many cases. These ulcerations heal by cicatrization, and tend to narrow the lumen; hence the great frequency of strictures in this region.

In the prostatic region the infiltration distorts the mucous membrane. The fibrous tissue formed compresses, and finally obliterates, the orifices of

the ejaculatory ducts. The latter are also often infiltrated, and their walls become rigid and gape.

The prostatic glandules become the seat of a muco-purulent or purulent catarrh, or even undergo, as a result of periglandular infiltration, necrosis and destruction.[1]

The inflammatory process may not extend beyond the superficial layers of the subepithelial tissue, but it is more common for the inflammation to reach the deeper structures, and this extension of the inflammation takes place chiefly along the glands and their excretory ducts.

Sometimes, only the orifice of an ejaculatory duct is involved. In cases of this kind the opening becomes sclerosed and narrowed; hence the shooting pain felt by certain patients during ejaculation, when the sperma is on the

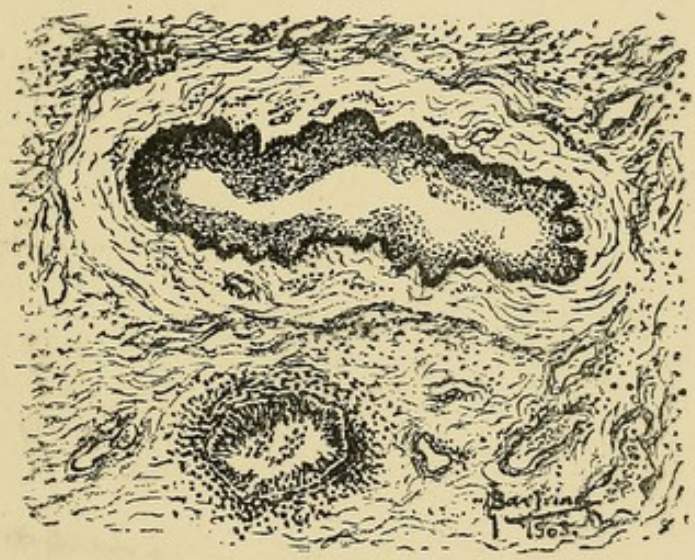


FIG. 32.—DEEP CHRONIC URETHRITIS: KERATINIZED EPITHELIUM; SCLEROSIS OF MUCOSA AND SUBMUCOSA; DEEP INFILTRATIONS; ADENITIS. (Motz.)

point of passing the narrowed orifice of the duct. Moreover, these rigid ejaculatory ducts close the seminal vesicles incompletely, and thus spermatorrhea is not infrequent in chronic urethritis.

The epithelium of the prostatic glands also undergoes changes, of which two types may be distinguished:

Either the glands are filled with atrophied and desquamated epithelium, in which case the prostatic secretion is copious, white, opaque, and contains an excessive amount of epithelial elements; or they are filled with polymorphonuclear leucocytes, and secrete freely a thick yellowish mass—pus indicative of prostatitis.

[1] De Keersmaecker and Verhoogen, *L'Urétrite Chronique d'Origine Gonococcique*, Bruxelles (Lamertin), 1898.

Urethral Polypi.

Gonorrhea has an incontestable influence on the formation of polypi in the urethra. Polypi may develop as an immediate result of the inflammation which leads to hypertrophy of the papillæ; or they may arise at a later period subsequently to the formation of strictures. Oberländer,[1] Grégoire,[2] and Burckhardt,[3] have devoted special studies to them, and Dr. A. Pelletier has published a very interesting paper[4] on this subject.

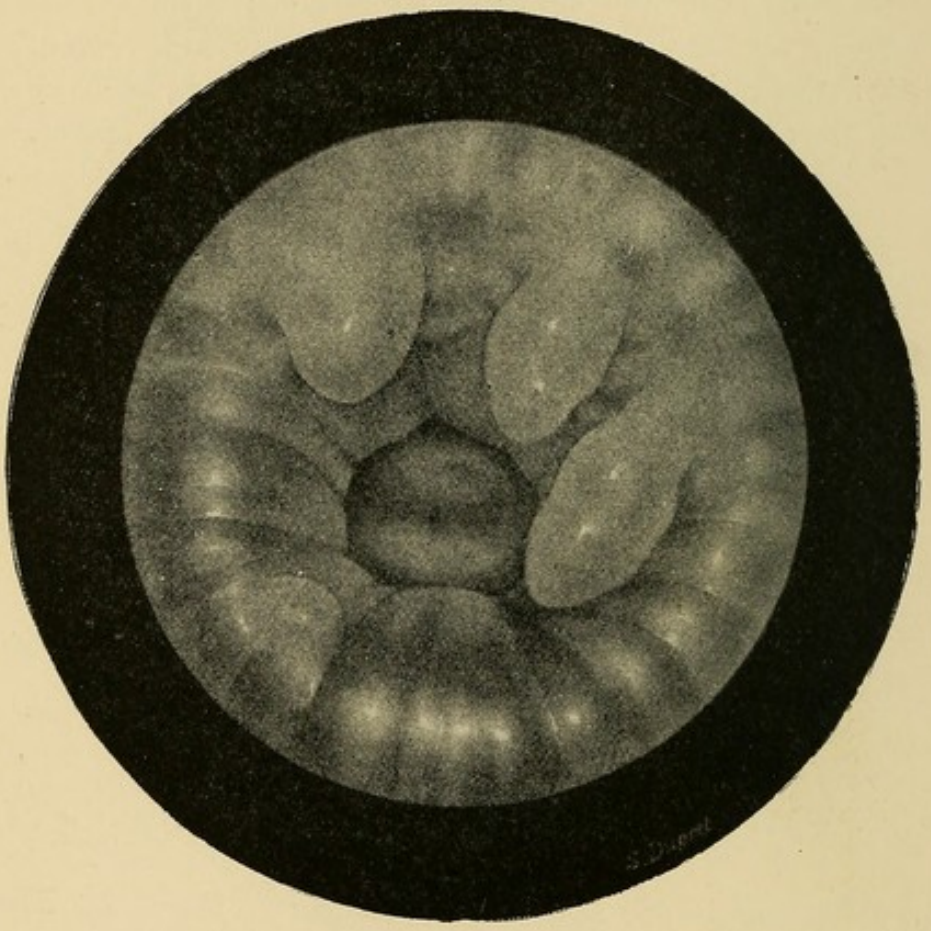


Fig. 33.—Polypi of the Neck of the Bladder in a Woman (Typical Case drawn from Nature).

According to Burckhardt, four varieties of polypi are found:

1. **Caruncles.**—These are small vascular tumours with a more or less well-defined pedicle, which are chiefly found in women. They resemble a raspberry in aspect, and are most common about the meatus. Owing to

[1] Oberländer, "Ueber die papillomatöse Schleimhautentzündung der männlichen Harnröhre," *Vierteljah. f. Dermat. und Syph.*, 1887; *Lehrbuch der Urethroscopie*, 1893.

[2] Grégoire, "Les Polypes de l'Urètre chez la Femme." *Ann. des Mal. des Org. Génito-Urin.*, 1904, p. 321.

[3] Burckhardt, "Die Verletzungen und Chirurgischen Erkrankungen der Harnröhre," *Handbuch der Urologie*, 1906, vol. iii., p. 267 (Die Neubildungen der Harnröhre).

[4] Albert Pelletier, "Les Polypes de l'Urètre," *La Clinique*, 1911, p. 260.

their great vascularity, they bleed readily. Histologically, these tumours are composed mainly of numerous dilated bloodvessels covered by a pavement epithelium of moderate thickness.

2. **Papillomata.**—They can be distinguished with the naked eye owing to the presence of papillæ. Microscopically, they are formed by a thick layer of pavement epithelium; their long axis is occupied by bloodvessels.

3. **Condylomata.**—These tumours have the naked-eye appearance of little cock's combs. Microscopically, they have a very thick epithelial lining which is supported by a compact stroma which is comparatively poor in cells and bloodvessels.

4. **Glandular and Mucous Polypi.**—These growths owe their origin to a hypertrophy of the glandular culs-de-sac of the mucous membrane. Their stroma, which is covered by several layers of epithelial cells, is composed of loose tissue, and contains numerous glands.

I have seen a polypus of this type in a doctor who consulted me in 1910. By means of my urethroscope I discovered it in the region of the prostate, and removed it with a pair of cutting forceps. The histological examination made by Dr. Chenot showed it to be an "adenoma" which owed its origin, in all probability, to a previous attack of gonorrhea which had set up a chronic irritation of the prostatic cells.

CHAPTER VI

THE SYMPTOMATOLOGY OF ACUTE GONORRHEA

THE membranous sphincter of the urethra is a well-defined boundary which the gonococcus usually respects. In front of it, we have the *anterior urethra;* behind it, is the *posterior urethra.* When the gonorrheal infection reaches this latter portion of the urethra, peculiar and special symptoms appear which are characteristic.

Acute Anterior Urethritis.

Acute anterior urethritis has several stages, viz. :

1. **A Period of Incubation.**—In most cases the time of incubation varies from three to five days. Sometimes it is shorter (twenty-four hours or less); in other instances it is longer (seven to eight days). An incubation period which lasts more than a fortnight is quite exceptional. The cases in which the discharge comes on at so late a date are usually not due to a fresh infection; they are sudden exacerbations of a gonococcal infection which has been present for a considerable time.

2. **Prodromal Symptoms.**—One observes (*a*) *Local Symptoms,* such as redness of the lips of the meatus, which are stuck together. Between two micturitions a slightly greyish and sticky drop is formed, which on microscopic examination is found to consist of epithelial cells of the pavement type, a few leucocytes, and a few gonococci. If the patient makes water into several glasses, the first one contains turbid urine, laden with heavy flakes, whilst the remainder are clear.

(*b*) *Functional Symptoms.*—The first symptom is a sensation of tingling and slight pricking, which comes and goes suddenly, "as if a fly were settling down" (Diday).

(*c*) *General Symptoms.*—They are characterized by a certain depression, fatigue, and loss of appetite.

3. **Florid Stage**—(*a*) *Local Symptoms.*—The inflammatory phenomena appear rapidly, after twenty-four to forty-eight hours. The skin of the penis and the prepuce are red and œdematous. The latter is covered with excoriations, and often cannot be drawn back (inflammatory phimosis).

Under the skin of the penis the inflamed lymphatics become visible as cords running along the dorsum. The glans is red, inflamed, and covered with small ulcers, which sometimes "shine like a ripe cherry" (Hunter). The lips of the meatus, which reflect the condition of the urethral mucous membrane "in the same way as the tongue is the mirror of the alimentary canal" (Diday), are red, edematous, and often excoriated. There is a certain degree of ectropion. A profuse flow of pus sets in—a regular "incontinence of pus," as Forgue puts it. The inflamed urethra is like a thick rope to the touch, and very tender. On palpation a number of little nodules of the size of millet-grains are felt along its under-surface; they are inflamed glands of Littre. The discharge becomes thicker, creamy, yellow, and purulent. Towards the end of the first week it assumes a more greenish tint, and produces the characteristic spots on the linen. In the centre of these stains is a thick purulent zone, surrounded by a lighter halo which corresponds to the serous constituent of the discharge.

The flow is always greatest in the morning, because the patient micturates but little, if at all, during the night. In the daytime the urethra is frequently cleansed by making water.

The reaction of the discharge is alkaline.

(*b*) *Functional Symptoms.*—At this stage appears the characteristic symptom of *pain.* Those affected with gonorrhea suffer during micturition, during erection, and during ejaculation. The pain on making water is more or less pronounced; occasionally it is unbearable. Some patients feel as if they were "passing a red-hot iron," or as if they had "razors in their pipe." The severity of the pain depends to a large extent on the suddenness with which the flow of urine dilates the inflamed passage. In most cases the pain is sharp, shooting, or burning. This last-mentioned character has left a lasting impression on the French mind; hence the popular term of "chaudepisse" for gonorrhea. The patients usually dread the act of micturition, and delay it as much as possible, and eventually they proceed with the utmost caution. The seat of the pain on making water varies; it is usually located all along the penile portion; occasionally it is the perineum which feels "heavy."

Owing to the swelling of the mucous membrane, the lumen of the urethra is narrowed, and thus a certain mechanical difficulty in making water is produced. The stream is smaller, thin, split, and sometimes resembles a spray. In the very acute cases the patients micturate drop by drop.

In a few rare instances a certain degree of retention is present, which is partly due to the swelling of the mucosa, and partly to spasm of the membranous region. At this stage the patient is constantly troubled, when he lies down, by erections which result from the congestion of the parts in the horizontal position, the warmth of the bed, or from lascivious dreams or his

compulsory abstinence. These erections are usually accompanied by sharp pains, because the mucous membrane loses its elasticity and its dilatability when it is inflamed. The patient tries to rid himself from these erections by getting up, or by putting cold compresses on his penis, and ultimately succeeds; but as soon as he returns to his bed, he is in as bad a plight as before. When these erections are followed by pollutions (so-called "wet-dreams"), the ejaculations give rise to intense pain; they may even lead to slight fissuring of the mucosa. In this way the slight hemorrhages occur which one meets with. They often cause the pus and the sperma to be blood-stained, a condition which has been decorated with the name "Russian clap."

As the elasticity of the mucosa is diminished, the latter cannot follow the expansion of the corpora cavernosa during erection, and thus the penis becomes distorted. In slight cases, only the glans is bent, but in severer cases the entire penis becomes arched. This condition is known as *chorda venerea*, or *chordee*, and is said by many authorities to be due to the contraction of the longitudinal unstriped muscle fibres of the urethral submucous tissues.

The pain of chordee has led some ignorant patients to seek relief by placing their erect distorted penis on a firm flat support, and attempting to straighten it by hammering it into shape with their fist. This deplorable practice is apt to be followed by serious accidents; the urethra ruptures at some point or other, and it may bleed so furiously that death takes place, as in the case recorded by Voillemier. Moreover, extravasation of urine, sepsis, and traumatic stricture, are apt to supervene.

(*c*) *General Symptoms.*—The troubles mentioned are accompanied by general systemic disturbances, such as slight chills, lassitude, loss of appetite, fatigue, and an earthy pallor. Slight fever up to 38° C. (100·4° F.) is also not uncommon.

The gonococcus produces a general intoxication of the body which is characterized by pallor, loss of appetite, wasting, headache, and a typical anemia.[1]

In many instances these systemic troubles are insignificant, and a good number of patients "drip" calmly for fifteen to thirty days, without showing much worry or anxiety.

The acute stage of gonorrheal inflammation reaches its height about the middle or the end of the third week, after which improvement sets in, if there are no complications.

4. **Period of Decline.**—After twelve to fourteen days the symptoms become less marked. The inflammation of the glans and of the meatus diminishes progressively; the walls of the urethra become supple again, and gradually regain their normal aspect. Micturition and erection cease to be

[1] *Vide* Chapter III., Gonococcal Septicemia.

accompanied by pain. The microscopic examination shows fewer and fewer gonococci and pus cells, whilst more and more epithelial cells are found, especially of the pavement type. The urine becomes clearer, and finally only the first glass contains a few filaments.

The usual duration of an acute anterior urethritis is about five to six weeks. Recurrences are frequent. They are due to the numerous recesses in the mucosa in which the gonococci lodge themselves, and remain latent for a considerable time. A spontaneous cure is very rare. As a rule inflammatory areas are left which keep up a chronic urethritis. The course of the malady is largely influenced by the age of the patient. In old people there is a marked tendency for the disease to spread rapidly to the bladder and to the kidneys. There is a great variety of different clinical types, but they are not sufficiently definite and distinct to deserve individual descriptions.

The phase of decline is of variable length. It may last two or three weeks, but it has no definite limit, as all depends on the observance of the necessary hygienic measures and on the treatment. Carelessness and a misdirected therapy invariably prolong the course of the disease.

Acute Posterior Urethritis.

Inflammation of the posterior urethra is an infinitely more formidable illness than anterior urethritis, owing to the complications which may arise, such as cystitis, epididymitis, prostatitis, and vesiculitis. These troubles are very common, and, as the posterior urethra is affected in almost 80 per cent. of all cases, an early diagnosis of this inflammation is imperative.

Etiology of Posterior Urethritis.—Some authors, like Heissler,[1] have maintained that the posterior urethra is always involved during an attack of gonorrhea. This view, however, appears to be exaggerated, and there is very little doubt that in a considerable number of cases the anterior urethra is alone affected.

There are many causes for the spreading backwards of the gonorrheal infection to the posterior urethra. In some cases this appears to occur spontaneously without any therapeutic interference. But there is practically always a definite cause for the invasion of the posterior urethra by the gonococcus, and one can find it, if one takes the trouble to look for it. General or local fatigue, such as excessive drinking, coitus, prolonged erections, and violent exercise (long walks, cycling, riding), are responsible in certain cases; in others the fault is to be found in neglecting to keep the parts clean.

But the principal cause for the onset of a posterior urethritis is the practice of giving *injections* into the anterior urethra *by means of a small*

[1] Heissler, *Arch. f. Dermatolog. und Syphilis*, 1891, vol. xxiii., p. 765.

syringe. This dangerous custom should be given up for good. An energetic patient has only to inject a certain amount of fluid, pushing the piston as far as it will go, and to keep his urethra closed at the same time; the walls of the canal are then under tension, and the fluid tends to seek an outlet. Finally the membranous sphincter yields, and the liquid, which is full of gonococci, enters the posterior urethra, and infects it with the pus from the anterior part.

Another important cause is a *clumsily and badly given urethro-vesical irrigation.* In nearly every instance the first irrigations do not enter the posterior urethra easily, unless the patient is an habitué. The membranous sphincter contracts, and keeps the liquid back. The gonococci are thus driven into the posterior limit of the anterior urethra, and settle down there, as no flow of antiseptic fluid removes them immediately.

As we shall see later on, in the chapter on Treatment, a well-given urethro-vesical irrigation is the best safeguard against the onset of a posterior urethritis. It is just as beneficial as a clumsy irrigation is harmful.

Another common cause for the development of a posterior urethritis is the *untimely passing of a catheter*—for instance, if it is carried out without urgent need, and without sufficient previous disinfection of the anterior urethra.

At all events, it is absolutely necessary to diagnose a posterior urethritis at the earliest possible moment. Under immediate and proper treatment this trouble tends to heal rapidly, and without any further damage; but it is prone to cause a number of serious complications if neglected.

A patient who consents to stay in bed from the beginning of his gonorrhea on, who commits no carelessness and no therapeutic error, has the greatest possible chance, if not the certainty, of escaping an infection of his posterior urethra.

Symptoms of Acute Posterior Urethritis.—Posterior urethritis comes on during the first or second week of acute gonorrhea. Its onset is insidious, so much so that most patients are unaware of their trouble; but it is just this benign character of the symptoms which should attract the attention of the surgeon.

The cardinal symptoms of this condition are the following:

1. *The Small Amount of Discharge visible at the Meatus.*—When the posterior urethra becomes infected during an ordinary attack of gonorrhea, one frequently finds that the discharge suddenly diminishes considerably in a day or so. The patient is usually very pleased when he notices this apparent improvement. One should, however, not share his joy, and keep a careful watch over his posterior urethra, which is in danger.

2. *The Turbidity of the Urine.*—All four glasses are turbid if the patient makes water into four glasses. This sign is extremely important, for it is the first clue to the diagnosis of a posterior infection if the case has been

treated with permanganate irrigations. It should be a hard-and-fast rule to examine the urine of all patients who are treated with urethro-vesical irrigations every day by the four-glass method.

3. *The Frequency of Micturition.*—This functional symptom is not present in the beginning, but it comes on soon. Its causation is not so much the inflammation of the posterior urethra as that of the neck of the bladder. There is vesical tenesmus; the micturitions become imperative and irresistible. The patient has to make water every ten or five minutes, quite irrespectively of the amount of urine contained in the bladder.

4. *Pain.*—The pain assumes almost at once the character of the pain observed in cystitis, and is marked by its intensity at the end of micturition.

Apart from these four cardinal symptoms, there are others which should not escape a careful observer's notice. "Wet-dreams" become frequent owing to the implication of the verumontanum in the inflammation. Slight terminal hematuria is also found occasionally. Lastly, the general health is impaired. The patient, who so far may have been very well in himself, feels tried, worn out, and complains of loss of appetite. His eyes are hollow and surrounded by dark rings. A curious and characteristic pallor is seldom wanting; the patient is, and feels, a wreck.

When these symptoms are present, a surgical examination becomes urgent; the prostate should be examined by palpation *per rectum.* In the early moments of acute posterior urethritis this exploration gives but little information or none; but after a couple of days it is nearly always possible to make out a painful, doughy spot in the prostate, or a general enlargement of the organ. The prostate is thus of the greatest importance in the pathology of posterior urethritis. The same is true for the seminal vesicles, which should always be examined, and any change in them should be noted.

Chronic Posterior Urethritis.

Symptoms.—The symptoms which characterize a lesion of the posterior urethra in chronic urethritis are generally not well known, and often escape the notice of the patient, as they are usually trifling, and as the discharge is reduced to a minimum, a slight moisture. The chief signs are the following:

1. *The Filaments in the Urine.*—When the patient makes water into four glasses, heavy filaments are constantly found, chiefly in the first and fourth glasses.

2. *The Pains.*—The pains complained of by the patients are usually vague, unpleasant sensations about the urogenital region. In slight cases complaint is made of an indefinite heavy feeling about the "back of the pipe," or the patient has a sensation of heat, or tickling, or of the presence of a weight, or foreign body, in his posterior urethra. On other occasions the patients claim that their urethra burns, especially when they make water.

These different sensations are mainly present at the moment of, or at the end of, micturition, but they may be permanent. Neuralgic pains shooting about the perineum, the groin, and the testicles, are also complained of, even when there is not the slightest evidence of epididymitis. They sometimes radiate to the loins, the sacral region, the upper part of the thigh, or the whole pelvis, and worry the patient when he is sitting down, and more so when he walks, or rides on horseback.

3. *Neurasthenic Troubles.*—Patients who have lesions in their posterior urethra are nearly always neurasthenics; they suffer from "sexual neurasthenia." Pains in the region of the kidneys, headache, vertigo, feelings of anxiety and of fainting are their lot, and the indefinite character of their trouble leads them to go from one doctor to another. Very often the true nature of their illness is not detected for a long time. This neurasthenia ultimately culminates in *sexual impotence;* the erections are incomplete, and lead to nothing satisfactory, and finally the patients become hypochondriacs on a sexual basis.

4. *Ejaculatory Troubles.*—There are four different varieties which one meets with—namely:

(*a*) *Loss of Semen* may occur, especially when the patient empties his bowels, or there is spermatorrhea or prostatorrhea at the end of micturition, or frequent "wet-dreams," or premature ejaculations—*ejaculatio ante portas*, as somebody has termed them—may be complained of.

(*b*) *Pain during Ejaculation.*—In some cases the voluptuous sensation during coitus is lost; in others an intense pain is felt at the height of the orgasm. Definite pathological conditions, which have been carefully studied, underlie these symptoms. There is atresia of the orifices of the ejaculatory ducts in these cases. The ducts have lost their suppleness; they have become rigid, and their lumen is narrowed by the formation of strictures. When the sperma is vigorously sent through them during ejaculation, they cannot dilate properly under the pressure, and thus give rise to pain.

(*c*) *Blood-Stained Ejaculations.*—Chronic lesions in the posterior urethra are always to be expected when a patient complains that his sperma is blood-stained. The latter may be definitely red, in which case a simultaneous inflammation of the seminal vesicles is probable, or it may be simply streaked with blood, in which case lesions of the verumontanum are likely to be present.

Lastly, *retrograde ejaculations* are sometimes noted. Instead of being expelled in the normal way outside the body, the sperma runs backwards into the bladder, which it leaves subsequently mixed with urine.

(*d*) *Repeated Attacks of Epididymitis.*—This is another equally characteristic symptom of chronic posterior urethritis. Sometimes the epididymitis recurs at variable intervals in the same testis; in other instances both sides are affected alternately, a condition known as *orchite à bascule.*

CHAPTER VII

THE DIAGNOSIS OF URETHRITIS

THE diagnosis of urethral inflammation is of the utmost importance. On its correctness and completeness depends the choice of treatment, and one may say without exaggeration that a rational and well-planned therapy invariably leads to a certain and permanent cure. The surgeon should therefore direct all his efforts towards a good diagnosis, and for this purpose he should keep all the principal symptoms which we are about to describe carefully in mind. He should consider—

1. The urethral secretions.
2. The walls of the urethra proper.
3. The glands connected with the urethra.

1. Examination of the Urethral Secretions.

It is a mistake to confine oneself to the examination of the purulent discharge which appears at the meatus. It is essential to investigate also the secretions which remain in the canal for a certain time, and are only expelled during micturition—namely, *the filaments.*

One has therefore to examine—

1. The urethral discharge proper.
2. The filaments found in the urine.

1. **Examination of the Discharge.**—First of all one has to satisfy oneself that the discharge complained of really comes from the urethra, and not from a neglected or unsuspected balanoposthitis. Individuals who suffer from phimosis, very often develop under their long and tight foreskin, which permanently covers their glans, an ulcer, or a chancre, or warts. These conditions are apt to give rise to a discharge, which could easily be diagnosed wrongly, and be mistaken for a discharge from the urethra.

Then there are patients who are addicted to the practice of injecting antiseptic solutions into their urethra in order to cure the gonorrhea which they believe themselves to be suffering from. All they achieve is to set up

a chemical urethritis which could easily have been avoided had a properly conducted medical examination been made.

As to the discharge itself, one has to ascertain, in the first place, if it is continuous, and if it shows itself again within an hour or an half-hour after having made water—a characteristic feature of a still evolving attack of acute gonorrhea—or, if there is but a drop, rather pointing to an inflammation of a chronic nature. Then, again, one has to consider if the discharge is present during the day or only in the morning, in which latter case one has to deal with a true "gleet." Is the discharge *so scanty* that it only just forms a little scab or crust over the lips of the meatus, causing it to be *sticky?*

The colour of the discharge should also be noted. It may be white, or yellow, or green, or greyish, or opalescent, or clear like glycerine. Every one of these tints bears a definite relation to the amount of pus cells contained in the discharge.

Its consistence is also of importance. Is it uniform, "laudable," pus, or is it flaky? Is it viscous and slimy, and does it stain the linen? Not infrequently the discharge is represented solely by a drop of clear fluid, like water, and is only visible in the morning. During the day the lips of the meatus are only slightly stuck together. This condition corresponds to Diday's "mucous oozing," or urorrhea. A discharge of this kind contains but very few epithelial elements; occasionally, also, a small number of odd bacteria are found, but never any pus cells.

2. **Examination of the Filaments in the Urine.**—A painstaking examination of the filaments found in the urine, and their differentiation, are of the greatest importance, and should never be omitted. By examining the filaments methodically, an experienced eye can at once establish the basis of his diagnosis.

One is thus also enabled to control the result of a methodical treatment, and to tell approximately—although not with certainty—whether the patient is cured or not. To satisfy oneself that the patient's meatus is no longer sticky, and that he has no sign of a discharge, is not sufficient for giving him a clean bill of health. It is, amongst other further precautions, absolutely essential to ascertain that there are no filaments in the urine. To act differently means running the risk of serious miscalculations, of which the least dangerous one would be to see the patient return a few days after his supposed cure, with a recurrence of his discharge, or with an epididymo-orchitis, or with some other complication.

It is best to examine the first urine which the patient passes in the morning; but in practice this cannot always be carried out, and it is sufficient in most cases to test a specimen which is obtained three to four hours after the last micturition.

If the urine is turbid, it is one's first duty to ascertain that this turbidity is not due to the precipitation of salts, chiefly phosphates, in an alkaline urine. For this purpose a few drops of acetic acid are poured into the turbid urine; if phosphates be present, they are immediately dissolved, and the urine becomes clear. The omission of this test is apt to lead to serious mistakes.

In order to differentiate the various filaments found in the urine according to their origin, a number of methods have been devised, which we will rapidly review here.

Thompson's Method.—Thompson's method is very simple, but also very inaccurate. It consists in making the patient pass his water into two glasses only.

The first glass is supposed to represent the condition of the anterior urethra, and the second one that of the posterior urethra.

If we exclude all patients who suffer from renal or vesical lesions which give rise to turbid urine and to special symptoms, and only consider cases of urethritis, then three groups of cases can be distinguished:

1. Both glasses are turbid.
2. The first one is turbid, the second one clear.
3. Both glasses are clear; but there are filaments, in one or in both.

Each of these different groups has a different signification.

The first two (turbid urine) indicate *diffuse acute* or *recent superficial lesions*. In the first instance the urethritis is a total one; in the second group the anterior urethra is alone affected.

The third alternative is the most common (clear urine with filaments), and means practically always a *localized chronic lesion*.

But to distinguish between lesions of the anterior and of the posterior urethra in this case is extremely difficult.

Thompson's two-glass method is based on the purely theoretical assumption that the external sphincter of the bladder divides the urethra anatomically, and physiologically into two distinct portions. This muscle is supposed to form so impassable a barrier that all secretions which are formed in the anterior urethra are at once driven towards the meatus, whilst those of the posterior portion flow back into the bladder and mix with the urine. This view is more theoretical than practical, for common experience tells that, in the overwhelming majority of cases, the filaments are found in the first glass whether they come from the anterior or from the posterior urethra. The first stream of urine drives them out of the meatus, and thus they fall into the first glass, so much so that there is no need for the second glass to contain any filaments at all.

Thompson's method is thus quite useless for accurate work.

Supposing the patient passes very little urine into the first glass, less than necessary for washing away all the filaments, the latter are then found in the second glass, even if they originated in the anterior urethra.

Again, in cases of obvious posterior urethritis, pus and débris may be present in the first glass, whilst the second one is quite clear, owing to the fact that the first lot of urine sufficed to cleanse the urethra completely. In cases of this kind a wrong diagnosis would be made with certainty were one to rely upon this method.

However, one must admit that a posterior urethritis is usually present when big and heavy filaments are found in the second glass. A control by other methods of investigation is, however, always required (cross-examination of the patient in order to ascertain if he has suffered from cystitis or epididymitis, and, still more important, examination of the prostate *per rectum*).

Kollmann's Method.—Professor Kollmann of Leipzig has devised a five-glass method which safeguards against the errors of Thompson's process.

The examination is best carried out in the early morning, before the patient has made his first water. His anterior urethra is washed out with a syringe, or through a soft sound passed as far as the bulb, the patient standing upright, and great care being taken to irrigate slowly, and not to force the sphincter. The washings are all collected in the *first glass* as long as filaments come away. When the irrigation fluid is returned quite clear, a result which is only obtained after ½ to 1 litre has been used, it is collected in the *second glass*, which is kept as evidence that the anterior urethra has been thoroughly washed. The patient then makes water into the *other three glasses*. If one of them contains filaments, or if the urine is turbid, the phosphates having been eliminated, then the posterior urethra must be affected. If, on the other hand, neither turbidity nor filaments are present, whilst the first glass (containing the washings) is full of filaments, the anterior urethra is alone diseased.

Kollmann's five-glass method is absolutely accurate when applied with care.

Young of Baltimore has developed this method into a seven-glass process. He first washes the anterior urethra: *first glass*. The patient compresses his urethra at the root of the penis, and the washings are continued until they are returned perfectly clear: *second glass*. A glass tube is now inserted as far as the bulb, and one irrigates again until no more filaments come away; these washings are the *third* and *fourth glasses*. The patient then empties his bladder into the *fifth*, *sixth*, and *seventh glasses*.

The Jadassohn-Goldberg Method.—The anterior urethra is washed carefully with a syringe until the washings return quite clear. These washings contain, of course, the secretions of the anterior urethra only.

The patient then makes water into two glasses, and any pus or purulent débris found in them necessarily comes from the posterior urethra.

This method allows one to distinguish clearly between the secretions of the anterior urethra and those of the posterior urethra; but it does not allow one to differentiate between those of the posterior urethra and those of the bladder. The same criticism applies to Krohmeyer's method, which we will consider next.

Krohmeyer's Method.—Krohmeyer injects or instils 4 or 5 c.c. of a 0·1 per cent. solution of methylene-blue into the anterior urethra, and allows this fluid to be retained for a few minutes. The patient then makes water into several glasses. Any filaments stained blue are derived from the anterior urethra, whilst those of the posterior urethra are colourless.

Lohnstein's method is very similar.

Lohnstein's Method.—Before the first lot of urine has been passed in the morning, a 0·5 per cent. solution of potassium ferrocyanide is injected into the anterior urethra until the fluid comes out clear. Great care must be taken not to force the sphincter.

All traces of ferrocyanide are then washed away. That this has been achieved can be controlled by the addition of a few drops of perchloride of iron solution to the washings, as they are returned. Any trace of ferrocyanide would be revealed by the appearance of a characteristic colour (Prussian blue).

When it is certain that the washings have removed all the reagent, the patient makes water into three glasses, which are inspected for filaments. To each glass a little perchloride of iron is added, and should give no colour. A blue colour would indicate that some of the ferrocyanide has passed into the posterior urethra. In this way the correctness of the technique can be controlled.

None of these methods permit of a rigorous distinction between the secretions of the posterior urethra and those of the bladder or those of the prostate. This differentiation is possible by means of Wolbarst's method.

Wolbarst's Method.[1]—Four glasses are required, and one proceeds as follows:

1. The anterior urethra is carefully washed, and the washings are collected in the first glass; they represent the condition of the anterior urethra.

2. A soft catheter is passed into the bladder, and the pure vesical urine is collected in the second glass.

3. The bladder is now washed until the fluid returns clear. It is then filled with water, and the catheter is withdrawn.

The anterior urethra and the bladder are now thoroughly clean.

4. The patient now passes some of the fluid which had been injected

[1] Abr. L. Wolbarst, of New York, *Medical Record*, April 21, 1906, p. 627.

into his bladder into a third glass; this lot contains any secretions which may come from the posterior urethra.

In this way the secretions from the three parts of the lower urinary passages are separated.

5. The prostate is massaged, and the patient makes water into the fourth glass, the contents of which represent the prostate.

The author of this process has never found it to fail, and he considers its indications to be absolutely accurate.

There is no doubt that these various methods are of great assistance in complex cases which require special accuracy, but for ordinary purposes they are too tedious and too complicated.

The Practical Method.—In most cases it is sufficient to ask the patient to make water into four glasses. One can thus differentiate with sufficient accuracy the lesions of the anterior urethra from those of the posterior. If the contents of the first glass failed to cleanse the anterior urethra, those of the second, and *a fortiori* those of the third, will do so; and if the fourth glass contains heavy flakes, whilst the second and third do not, or only contain a few, then the diagnosis of posterior urethritis is certain. This simple method is sufficiently accurate.

The differentiation between the anterior and the posterior urethra is effected in this method by the second and third glasses.

The types most commonly observed are the following:

I.	First glass clear or turbid, with heavy filaments; second, third, and fourth glasses clear, without filaments.	=	Anterior urethritis *or* posterior urethritis.
II.	First glass clear or turbid, with heavy filaments; second and third glasses clear, without filaments; fourth glass clear or turbid, with heavy filaments.	=	Anterior urethritis *and* posterior urethritis.
III.	First glass clear, with a few heavy filaments; second and third glasses clear, with a few or no filaments; fourth glass turbid, with heavy filaments.	=	Posterior urethritis chiefly.

Macroscopical Examination of the Filaments.—The filaments vary in character, and should be examined carefully. Sometimes they are *very long, mucous, viscous, and, above all, light. They float* in the urine, and rise to the surface. They signify *irritation, superficial congestion,* rather than a deeply-situated lesion, and are commonly found in the first glass, if the case has been treated with permanganate irrigations. These are the light or mucous filaments.

In other cases the filaments are *thick, heavy, and sink rapidly to the bottom of the glass.* They always contain pus cells, and are indicative of a still progressing lesion; *they are the dangerous filaments.* If they are only

found in the first glass, the anterior urethra alone is likely to be affected. If they are present in the last one or two glasses, and have the shape of thick crumbs, they denote a lesion of the posterior urethra.

Between these two extreme types of filaments many intermediate varieties occur, but one has only to wait a few moments to see them behave in one of the two ways described.

Again, the filaments may be *comma-shaped.* According to Fürbringer and Finger, these special filaments are derived from the glandular elements of the prostate, which are moulded upon them, and these authorities hold that their presence is an urgent indication to explore the prostate *per rectum.*

This view is perfectly correct, but there are also other comma-shaped filaments which are less well known, and which differ not only in their aspect, but also in their origin, from them.

These filaments resemble a well-made comma or a well-shaped crescent. They are slender, and contrast by their lightness with the heavier and thicker prostatic filaments. Moreover, they are only found in the first glass. They are often present in large numbers, and are of great importance, because they are an almost infallible sign of an inflammation of Littre's glands.

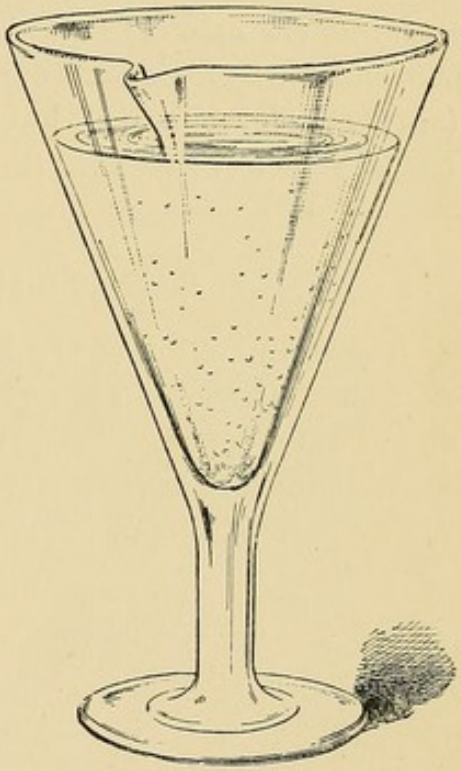


FIG. 34. — SUSPENDED IN THE URINE: SMALL, LIGHT, TYPICAL "COMMA-SHAPED" FILAMENTS, INDICATING LESIONS OF LITTRE'S GLANDS.

These characteristic filaments originate, without any doubt, in the glands of Littre which are found in the penile urethra. Whenever this diagnosis can be controlled by means of the urethroscope, one sees that the orifices of these glands are inflamed (*vide* Coloured Plate III., Figs. 1, 2, 3, 4); and palpation always reveals in these cases small nodules of the size of a millet-grain or hempseed along the under-surface of the urethra (*vide* p. 100). Lastly there is the therapeutic proof. Under a rational and well-conducted treatment of Littre's glands, these characteristic filaments disappear as the littritis subsides.

Microscopical Examination of the Filaments.—This examination is essential whenever it is impossible to examine the discharge.

One is thus enabled to distinguish the microbic elements which come from the balano-preputial sulcus and from the meatus, and are not present

in the urethra. In the latter case there are no organisms in the filaments, even if the microscope had shown them in the discharge collected from the meatus.

The technique is very simple. With a platinum loop which has been passed through the flame, one or two filaments are removed from the urine and placed on a slide, which is then dried in a current of air, and fixed by being passed rapidly through a Bunsen flame three times. It is then stained by one of the methods described in Chapter III. and examined.

Cultivation of the Filaments.—When there is no discharge, it is very often important to know if the filaments are quite sterile. This is, for instance, the case if the patient wishes to marry. It is then advisable to cultivate these filaments; one can use the ordinary media for this purpose (agar, gelatin, or broth), but it is preferable to inoculate them on special media, such as blood-agar (Bezançon and Griffon's medium).

2. Examination of the Urethra Proper.

The examination of the urethra proper consists chiefly in the study of its walls. It should always be preceded by the inspection of the meatus and of the prepuce.

We therefore have to consider—

1. The examination of the meatus.
2. The examination of the prepuce.
3. The exploratory catheterization of the urethra.

1. Examination of the Meatus.

The meatus requires careful inspection; in the same way as the tongue is the mirror of the stomach, the meatus is "the mirror of the urethral mucous membrane."

Red, hyperemic, and edematous lips of the meatus allow one to suspect an acute and recent inflammation of the canal. On the other hand, if the lips are bluish, almost dry, or scabbed over, or stuck together, a chronic condition is more likely to be present.

One should also note if the shape of the meatus is normal or not, if there is epispadias or hypospadias, and if diverticula which so often harbour gonococci are present.

The *para-urethral ducts* should be sought for carefully in the neighbourhood of meatus and frenum. Their exploration is greatly facilitated by the use of a small urethral speculum and of a small probe with which they can be catheterized.

These fistulæ and para-urethral ducts are often responsible for the

non-success of urethro-vesical irrigations with antiseptic solutions; the latter simply pass over them without entering them.

The diverticula which are visible on the outside have been well described by Janet.[1] They are relatively easy to treat. Those which are situated inside the lumen of the urethra are only observable with the aid of the urethroscope.

The former variety, which may be termed "external," often opens by means of a tiny orifice which is in no proportion to the length of its tract.

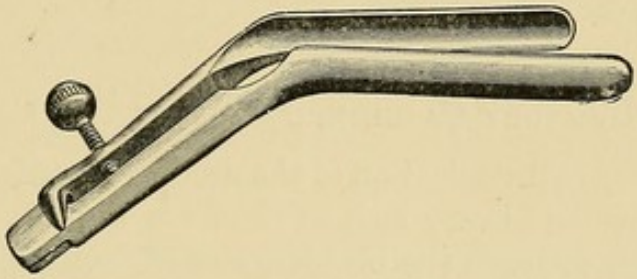


FIG. 35.—SMALL URETHRAL SPECULUM FOR EXAMINING THE MEATUS.

It should be explored with a stylet ending in a sharp point, and not with a soft bougie, because the latter lacks the necessary resistance. Another common bulwark of micro-organisms is to be found in this region—namely, Tyson's glands. When these para-urethral ducts are infected, they can only be treated successfully and cured in one way: by opening them up in their whole length.

The second variety, the internal fistulæ, is common. These fistulæ are readily seen with the urethroscope, and demand the same treatment as the external variety.

FIG. 36.—SMALL STYLET FOR EXPLORING THE PARA-URETHRAL DUCTS.

One should not restrict the examination of the meatus to inspecting it in the closed condition. The lips should be seized between thumb and index, and be separated. One is thus often able to make interesting discoveries. For instance, a youth who was sent to me by Dr. Barbier showed nothing abnormal on ordinary inspection, but when I separated the lips of his meatus, two polypous masses, analogous to those found on the glans, projected, and showed us that he was suffering from a polypous urethritis.

[1] Janet, "Les Repaires Microbiens de l'Urètre," *Annal. des Mal. des Organes Génito-Urin.*, 1902, p. 897.

2. Examination of the Prepuce.

The prepuce should be drawn back completely for examination. The balano-preputial sulcus is cleansed with swabs and carefully inspected. One's attention should not be confined to its state of inflammation; but one should also look for abnormal or inflamed orifices, such as the openings of Tyson's glands, already alluded to.

The length of the prepuce has also to be considered; a prepuce of excessive length favours balanoposthitis, and often keeps up a chronic urethritis for a considerable time.

3. Exploratory Catheterization of the Urethra.

The exploratory catheterization of the urethra is carried out with special bougies which have an olivary end, as shown in Fig. 37. They should be of sufficient length to reach the bladder, and of such rigidity that they do not curl up at the slightest obstacle. On the other hand, they should adapt themselves easily to the curves of the urethra, and have such a diameter

Fig. 37.—Exploratory Olivary Bougie.

that they are not in actual contact with its walls. The terminal olive forms a marked projection where it joins the stem of the instrument, a kind of heel.

The sizes of the various olives are measured by means of a special gauge[1] (*vide* Fig. 38).

Contra-Indications against Instrumental Examination of the Urethra.—One should never introduce an instrument into the urethra without having examined the urine previously, which should be passed into several glasses. This precaution allows one to avoid serious troubles, because the passing of

[1] The gauge used is the ordinary French scale, and is graduated in thirds of a millimetre. Thus, No. 1 is $\frac{1}{3}$ millimetre thick, No. 12 equals 4 millimetres, etc. In addition to this "filière Charrière," there is the "filière Guyon," which is graduated in sixths of a millimetre. This scale was introduced by the late Professor Guyon, and is generally used for dilators and other metal instruments. The equivalence of the two scales is easily calculated. Guyon's odd numbers have no equivalent in the Charrière scale. His even numbers are the double of the corresponding numbers of the ordinary gauge ; thus, 40 Guyon equals 20 Charrière, etc.

For genito-urinary work the French scales are preferable to the English catheter gauge, as Mr. Reginald Harrison pointed out long ago (*Surgical Disorders of the Urinary Organs*, J. and A. Churchill, 1893). I have therefore thought it undesirable to complicate the text by giving the approximate English equivalents. Where reference is made to Guyon's scale, a G has been added (A. F.).

instruments is apt to lead to complications when the urethra is acutely inflamed. For instance, if the posterior urethra be healthy, whilst the anterior portion is inflamed, an instrument can easily convey organisms from the latter to the former, and thus infect it.

In practice one should therefore be guided by the principle that a patient whose first glass of urine is turbid should not be treated with instruments, even if the second one be clear. In a case of this kind, diffuse and recent superficial lesions are present, which hasty and untimely manipulations would probably aggravate.

When the urine is clear, and contains but filaments—*i.e.*, when the lesions are localized—then, and only then, can instrumental examination of the urethra be carried out without any risk.

Technique.—For a urethra which one has never explored before, it is best to take an exploratory bougie (No. 18). The meatus and the anterior

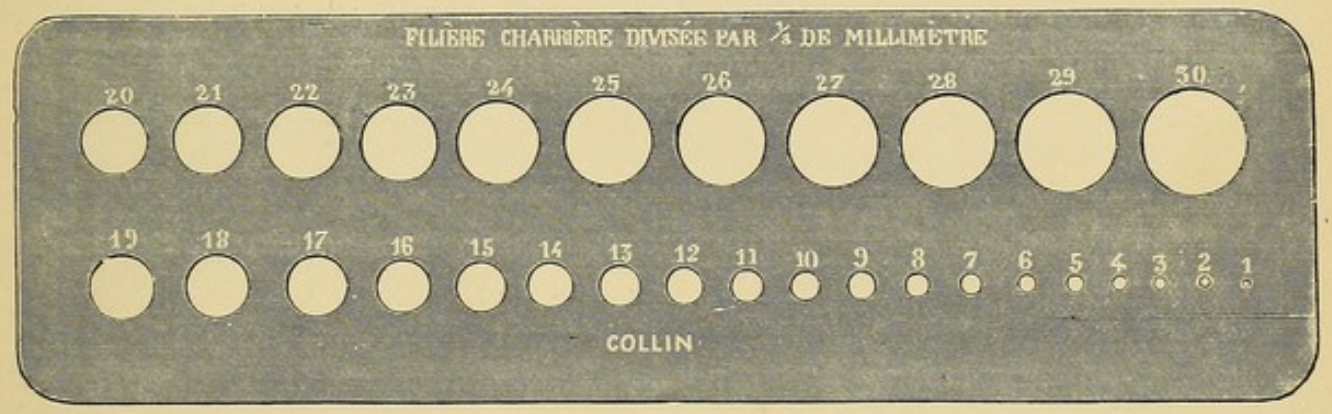


FIG. 38.—FRENCH CATHETER SCALE (FILIÈRE CHARRIÈRE).

urethra are washed, and it is wise to allow a little boric solution to run into the bladder from an irrigator. A catheter should not be used in filling the bladder.

The lubricated exploratory bougie is then placed against the meatus with the right hand, whilst the left one stretches the penis somewhat. The olivary end is then gently passed into the meatus by means of a slight rotatory movement, and pushed onwards. In a healthy urethra the instrument advances without difficulty, and without causing any pain, until the membranous urethra is reached. Here the olive meets with an obstacle which is physiological, and is present in every urethra. It is indispensable to inform the patient of this fact. By so doing one saves him the surprise of an unexpected, disagreeable, and painful sensation, and enables him to assist matters by trying to relax his sphincter, as if he were about to make water, or by letting himself go, taking deep breaths, as if he were fast asleep. In most cases the sphincter is thus overcome; the instrument passes over the prostate and enters the bladder, where it becomes freely movable.

But before it glides past the neck of the bladder the olive always gives a little "jerk," as Lallemand pointed out as far back as 1836. This is due to the presence of the verumontanum, which projects into the lumen of the urethra, and thus forms a slight obstacle. Normally this structure is almost void of sensation, but when it is chronically inflamed it occasionally becomes exceedingly tender. The passage of an instrument is then horribly painful, and throws the patient into the position of opisthotonos as long as the instrument remains in contact with his verumontanum. In cases of chronic posterior urethritis, and in nervous subjects, one also meets with instances

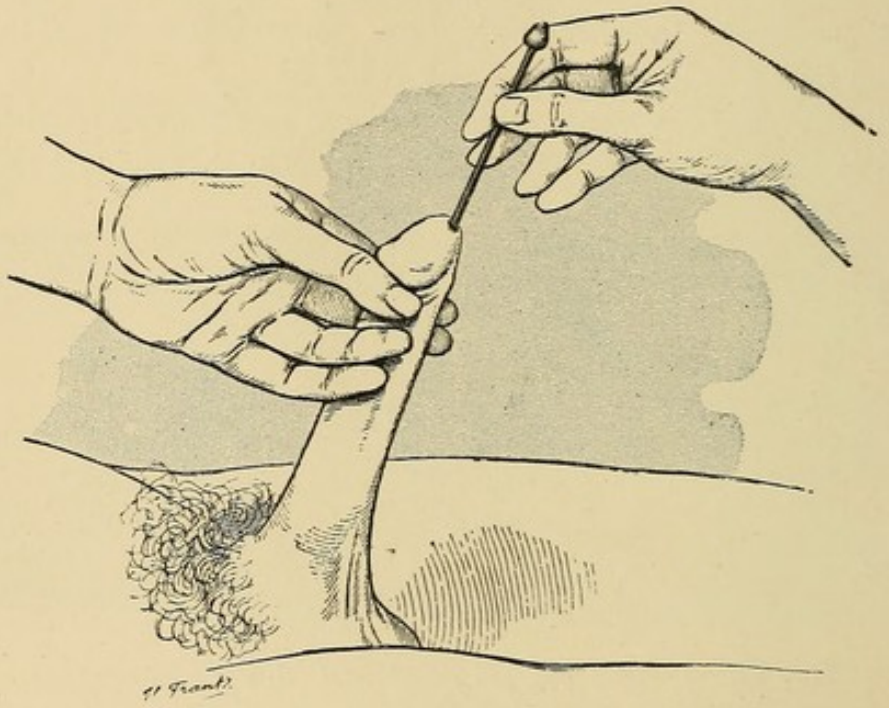


Fig. 39.—Exploratory Catheterization of the Urethra.

in which the bougie will not pass; the sphincter is firmly contracted, in a state of *spasm*, although the patients may do their best to assist the intervention.

When such spasm is present, the following simple remedy may be tried: One presses the bougie gently against the sphincter with the right hand, whilst the left hand draws the penis upwards. By this means one prevents the olive from being caught in a fold of mucous membrane instead of the sphincter.

This procedure is often of no avail, and the sphincter remains so tightly contracted that nothing can pass.

Then one may try a thin, more rigid bougie, which may take the sphincter by surprise and pass it. This method is often successful, and allows one to pass the olivary bougies subsequently.

Or one may anesthetize the sphincter with stovain. For this purpose,

either an instillation of a few drops of a 1 per cent. solution is made just in front of the sphincter, or the anterior urethra is filled with 10 c.c. of this solution, which is allowed to act for a few minutes.

Lastly, another means consists in passing a large metal sound (No. 40 G or No. 42 G).

This last method is as a rule the most likely one to prove successful. In one of my cases, for instance, the patient, a young man of twenty-seven, had a chronic urethritis, and was able to pass his water without any difficulty. His sphincter, however, contracted firmly every time an instrument came into touch with it. First a filiform bougie was stopped, and the spasm of the sphincter was accompanied by spasmodic contractions of his right femoral triceps. Then instillations of cocain proved useless. Finally a sound was introduced; it passed easily along the anterior urethra, but as soon as it reached the sphincter the patient had a seizure, which compelled me to remove the instrument speedily. However, a second attempt was made, after he had quieted down, and this time the sound entered with the greatest ease.

Fig. 40.—Curved Metal Sound (Béniqué with Guyon's Curve).

At all events the membranous sphincter is a fixed and precious landmark which allows one to locate any abnormal sensations which may be felt whilst the exploratory catheter is being passed. For further precision one should use the touch. The relief formed by the olive should be felt through the integuments, and this is easy if one moves the instrument gently to and fro. In this way a lesion can be accurately located.

Generally speaking, exploration of the urethra by means of the olivary bougie is most useful. This instrument is really a continuation of the palpating finger; it allows one to feel any changes in the lumen of the passage, and to locate the lesions present fairly accurately.

Results obtained by the Exploratory Catheterization of the Urethra.—1. This method of examination is especially useful in *chronic urethritis*. The patches of induration and of infiltration which develop in the course of this affection are detected by the olivary bougie, and hence the suitable treatment is indicated.

Some of these patches are almost imperceptible, the so-called *wide strictures*, and should always be looked for with great care. It is often

necessary to use a bougie (No. 20, or even 25 or 27) for their detection, if the smaller instruments do not allow one to feel them.

The exploratory bougie should be introduced slowly, and any sensations of roughness or hardness of the urethral walls should be carefully noted. Once the instrument has traversed the entire canal, it is gently withdrawn. This *withdrawal* is of special importance, because the heel of the olive knocks up against the slightest obstacle, and thus gives valuable information.

One often notices, whilst the instrument is being withdrawn, uneven or rough places immediately in front of the sphincter. Or the heel of the olive is stopped in its course by a small, more or less complete ring in the perineal or scrotal portion.

There are cases in which even a large explorator reveals nothing when one moves it about very slowly. It is then advisable to move it quickly like the bow of a violin. Occasionally a roughness which would not be noticed otherwise, is detected in this way. One should therefore combine the different modes of passing an olivary bougie. In all cases, however, the manipulations should be carried out with gentleness.

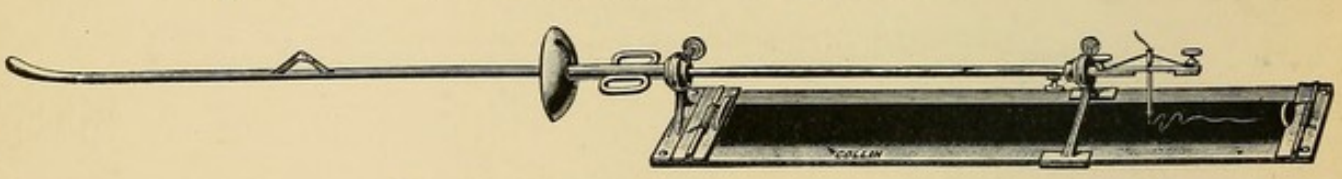


Fig. 41.—Hamonic's Urethrograph.[1]

It is very important to discover the presence of any *wide strictures*, and to locate them. They are very common in chronic urethritis, and require a different therapy according to their position.

2. The olivary bougie is especially useful for exploring *strictures of the urethra*. The latter are often multiple, and are best examined with a somewhat large bougie, say No. 20. If one proceeds differently, and takes a smaller olive, one is apt to overlook those present in the penile portion, and to recognize only those which are farther back—for instance, those of the perineal portion.

One notes, to begin with, the exact point at which an olive (No. 20) stops, takes a smaller one, say 18 or 15, and notes again where this instrument meets with an obstacle. In this way one proceeds, using smaller and smaller bougies, until one of them reaches the bladder. When the olive is withdrawn, the heel is caught at the various strictures, and gives each time a characteristic jerk. By this means one is enabled to make out the exact number of the strictures present, their size and their exact position. An interesting instrument, which gives a graphic record of the strictures found, is Hamonic's urethrograph (Fig. 41).

3. The exploration of *the antero-posterior measurement of the prostate* is

[1] Hamonic, "Nouvel Urétrographe," *Ass. Française d'Urologie*, 1906, p. 234.

possible within limits by means of the olivary bougie. For this purpose an instrument (No. 20) is passed into the bladder; it is then gently withdrawn until one feels a very slight resistance, which indicates the neck of the bladder. The point on the stem which is now in contact with the meatus is noted, and the bougie is again slowly withdrawn until the olive loses touch with the membranous sphincter.[1] By measuring the distance on the stem between the point marked and the point which now corresponds to the meatus, the length of the prostatic urethra is found.

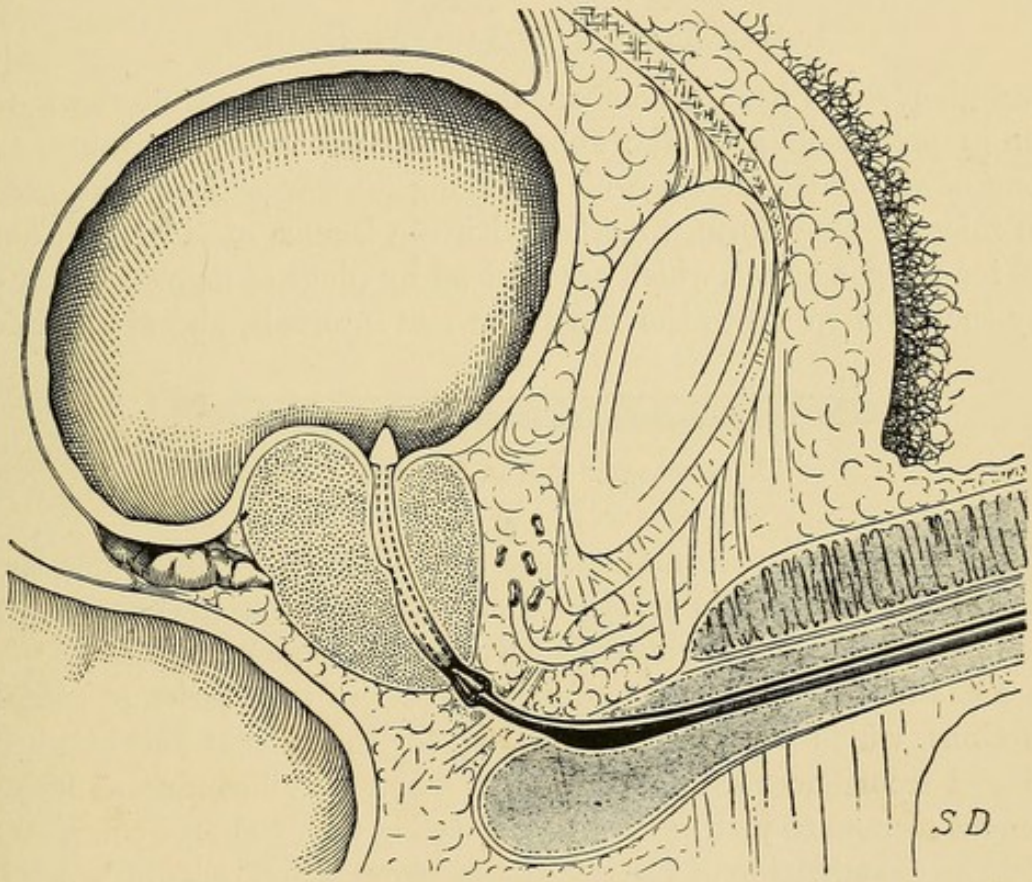


FIG. 42.—EXPLORATION OF THE ANTERO-POSTERIOR MEASUREMENT OF THE PROSTATE BY MEANS OF THE OLIVARY BOUGIE.

4. The olivary bougie is also a useful instrument for diagnosing the seat of foreign bodies in the urethra, whether they be calculi, or pieces of a broken catheter, or articles which have been introduced for inadmissible reasons.

3. Examination of the Glands connected with the Urethra.

The exploration of the glands which are connected with the urethra is at least as important as the examination of the canal itself. They often harbour gonococci, and are therefore largely responsible for the exasperating tenacity of gleet.

[1] As a rule this can be felt without difficulty.

In the same way as Ricord "felt the pulse of syphilis," we should nowadays be able to "feel the pulse of gonorrhea."[1]

A methodical exploration of the urethral glands comprises the following glands:

Littre's glands.
Cowper's glands.
The prostate.
The seminal vesicles.

1. Exploration of Littre's Glands.

The glands of Littre, which are found in the mucosa of the anterior urethra, represent its glandular apparatus, and are very important, as they are one of the chief factors which prolong discharges from the urethra. When infected they form, together with the lacunæ of Morgagni, hiding-places for the gonococci, which are shut off by plugs of mucus. They only empty their contents into the urethra at odd intervals, and are practically

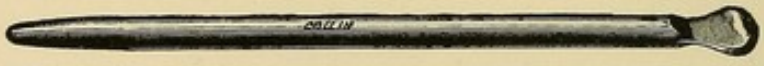


Fig. 43.—Straight Metal Sound. (Béniqué.)

unaffected by irrigations, instillations, and injections. The fluids used in these different therapeutic procedures merely pass over the general surface of the mucosa, but do not enter the crypts of these glands.

A focus of this type is thus apt to give rise to a series of successive reinfections, which are most exasperating for the patient and his surgeon. Continued recurrences are the rule, even when a well-conducted irrigation treatment seemed to justify the hope of curing the discharge completely.

For the examination of Littre's glands two methods should be used:

1. *Urethroscopy*, which enables one to see the orifices of these glands. We merely mention it here, because this diagnostic method is described fully in the following chapter.

2. *Palpation of the Urethra*, which gives a rough idea of the volume, shape, and number, of the glands involved.

Palpation of the Urethra.—The credit of having pointed out the value of this diagnostic method belongs to Motz, who described it fully in 1901.[2]

It is useless to try to palpate the urethra without the assistance of an instrument. The introduction of as large a béniqué as possible is essential. This method should be reserved for cases in which all acute inflammation has disappeared, and, when possible, it should only be resorted to after the first glass of urine has become clear.

[1] Luys, "Comment on tâte le Pouls à la Blennorragie," *La Clinique*, April 13, 1906.
[2] Motz, *Comptes Rendus de l'Ass. Franç. d'Urologie*, 1901, p. 219.

The examination itself is carried out by introducing a large straight sound, at least No. 40 G, into the anterior urethra, seizing the penis with the left hand, and stretching it on the instrument. With the first fingers

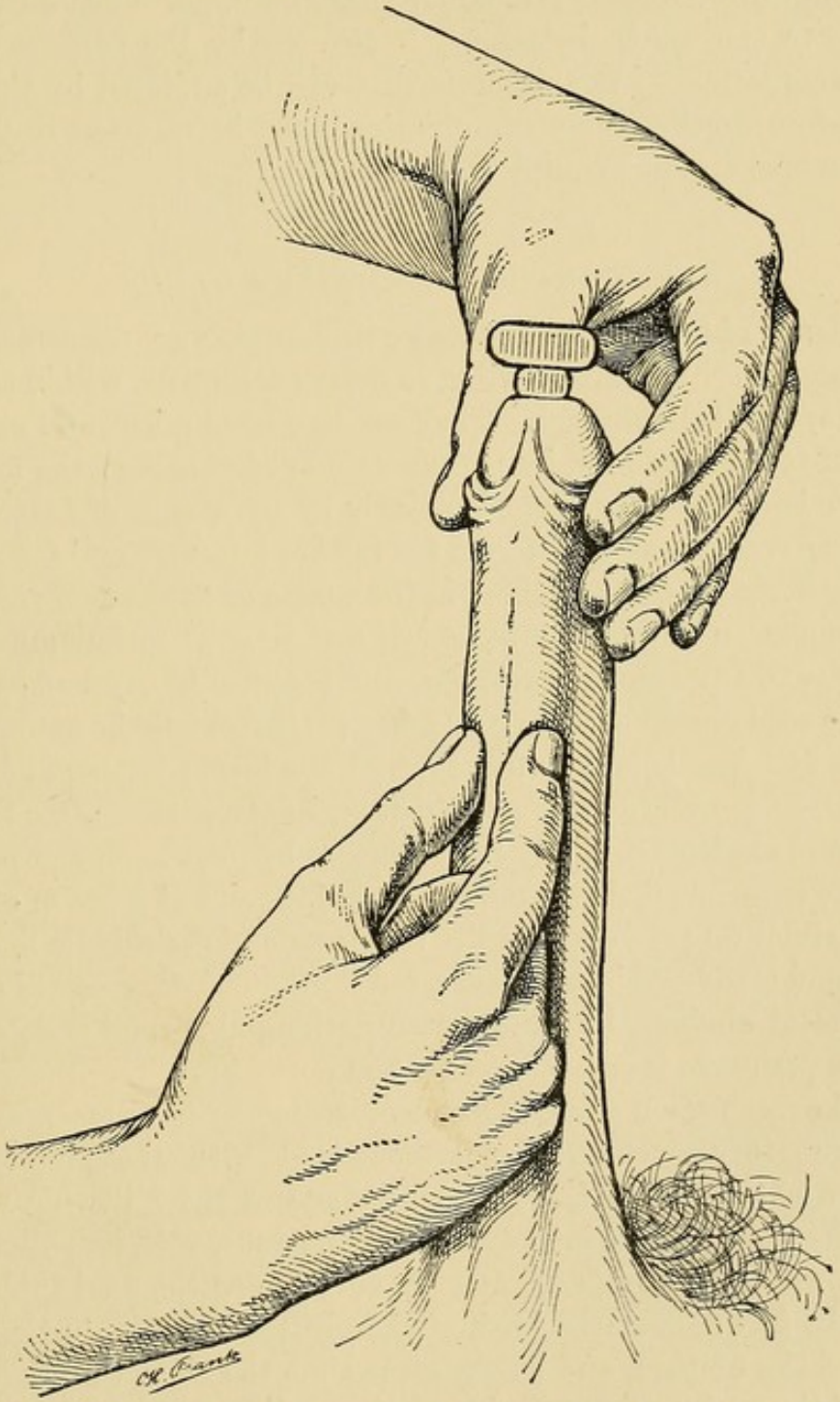


FIG. 44.—PALPATION OF THE URETHRA: SEARCHING FOR CHRONICALLY INFLAMED GLANDS OF LITTRE.

of the right hand one now palpates carefully the wall of the urethra (*vide* Fig. 44). If this palpation reveals the presence of small nodules of the size of a millet-grain or of a hempseed, one may be certain that they represent diseased areas which shelter gonococci and keep up the illness.

It is highly advisable to make this examination in all cases of chronic urethritis, because it allows one to detect one of the most common localizations of chronic discharges.

It is, however, well to remember that the upper urethral wall is not accessible to the touch, because it is covered by the corpora cavernosa. Only three-quarters of the circumference can be explored by this method, and therefore urethroscopic examination must be resorted to in order to render the investigation complete.

2. Examination of Cowper's Glands.

The glands of Cowper are mucous glands which are connected with the urethra, and are situated, according to most anatomists, within the muscles of the urogenital diaphragm. They are two in number, and open on the inferior surface of the bulb by two ducts on either side of the middle line. They have been carefully studied recently by Dr. Hogge of Liège, to whose writings the reader may be referred for further information.[1]

These glands are often infected in the course of gonorrhea, and therefore their examination should be a matter of routine. Their inflammation does not give rise to any special symptoms, and is apt to be overlooked.

For the exploration of these glands the patient should lie flat on his back, the thighs and legs being semiflexed, with the heels together and the knees separated. It is well to place a cushion under the pelvis. One lifts up the scrotum, and explores carefully the perineum by inspection and palpation.

In some cases one finds a small swelling of the size of a pea or of a cherry, which is tender on pressure. It lies to one side of the middle line, close to the anus, and is covered by hot, tense, red skin. The diagnosis of cowperitis is then almost obvious, but more often nothing abnormal is detected; the skin of the perineum is smooth, white, and normal.

Digital examination should then be resorted to in order to ascertain if the inflammatory swelling is not connected with the prostate. This exploration should be *bidigital*, and be made in the following way: The index of the right hand is introduced into the anus, with its palmar surface directed towards the urethra. After having passed the anal sphincter, the finger hooks forwards at the beak of the prostate. Its pulp then touches the bulb of the urethra, and at the same time the right thumb presses on the skin of the perineum to one side of the median raphe, and tries to meet the pulp of the index (*vide* Fig. 45).

If one feels between the index, in the rectum, and the thumb, on the perineum, a small swelling of the size of a large pea, which is definitely painful, one may be certain that one is dealing with an inflamed Cowper's gland,

[1] Hogge, "Recherches sur les Muscles du Perinée et du Diaphragme Pelvien," *Annal. des Mal. des Organes Génito-Urin.*, July 15, August 1 and 15, 1904.

as this organ is insensitive in its normal state. This examination should, of course, be made on both sides of the middle line.

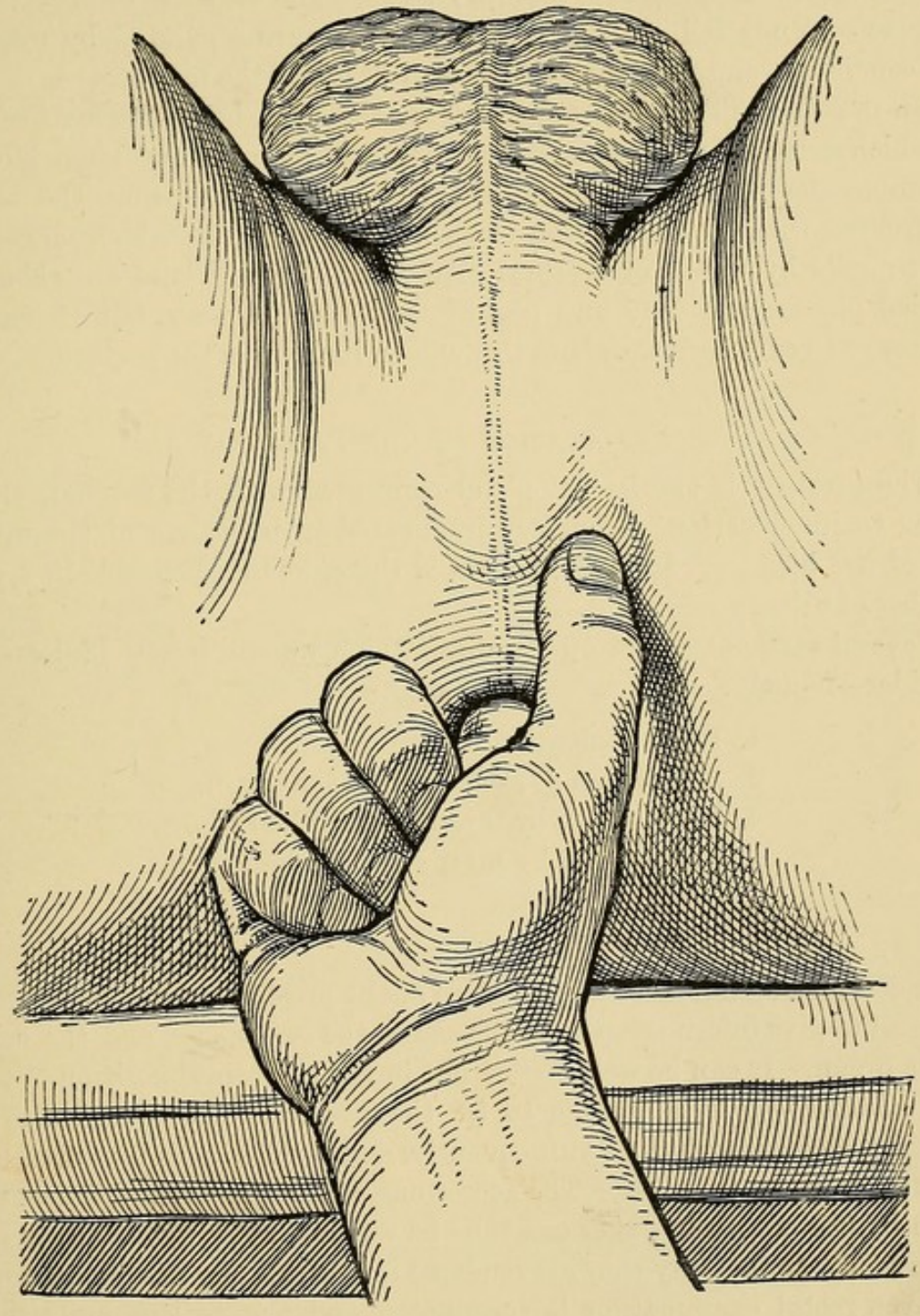


FIG. 45.—BIDIGITAL PALPATION OF COWPER'S GLANDS.
The affected gland is felt between the index, in the rectum, and the thumb, on the perineum.

Once the bidigital examination has shown that one of Cowper's glands is enlarged and inflamed, the exploration should be completed by expressing its contents. For this purpose the patient should first make water, and then

have his bladder filled with boric lotion. One now massages the diseased gland, or glands, taking care not to touch the prostate, and asks the patient to pass the boric lotion into several glasses. The contents of the inflamed Cowper's glands fall into the first glass; they are separated by means of the centrifuge, and then carefully examined under the microscope.

In most cases this *modus operandi* is successful, but there are instances in which even the most energetic attempts at massage and expression fail to empty the inflamed glands, and merely cause severe pain. One is then confronted with an obstruction of their duct, or ducts, which one should try to open by means of urethral dilatation. These dilatations should be carried out methodically and pushed very far. If they fail, it becomes necessary to extirpate the gland through an incision in the perineum.

3. Exploration of the Prostate.

The prostate is the largest gland connected with the urethra, and is, owing to its situation, frequently implicated in infections of the urethra and of the bladder. Its examination is therefore indispensable in a great number of urinary affections.

Several methods are at our disposal, which we will briefly indicate and consider—namely:

1. Rectal palpation.
2. Expression (" milking ") of the organ.
3. Exploration by means of an olivary bougie.
4. Exploration by means of a bladder sound.
5. Urethroscopy.
6. Cystoscopy.

1. **Rectal Palpation.**—The palpation of the prostate *per rectum* is mainly destined to give information as to the *shape*, the *consistence*, and the *volume* of the organ. It can be well carried out in the horizontal position.

Technique.—It is advisable to let the patient make water into four glasses, which are examined subsequently, and to fill his bladder with boric solution from an irrigator. The secretions which are expressed from the organ by the palpating finger can thus be washed away by a slightly antiseptic fluid. In this way they are rendered innocuous, and can be examined, once the rectal examination is terminated and the patient empties his bladder.

The patient should lie flat, with his legs apart and slightly flexed, and his pelvis raised by means of a cushion. The index, after having been protected by a finger-stall, is well lubricated, and introduced into the rectum. One palpates methodically the prostate, first its beak, then its lateral lobes, and finally its middle portion. One thus becomes acquainted with its size, shape, consistence, and also its *degree of tenderness*. One determines whether

the pain experienced by the patient is due to the prostate or to the posterior urethra, by palpating alternately the lateral lobes and the middle line. Pain along the latter is connected with the urethra, especially with the verumontanum, whilst any pain felt laterally is due to the prostate.

Indications for Rectal Examination.—This method of examination is required *in the course of every inflammation of the urethra.* In chronic cases it allows one to tell if the prostate is affected, and if it contains a focus which is prolonging the illness. Carried out early in acute cases of gonorrhea, it enables one to find out if the posterior urethra is being invaded by the gonococci almost as soon as this takes place.

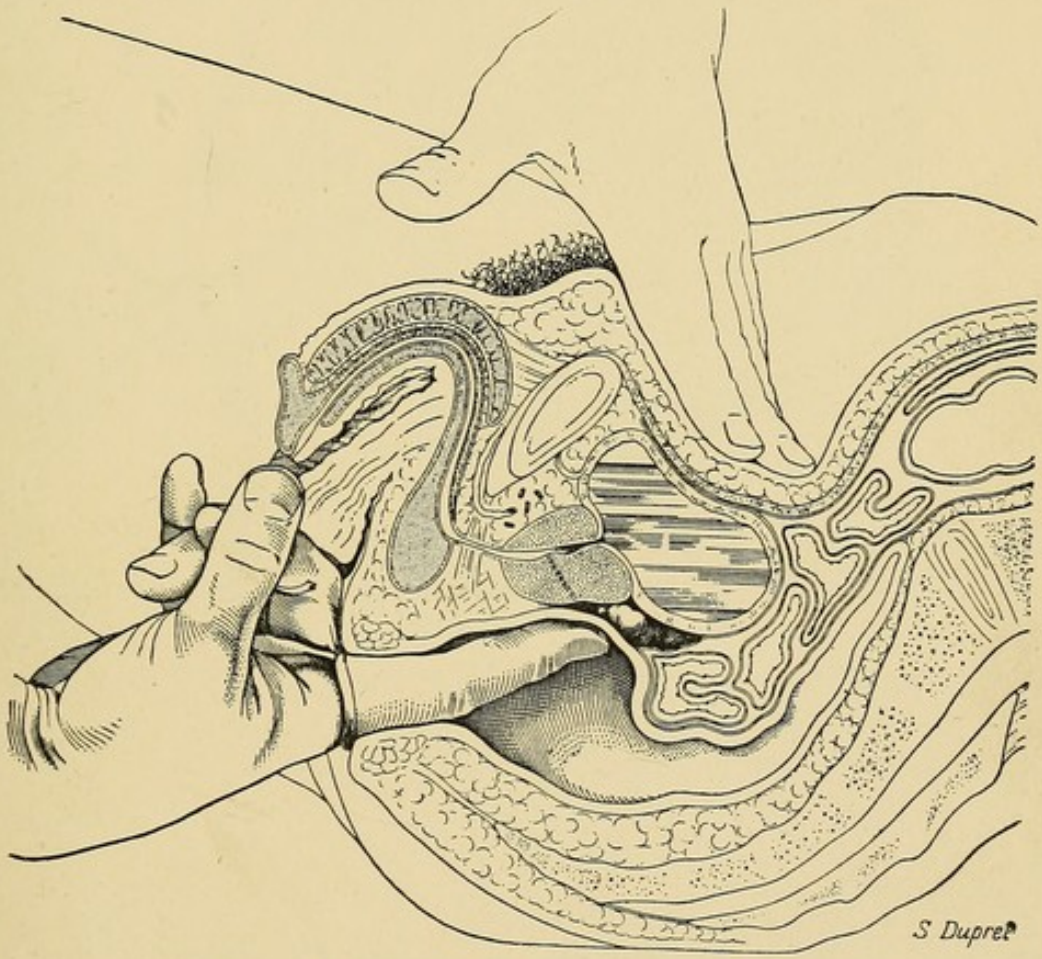


FIG. 46.—RECTAL EXAMINATION OF THE PROSTATE.

The figure shows that the finger in the rectum barely reaches the lower end of the seminal vesicle in the horizontal position. For the examination and expression of these organs the position indicated in Fig. 47 is required.

2. **Expression (Milking) of the Prostate.**—By this procedure *the contents of the gland and the prostatic secretions* are examined.

Technique.—The patient should first make water; this safeguards against mistakes, such as attributing to the prostate the purulent débris which his urine may contain, and which really comes from the kidneys, or the bladder, or the urethra. The patient is then irrigated until the washings are returned

quite clear, and the urethra is cleansed thoroughly. Once this has been done, the bladder is filled with boric solution, and the patient places himself in the proper position for massage. He should be standing firmly, with his body bending forwards, and his elbows resting on a firm support, such as a couch. With one hand he holds a glass under the meatus, in which the prostatic secretion is collected for examination.

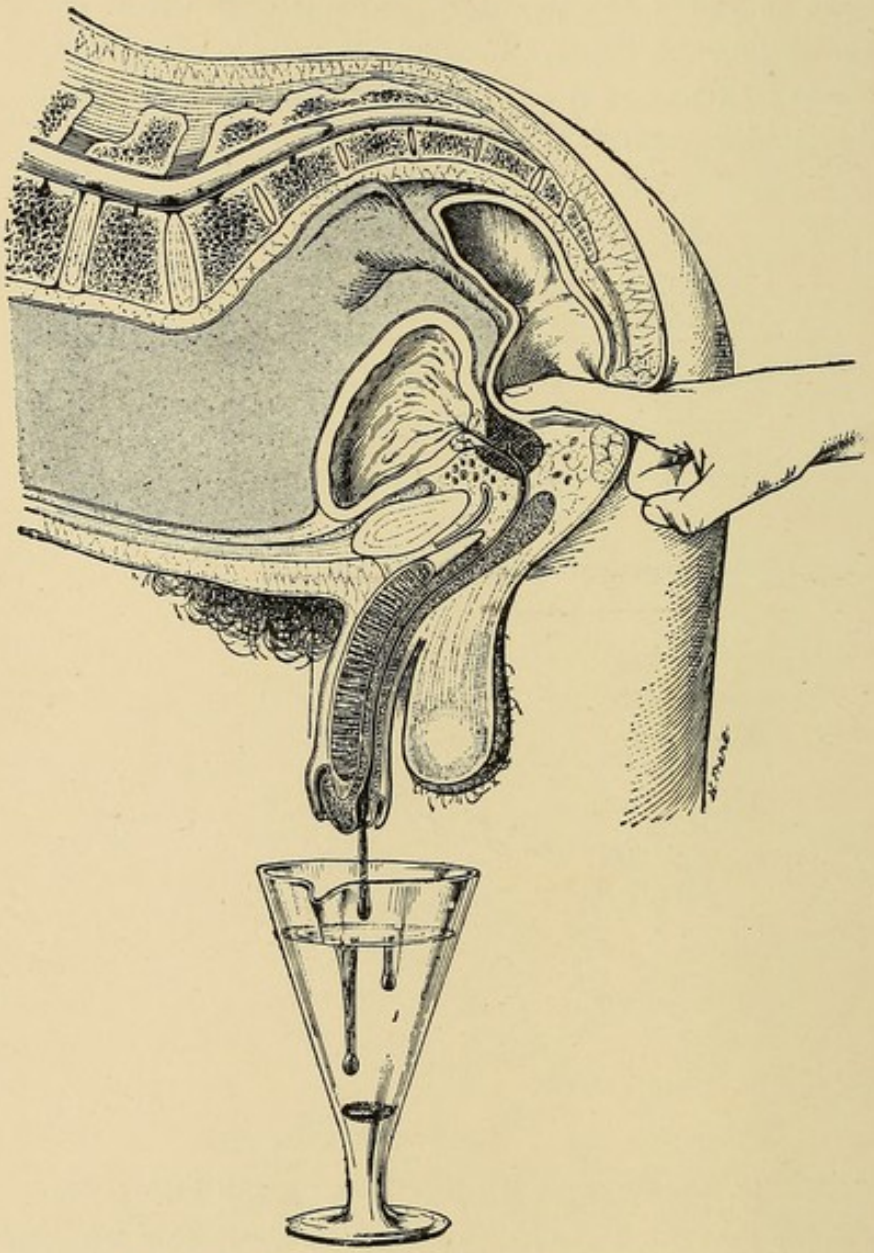


FIG. 47.—EXPRESSION OF THE PROSTATE.

The prostatic secretion is collected in a glass which has been half filled with water. The flakes of pus are thus more easily differentiated from the normal prostatic fluid, which is opalescent.

The surgeon then covers his fingers with vaseline, introduces it into the rectum, and makes for the prostate. He presses on the lobes of the gland, and expresses their contents, which pass into the urethra, and then into the glass kept ready for them. In cases of intraprostatic abscess, the finger

often feels a soft area which yields to it, and retains the mark of the finger. The sensation experienced frequently in these instances has been compared by Guyon with that felt by a finger "when it presses on a supple cloth stretched on a frame."

Some patients find the first sittings very painful, and may even faint, It is therefore advisable to proceed gently and slowly at first. As the patients become more accustomed, the treatment should gradually become more energetic.

After the massage the patient empties the boric solution, which had been run into his bladder, into four glasses. In this way one can examine the débris removed from the prostate by the massage.

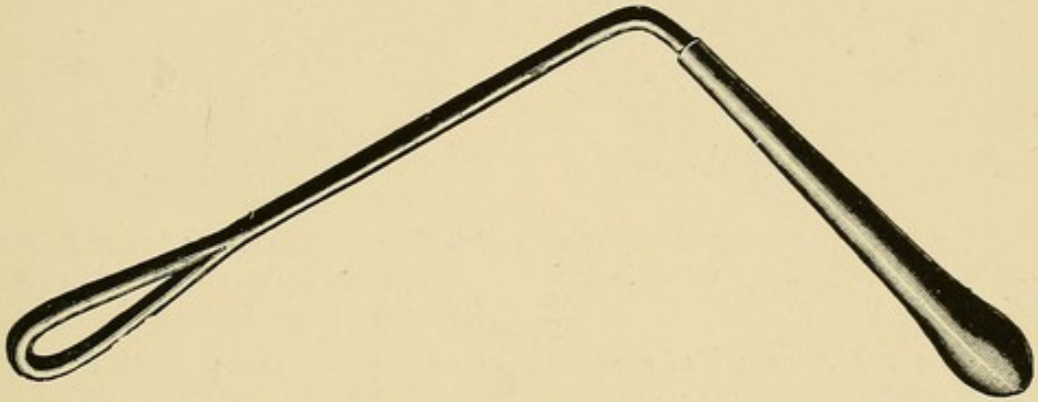


FIG. 48.—FELEKI'S INSTRUMENT FOR PROSTATIC MASSAGE.

The digital method just described is the best, and none of the instruments devised for the purpose, such as Feleki's instrument (Fig. 48), are equal to the finger.

Indications.—The prostate should be massaged whenever one suspects it of containing pus or retention products. The secretions should always be microscoped, as valuable diagnostic information is obtained in this way. It is therefore indicated in all cases of prostatitis.[1]

The following figures, which have been taken from Oberländer and Kollmann's work,[2] show the different microscopical findings in the various degrees of prostatic inflammation.

Very valuable researches on this subject have also been carried out by Dr. Ernst Frank, of Berlin, who found the gonococcus in 179 cases out of 210; 20 contained other organisms, and 11 had an aseptic secretion.[3]

3. **Exploration by Means of the Olivary Bougie.**—This method is really an *intraprostatic palpation* (Guyon).

Technique.—The bladder having been filled with boric lotion, the olivary bougie is passed as far as the membranous urethra. The prostatic portion

[1] *Vide* on this point: Maurice Picot, *Le Massage de la Prostate* (Thesis, Paris, 1906).

[2] Kollmann and Oberländer, *Die Chronische Gonorrhoe*, 1901, Leipzig.

[3] Frank, "Die Gonorrhoische Erkrankung der Vorsteherdrüse," *Monatschr. f. Harnkrankh. und Sexuelle Hyg.*, 1906, fasc. 1.

is then explored, and one notes carefully the curves of the passage, the extent to which its lower wall projects, the degree of tenderness of the verumontanum, the length of the prostatic urethra, and any deviations of its course.

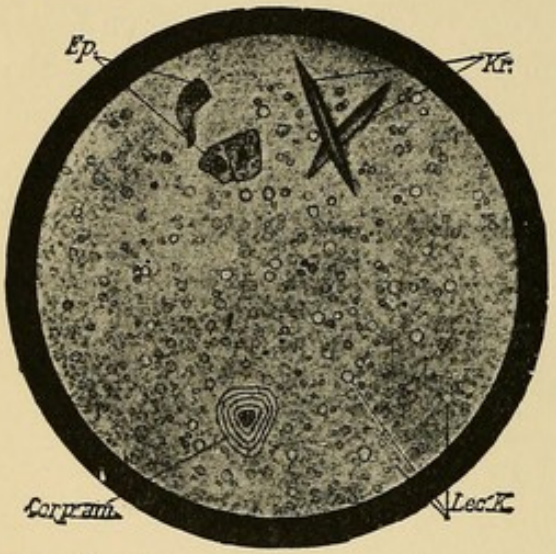


FIG. 49.—NORMAL PROSTATIC SECRETION UNDER THE MICROSCOPE. (Oberländer and Kollmann.)

Ep., Prostatic epithelium; *Kr.*, spermacetin crystals; *Corp. am.*, corpora amylacea; *Lec. k.*, lecithin globules.

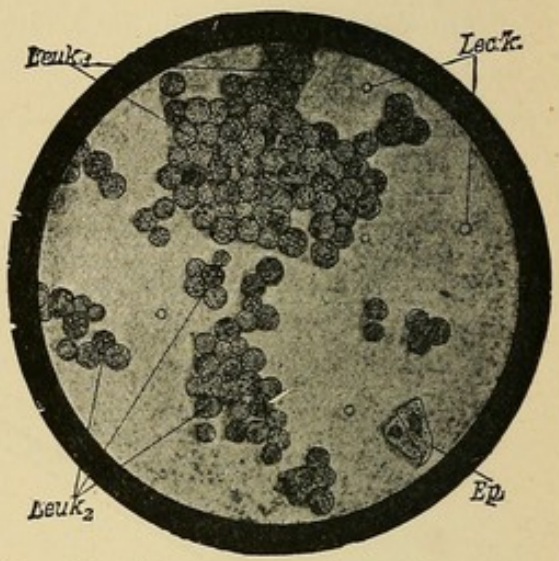


FIG. 50.—SECRETION IN ACUTE PROSTATIC INFLAMMATION UNDER THE MICROSCOPE. (Oberländer and Kollmann.)

Leuk., Leucocytes; *Lec. k.*, lecithin globules; *Ep.*, prostatic epithelium.

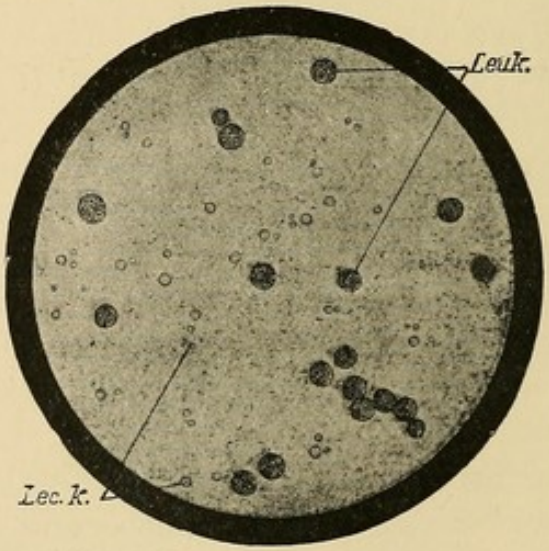


FIG. 51.—SECRETION IN MILD PROSTATIC INFLAMMATION UNDER THE MICROSCOPE. (Oberländer and Kollmann.)

Leuk., Leucocytes; *Lec. k.*, lecithin globules.

The amount of congestion can also be made out by this method. If the instrument is gently and carefully introduced, and the urethra begins to bleed, one is entitled to conclude that the prostate is friable and intensely congested (Guyon).

Lastly, this method enables one to measure the length of the prostatic channel, as pointed out above (p. 99).

4. **Exploration by Means of a Bladder Sound.**—By means of a rigid metal instrument one is able to judge how far the prostate gland, and especially its middle lobe, projects into the interior of the bladder. Moreover, information is also gained as to the depth of the fundus of the bladder, and this is often of considerable importance.

5. **Urethroscopic Examination.**—The examination of the prostatic portion of the urethra by means of the urethroscope gives but little information on the condition of the prostate itself. The endoscopic tubes only permit one to see the superficial parts of the prostatic urethra; hence the verumontanum and the prostatic lacunæ are the only parts which are explorable by this method, but they are very clearly visible.

Urethroscopic examination of the prostate is of considerable value in cases of chronic posterior urethritis which resist ordinary treatment. It should be *complete* in all cases—*i.e.*, the urethroscopic tube should explore methodically and slowly the whole urethra between the neck of the bladder and the membranous sphincter. It is a great, and unfortunately common, mistake to urethroscope only as far as the verumontanum. It is indispensable to include in the examination the important region between the neck of the bladder and the verumontanum, which is known as the *prostatic fossette* (Fig. 108).

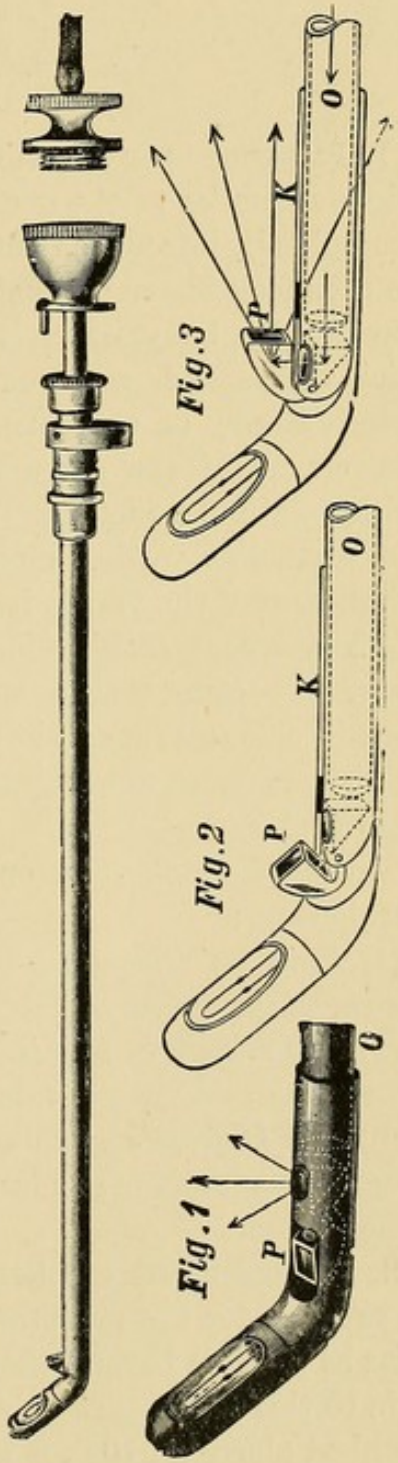


Fig. 52.—Schlaginweit's "Retrograde" Cystoscope.

6. **Cystoscopic Examination of the Prostate.**—In order to get a clear picture of the relief produced in the bladder by an enlarged prostate, cystoscopic examination should be resorted to. One of the best instruments for the purpose is Schlaginweit's *retrograde cystoscope*. It gives a clear view of the whole circumference of the neck of the bladder, and shows accurately any intravesical bulging of the prostate, if present.[1]

[1] *Vide* Luys, *Exploration de l'Appareil Urinaire*, Paris (Masson), p. 176, for further details.

4. The Examination of the Seminal Vesicles.

The examination of these organs is also of great importance, and is carried out by means of—

1. Palpation *per rectum.*
2. Expression of the vesicles.
3. Urethroscopy.

1. **Palpation per Rectum.**—The method for examining the seminal vesicles is similar to the one used for the prostate (*vide* p. 106). The index is completely introduced into the rectum, and passed over the prostate. One then feels above and behind the lobes of this gland a long, hard, sometimes doughy, body, which is the seminal vesicle. The shape of the inflamed vesicle corresponds more or less to that of the organ during health, and depends largely on the *amount of perivesicular inflammation* present. This involvement of the surrounding cellular tissue is seldom wanting. A healthy seminal vesicle is much more difficult to feel, and in certain cases it is impossible to distinguish it from the neighbouring tissues. This is notably true if the vesicle has been emptied recently by coitus.

These organs should always be explored in the course of an attack of gonorrhea, because their invasion by the gonococcus is usually accompanied by symptoms so vague and obscure that their infection escapes notice, unless one makes a point of examining the seminal vesicles in all cases of posterior urethritis.[1]

The signs which allow one to tell that a seminal vesicle is affected are the following:

(1) *Pain on Pressure.*—In most cases there is a marked difference between the two sides in this respect.

(2) *The Difference in Size*, which is usually dependent on the presence of a concomitant perivesicular inflammation.

(3) *The Difference in Consistency.*—One occasionally meets with diffuse indurations which are so marked that they simulate a cancerous infiltration of the bladder.

2. **Expression of the Seminal Vesicles.**—The technique is practically the same as for the prostate. It is, however, necessary to pass the index as far as possible beyond the prostate, and then to bring it gradually down again to this gland. The upright position, with the body leaning forwards, described above (p. 106), is absolutely essential, as it is the only one which enables the surgeon to reach these organs and to massage them properly—namely, from above downwards. The vesicles and the ejaculatory ducts can be emptied in this manner into a glass held in front of the meatus.

[1] And also because the seminal vesicles are the usual starting-point of a generalized gonococcal infection (A. F.).

Another position which also answers consists in letting the patient bear down at the edge of a table, and asking him to sit on the index of the surgeon, which has been passed into the rectum. It is, however, much more unpleasant and tiring.

Certain cases cannot be massaged successfully. Despite all efforts, and notwithstanding energetic pressure, their vesicles cannot be emptied. This condition is due to a complete obstruction of their ducts, and has to be regarded as a very disagreeable complication. The urine remains turbid for a very long time in these cases, and our means of treating this condition of the vesicles are very limited.

The secretions obtained by the massage are submitted to a microscopic examination in the same way as those of the prostate.

3. **Urethroscopic Examination of the Seminal Vesicles.**—The urethroscope only allows one to inspect the prostatic utriculus and the orifices of the ejaculatory ducts.

This investigation is rather difficult, but it is of great value when the ejaculatory ducts are diseased. In health the utriculus and the ejaculatory ducts are barely visible, but this changes in disease. The verumontanum bears towards the seminal vesicles the same relation as the orifices of the ureters bear towards the kidneys. As has been established by Professor Hurry Fenwick, the meatoscopy of the ureters allows one to foresee and diagnose an affection of the kidneys. In the same way, the aspect of the verumontanum allows one to foresee and to diagnose a chronic inflammation of the seminal vesicles. This is so true that the vermontanum deserves to be called " the mirror of the seminal vesicles."

Examination of the Female Urethra.

For the examination of the female urethra the following methods should be used:

1. Cross-examination.
2. Inspection.
3. Palpation.
4. Examination of the urine.
5. Exploratory catheterization.
6. Urethroscopy.

1. **Cross-Examination.**—One rarely obtains a definite answer from a woman whom one suspects of having gonorrhea, when one inquires about any pain which she may have had during micturition, and which would point to an acute infection of her urethra.

Gonorrheal urethritis is mild in women. They only suffer pain for a short time, and soon forget all about it. At the most they may recollect

having had pain for a day or so, and, in the vast majority of cases, they only become aware of the inflammation of their urethra if cystitis supervenes.

As soon as a woman realizes the suspicions which are rife against her, she becomes indignant and protests. She is certain that there is nothing wrong with her, and has usually been examined recently by her doctor, who was unable to detect any disease. Some even produce genuine certificates to that effect.

One has to admit that in most cases the women are perfectly sincere. Absence of morbid symptoms and normal appearances are perfectly compatible with infectiousness. This condition, which has been termed "latent gonococcismus," may last not only for months, but even for years, as Guiard[1] has pointed out. This author has published a series of typical cases in which acute gonorrhea was contracted from women who seemed to be in perfect health. In all these cases the intercourses were frequent, the parties were true to each other, and the men developed gonorrhea after having been with these women for months.

It is therefore highly desirable to trace these cases of latent gonorrhea. The usual naked-eye examination is quite insufficient, even if one uses a speculum, and combines it with a digital exploration. All investigations without a microscope are regrettable, not only for the sake of the reputation of the medical man who considers himself beyond the need of that instrument, but also inasmuch as the security of their patients is concerned.

The chief centres in which gonococci are found in woman are the urethra, the glands of Bartholin, the vagina, the cervix, the uterus and its appendages.

2. **Inspection.**—The meatus of the female urethra should be inspected with great care. Many women have material interest to prove that they are free from infective lesions, and have become past-masters in the art of concealing their ailments. The prostitutes know very well that it is to their advantage to cleanse their urethra by making water before they are medically examined, and some of them even go so far as to clean and dry their urinary meatus by means of a piece of blotting-paper, which they roll up until it is sufficiently pointed to enter the meatus. Others resort to copious vaginal douching before the medical examination takes place, and thus manage to conceal their urethral infection. They often defy by these tactics even the most thorough and careful examinations.

Some of our readers will remember Gosselin's famous case. After having been misled for some time by a certain lady, he decided to pay her a surprise visit. He appeared at her residence at 6 a.m. without warning, and thus prevented her from taking her usual precautions. He then demonstrated on the spot, in the presence of her unfortunate sweetheart, that she was suffering from gonorrhea.

[1] Guiard, *Ass. Franç. d'Urologie*, 1902, p. 255.

It is therefore advisable to keep a woman under observation for several hours, or at any rate to make certain that she has neither emptied her bladder nor used a douche for hours, before one examines her. This is the only way to assure a satisfactory examination, and it is easy to control if she is in a suitable condition; for one has only to see if the quantity of urine passed by the patient, after one has inspected her meatus, is sufficient.

Verchère[1] has dwelt upon the difficulty of tracing gonorrhea in registered (licensed) prostitutes. "She must be taken unawares, and must be watched. She should not be left alone for a minute. No licensed prostitute is ever

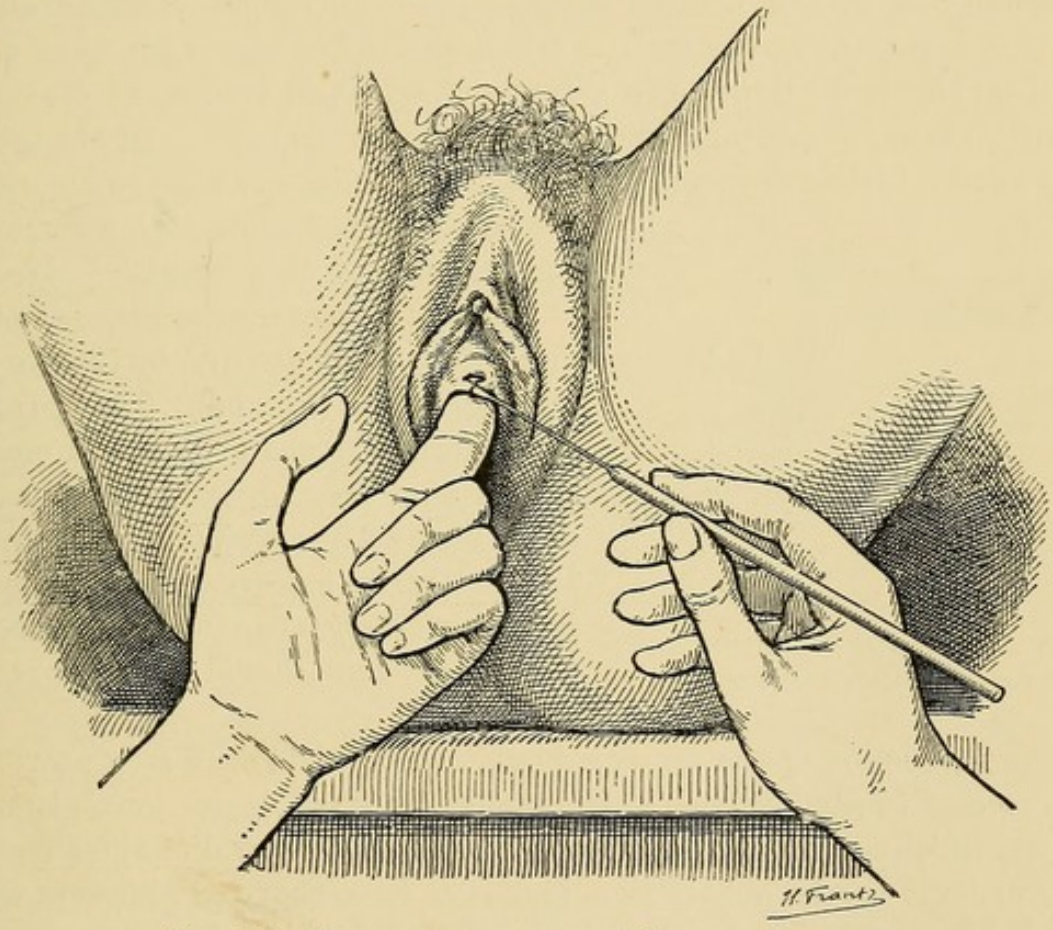


FIG. 53.—EXAMINATION OF THE FEMALE URETHRA.

arrested for having chronic gonorrhea. Only a few novices who are not yet registered are caught, because they have not yet learnt the tricks which all the old stagers know."

Of fifteen consecutive prostitutes who had been discharged by the Dispensary, he found eleven to be suffering from gonorrhea. In every case the disease had been overlooked, or rendered unrecognizable by the measures which these women adopted before they were examined. They all resort to special tactics, such as drying the meatus with blotting-paper or swabbing the vagina dry with cotton-wool, and thus defy the most careful search,

[1] Verchère, *La Blennorragie chez la Femme*, vol. i., 1894, Paris (Rueff).

apart from the fact that some have so slight lesions that there is nothing to see. As the disease may be latent, the presence of the gonococcus is the only criterion upon which reliance can be placed.

Unfortunately, this examination is somewhat tedious, especially if one makes several slides. One places the woman in the speculum position, separates the labia majora and minora, and inspects the orifice of the urethra. If a bead of pus is visible at the meatus, one collects it carefully, and examines it under the microscope.

If the mucous membrane is red, inflamed, and edematous, an acute inflammation of the urethra is probable. Sometimes a small reddish swelling is present at the meatus, which is fixed to one of the walls of the urethra: this is a polypus or a granuloma, which in very many cases owes its origin to a chronic inflammation of the urethral glands. Or the mucosa may show a certain degree of prolapse, in which case one has to investigate further if one is dealing with a tumour of the urethra or with a simple urethrocele.

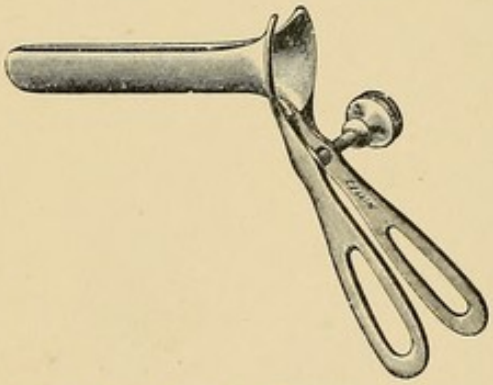


Fig. 54.—Small Speculum for the Female Urethra.

In certain cases the examination of the meatus is greatly assisted by the use of a small speculum (Fig. 54). The lips of the meatus are thus separated, and interesting details may become visible, such as the exact place of insertion of a polypus, etc. In most cases, however, the speculum is less satisfactory than the urethroscope, which therefore should be preferred as a rule.

The inspection of the meatus should include the entire zone around it. The meatus of some women is surrounded by small depressions, glandular crypts, which are prone to gonococcal infection. Several of these recesses may undergo partial obliteration, and thus form encysted abscesses which are liable to perpetuate the gonorrhea indefinitely. These depressions should not only be looked for; they should also be carefully explored individually by means of a stylet, in order to ascertain that none of them contain gonococci.

In woman, whose vulva is, so to say, nothing but a mass of glands, suitable hiding-places for the gonococcus abound.

As Guiard has pointed out, superficial scrapings should be taken from these crypts and examined microscopically. It is not sufficient to collect the purulent secretions on a platinum loop which has been passed through the flame. It is, of course, essential that these researches be carried out only if one is certain that the patient has not douched herself four to five hours previously, and that she has not made water.

The examination of *Bartholin's glands* should never be neglected. Chronic inflammation of these glands is nearly always painless, and usually escapes the notice of the patient.

By introducing a finger into the vagina, and by pressing simultaneously with another finger from the outside on the labium majus, a small tumour, varying in size from a small cherry to a plum, is felt.

If the inflammation is more recent, a few drops of pus may issue from the duct of the gland when one presses on the swelling. This pus contains gonococci in nearly every instance.

Besides Bartholin's glands, which are so commonly infected, one occasionally finds around the meatus little elevations which are traversed by minute ducts. The latter are often infected, and are very difficult to cure.

Sometimes congenital abnormalities are present, such as the para-urethra,[1] accessory ducts due to a developmental error. One of Jullien's female patients had a pervious duct of Gärtner, which was embedded in the lateral wall of her vagina, and opened at the vulva. During her attack of gonorrhea this duct became infected.

Lastly, it is absolutely necessary to pass a speculum into the vagina, and to examine the secretions of the cervix, which should be collected with a platinum loop and examined microscopically.

The cases in which the gonococcus is found at the first examination are not common. It is therefore advisable, in order to be sure of a reliable result, to proceed in two stages: A swab of cotton-wool is placed on the cervix, and left there for twenty-four hours. One then withdraws it, and examines the secretions on it for gonococci.

3. **Palpation.**—Palpation should accompany inspection. In this way very accurate information can be obtained in cases of urethral inflammation.

The palpation is carried out by means of the left index-finger, which is lubricated with vaseline, and introduced into the vagina in such a way that its palmar surface is in intimate contact with the under-surface of the urethra. The index is pushed as far as the anterior fornix of the vagina, and is then gently withdrawn along the anterior vaginal wall. The finger should press firmly against the latter.

In this way the urethra is squeezed out, and often a bead of pus can be obtained from the meatus. This discharge originates from the urethral mucous membrane, or from the glands connected with it, and should be microscoped.

In some cases this examination can be completed with advantage by moving a blunt curette gently to and fro in the urethra. The secretions are collected with greater precision in this way than with a platinum loop.

[1] Jayle, *Revue de Gynécologie*, August, 1909.

4. **Examination of the Urine.**—This investigation should always be made *after* the first three examinations have been concluded. Carried out in this order, it does not interfere with them, and, moreover, it allows one to verify if the woman is in a suitable condition to be examined. The more urine she passes, the longer she has been without cleansing her urethra.

The urine is tested in the same way as in the case of man; it is passed by normal micturition, and collected in four glasses. When a simple urethritis is present, the first glass is turbid, whilst the second one is clear. If the urethral inflammation is complicated by cystitis, all the glasses contain turbid urine.

5. **Exploratory Catheterization.**—This method of examination is contra-indicated whenever the urethra is in a state of acute inflammation. As in the case of the male, it would cause pain and be badly tolerated. Moreover, it would be apt to give rise to complications, such as inflammation of the urethral glands and cystitis.

It is therefore only indicated after the urine has become clear, especially the specimen contained in the first glass.

The intervention itself is carried out by means of an olivary bougie which is passed into the bladder, and then gently withdrawn towards the meatus. The heel of the olive will detect any narrowing, or roughness, or loss of dilatability, of the urethral walls.

6. **Urethroscopic Examination.**—The urethroscopic examination of the female urethra should be a matter of routine. It is the best means of ascertaining certain important details (*vide* Chapter VIII.) which would be overlooked otherwise, or never be suspected.

CHAPTER VIII

URETHROSCOPY

The Importance of Urethroscopy.

THE study of the urethral mucous membrane by direct inspection is termed "urethroscopy," and is carried out by means of a special instrument, the urethroscope.

In order to obtain a clear idea of the value and of the importance of urethroscopy, one has to realize the great services which direct inspection of the urethra has rendered in urethral disease, and especially in its most common form—chronic urethritis.

The Value of Urethroscopy in Chronic Urethritis.—It is well known nowadays that chronic urethritis is a localized disease, and that the inflammatory patches which perpetuate it, are in the majority of cases circumscribed and well defined. The whole secret of a successful treatment consists in the knowledge of these localizations, of their different types, and of the way of healing them.

One thus understands why so many methods and instruments for exploring the urethra and its appendages should have been invented, and why they have been in use for a long time. Amongst these exploratory methods, endoscopy of the urethra is of special importance, both from a diagnostic and from a therapeutic point of view.

The urethroscope bears the same relation to the urethra as the stethoscope does to the heart, the X rays to fractures, the laryngoscope to the larynx, and the ophthalmoscope to the eye. Although one does not require a stethoscope for a rough diagnosis of a heart lesion, this valuable instrument allows one to define and to locate accurately a cardiac murmur. The clinical symptoms are sufficient to diagnose a fractured bone, but the X rays and the fluorescent screen are indispensable in many cases for ascertaining the direction of the line of the fracture, and for selecting the most suitable and beneficial form of treatment. In the same way the urethroscope permits us to tell exactly in which portion of the urethra the lesions are to be found.

People who claim to have a scientific mind, should be reluctant to institute an active therapy against any morbid condition which is only incompletely

known to them. To work in the dark, to treat urethral inflammation on a purely empirical basis, is not consistent with the requirements of our age.

Under normal conditions the walls of the urethra escape our view, and our usual means of investigation only allow one to diagnose the gross lesions. It is the aim of urethroscopy to fill this gap, to enable us to *see* the circumscribed lesions in the urethra, and to discover their situation, their extent, and their shape. This diagnostic method fulfils thus the postulate of rational surgery; it enables us to ascertain *de visu* the lesions within the urethra, to diagnose them accurately, and to treat them accordingly.

No method, except direct inspection by means of the urethroscope, acquaints us with all the folds and all the recesses in the urethral mucosa. No method is more suitable for determining to which portion of the urethra the lesions of any given case of chronic urethritis belong.

By examining the urine and the filaments contained in it with the four-glass method, a gross differentiation between lesions of the anterior urethra and those of the posterior urethra can be made. But this method fails hopelessly, for instance, when one is confronted with the task of determining in which part of the anterior urethra the lesions present are located.

The anterior urethra is of considerable length, and different methods and totally different instruments are required according to the part which is affected.

Lesions of Littre's glands in the penile portion demand a treatment which is quite unsuitable for inflammatory troubles located in the cul-de-sac of the bulb. How can one be sure of the seat of a lesion if one has not seen it ?

Only the urethroscope can give the necessary information.

It should also not be forgotten that, apart from its diagnostic value, this instrument enables one to apply an energetic local treatment to the lesion which one has found and examined. I wish to insist upon the value and the importance of this mode of therapy. Moreover, is it not more logical to treat a lesion surgically, under the control of the eye, than to experiment in the dark ?

Then, again, urethroscopy allows one to control the results of any methodical treatment which has been carried out. One can thus, for instance, follow step by step the improvement obtained during a course of dilatations.

In the case of hemorrhage from the urethral mucosa, the tear produced by excessive dilatation can be located; one is able to convince oneself, by inspection, of the necessity of allowing an interval of sufficient duration between the various dilatations, and one can see that any attempt to dilate merely separates the edges of the tear until cicatrization is complete, and that the widening effect upon the sound part of the urethral wall is insignificant in cases of this kind. Dilatation treatment yields its best results when

it is carried out gradually and methodically under the control of the urethroscope. Blind and haphazard stretching does no good, and may do a great deal of harm.

May the above remarks suffice to show how ill-founded most of the criticisms are which have been advanced against urethroscopy!

The argument which one so often hears, that urethroscopy tells us nothing beyond the information which the ordinary methods of investigation yield, is hardly worth considering.

One has only to glance at the pictures contained in this book in order to realize how the urethroscope has lifted the veil from the mysterious causes of certain rebellious urethrites, and of a vast number of therapeutic failures.

As to the accidents which may follow upon the use of this instrument (epididymitis, cystitis, etc.), they are absolutely avoidable if one's technique has reached the necessary standard (*vide* Technique).

Urethroscopy should never be made use of for the diagnosis of diffuse, recent, and acute inflammations. It has its well-defined indications, which are set forth in this chapter. Correctly employed, and with careful manipulations, it never gives rise to the slightest accident.

To resume: *The urethroscope should be accepted nowadays as a common instrument for exploring the urethra. For diagnostic purposes it gives infinitely more accurate information than any other method of examination. For therapeutic purposes it gives the means of treating the lesions with astonishing precision and efficiency. It is indispensable in the treatment of chronic urethritis.*

Moreover, those who have practised the urethroscopic method for some time, and have become familiar with its technique, finally begin to wonder why one does not always use this precious diagnostic and therapeutic method, which is so practical and so powerful.

The congested patches, the ecchymoses, the gelatinous infiltrations of the mucous membrane, become visible, and with proper judgment and an up-to-date instrumental outfit one has the satisfaction of doing truly scientific and useful surgical work.

On the Great Importance of Urethroscopy for making sure that a Case of Gonorrhea is completely cured.—It is unnecessary to dwell upon the importance of ascertaining whether a patient has been completely cured of his urethritis or not. Everybody is aware that an incorrect answer to this question may lead to a series of calamities.

Searching for a discharge after the patient has remained without making water for several hours, and the examination of the urine and of its filaments, certainly yield precious information, and the same is true for the examination of the prostate by massage and for the exploration of the urethra

stretched on a metal sound. But even despite these investigations one is often disagreeably surprised by recurrences which seem inexplicable, and which would lead to disastrous consequences should one have already given the patient one's consent to marry.

Whenever it is a question of marriage, all possible precautions must be taken in order to safeguard the family, and the most important of these precautions is a thorough and complete examination of the urethral mucous membrane by means of the urethroscope. It is the most precise means of telling if the patient is completely cured, and on its result depends if the fiancé may be given the clean bill of health which allows him to embark upon matrimony with a clear conscience and physical aptitude.

Nowadays, *no patient should be told that he is completely cured unless he has undergone a satisfactory examination of his urethra by means of the urethroscope.*

In the following, several cases are described in which the gonococci persisted within the mucous membrane of the urethra for many years, and yet their presence was never suspected. Cases of this kind bring home forcibly the necessity of a urethroscopic examination before the patient marries.

Professors Oberländer and Kollmann say on this subject:[1] "However benign the case under observation may appear, one should not satisfy oneself with a single examination for the purpose of ascertaining if the patient is cured. Several examinations are required, and one should allow weeks to elapse between them, and not a few days. . . . On each occasion a careful urethroscopic examination should be made. The patient should have held his water for five or six hours, and, above everything, no cocain should be used. . . . The whole passage should be examined from one end to the other, and a complete cure may be diagnosed if the canal fulfils the following conditions:

"The mucosa must show normal folds and a perfect longitudinal striation. There should be no difference in the colour of the parts which were affected and of those which remained healthy. The epithelium should be of an equal lustre in all its parts. The lacunæ and Littre's glands should have ducts which show no sign of irritation. The periglandular infiltrations and the cicatrices of the destroyed glands should not project beyond the general level of the mucosa. They should be covered, like the rest, by a healthy epithelium.

"The other cicatrices which may have formed, and which are subepithelial, must have become invisible, and should be covered by an epithelial surface which is normal in its appearance and in its lustre."

There can be no doubt that one should take all possible precautions, when one has to assume the responsibility of giving one's consent to a

[1] Oberländer and Kollmann, *Die Chronische Gonorrhoe*, Leipzig, 1901, p. 168.

marriage, and one cannot but endorse the principles laid down by Professors Oberländer and Kollmann. However, there certainly are cases in which there is no hope of accomplishing a *restitutio ad integrum*. Instances in point are strictures.

Therefore : one must be certain that all definitely infectious organisms, such as the gonococcus and the adventitious bacteria, have disappeared, and with them all possibility of contamination, and repeated thorough urethroscopic examinations must have shown that there is no focus left which could conceal these organisms. Under these conditions one is entitled to give one's consent to the marriage.

The History of Urethroscopy.

Urethroscopy is by no means a new science; its beginnings date about one hundred years back.

A few unsuccessful attempts at obtaining a direct view of the urethra were made in 1805 by Bozzini of Frankfort,[1] and by Ségalas in 1826.[2] The first serviceable urethroscope, however, was devised in France by Désormeaux in 1853.[3] His invention marks the beginning of urethroscopy.

Since then, much work has been done on this subject, and in connection with it we may mention the names of Hacken[4] (1862), Cruise[5] (1865), Andrews[6] (1867), Fürstenheim[7] (1870), and Stein[8] (1874).

A great number of different instruments have been built; and although the list is large enough as it is, it is not yet closed, and new urethroscopes are being constantly put on the market.

They, however, all belong to either one of the following groups:

1. Urethroscopes with *external illumination—i.e.*, instruments in which the source of light is outside the urethroscopic tube.

2. Urethroscopes with *internal illumination—i.e.*, those which carry their lamp inside the endoscopic tube.

[1] Bozzini, *Der Lichtleiter oder Beschreibung einer einfachen Vorrichtung und ihrer Anwendung zur Erleuchtung innerer Höhlen und Zwischenräume des lebenden animalischen Korpers*, Weimar, 1807.

[2] Ségalas, *Compte Rendu de l'Acad. des Sciences*, 1826; *Traité des Rétentions d'Urine*, Paris, 1828.

[3] Désormeaux, *Bull. de l'Acad. de Méd.*, 1853; *De l'Endoscope et de ses Applications au Diagnostic et au Traitement des Maladies de l'Urètre et de la Vessie*, 1865.

[4] Hacken, "Dilatatorium Urethrae zur Urethroscopie," *Wien. Med. Woch.*, 1862, No. 12.

[5] Cruise, "The Utility of the Endoscope," *Dublin Quart. Journ. of Med. Sci.*, May, 1865.

[6] Andrews, "The Urethra viewed by a Magnesium Light," *Med. Record*, vol. ii., p. 107, 1867.

[7] Fürstenheim, *Berl. Klin. Woch.*, 1870, Nos. 3 and 4; *Oesterreich. Zeits. f. Prakt. Heilk.*, 1870, No. 25.

[8] Stein, "Das Photoendoscop.," *Berl. Klin. Woch.*, 1874, No. 3.

1. Urethroscopes with External Illumination.

This group comprises two distinct types. In the former the light is fixed to the tube of the urethroscope, whilst in the latter the illumination is independent of the tube.

1. **Urethroscopes with External Illumination attached to the Urethroscopic Tube.**—This was the first type to be invented, and dates from Désormeaux, the father of urethroscopy. His instrument consisted in its essential parts of ordinary urethroscopic tubes to which an artificial light had been added. The accompanying figure dispenses with a long description. In the first model the light was derived from an oil lamp, and in the later ones a petrol lamp was substituted. This illumination, however, proved inade-

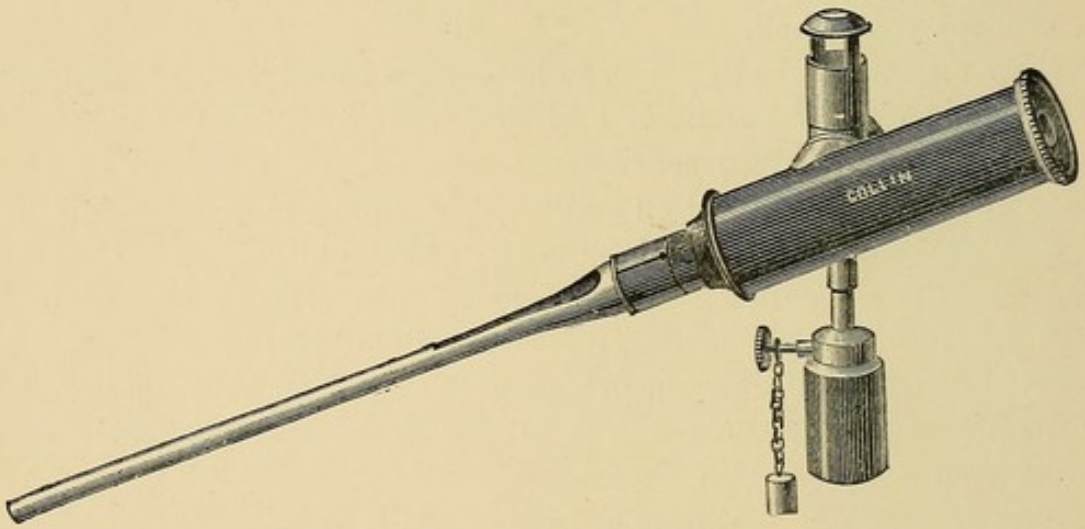


Fig. 55.—Désormeaux's Urethroscope.

quate, and it was only after an electric light had been adapted that the instrument was able to fulfil its rôle. It was Horteloup who thus greatly improved Désormeaux's instrument.

Other instruments which belong to the same type are—

(1) Leiter's pan-electroscope. This instrument consists of tubes of different width and length, corresponding to Nos. 18 and 20. Each tube has its metal pilot by means of which it is introduced into the urethra. The illumination is derived from an electric lamp, B, carried in a half-cylinder, of which the upper part is missing. The light from the lamp is reflected by a mirror, D, into the urethroscopic tube A. By means of the lens C, which can be replaced by other sizes to suit the observer's eye, the image seen at the fundus of the tube is magnified.

Heitz-Boyer has taken this instrument up, and had it shown at the Society of Surgery in Paris.[1] The only improvement worth mentioning

[1] *Bull. de la Soc. de Chirurgie*, January 4, 1911, p. 38.

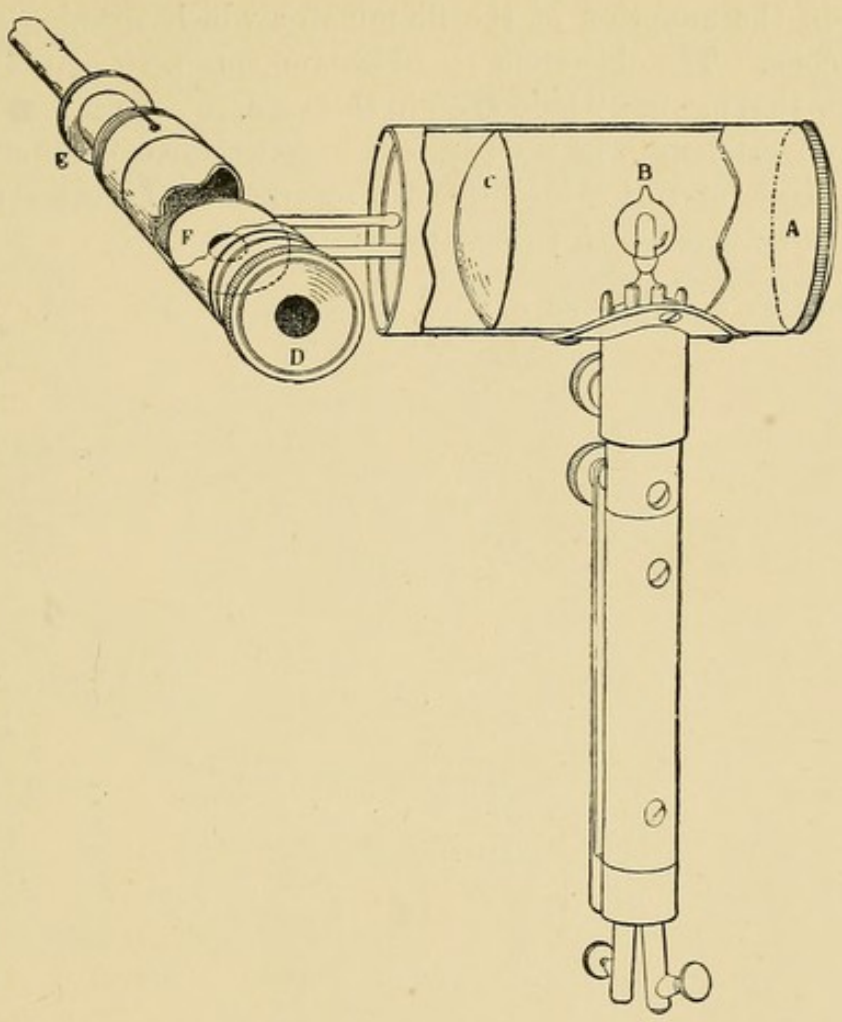


FIG. 56.—HORTELOUP'S URETHROSCOPE.

The cylinder which contains the lamp is closed. A is a concave mirror; C is a powerful lens which intensifies the light, which is reflected by the inclined mirror F into the urethroscopic tube. This tube is fitted on in E. D is the eyepiece, which contains a combination of lenses.

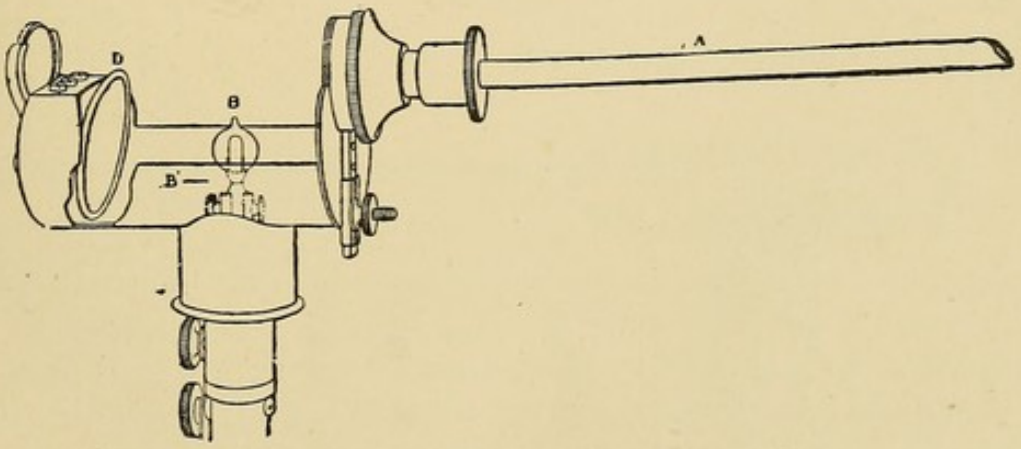


FIG. 57.—LEITER'S PAN-ELECTROSCOPE.

The upper part is open. The light is reflected by the mirror D into the speculum A. The images are magnified by a lens, C.

consisted in the adoption of the illuminator which Brüning uses for his esophagoscope. The objections to all instruments with external illumination (see p. 129) naturally hold good in this case.

Already Horteloup, who used Leiter's pan-electroscope for a time, found it inconvenient, and discarded it. He returned to Désormeaux's instrument, which he fitted with an electric lamp.[1]

(2) Schutze's diaphotoscope.

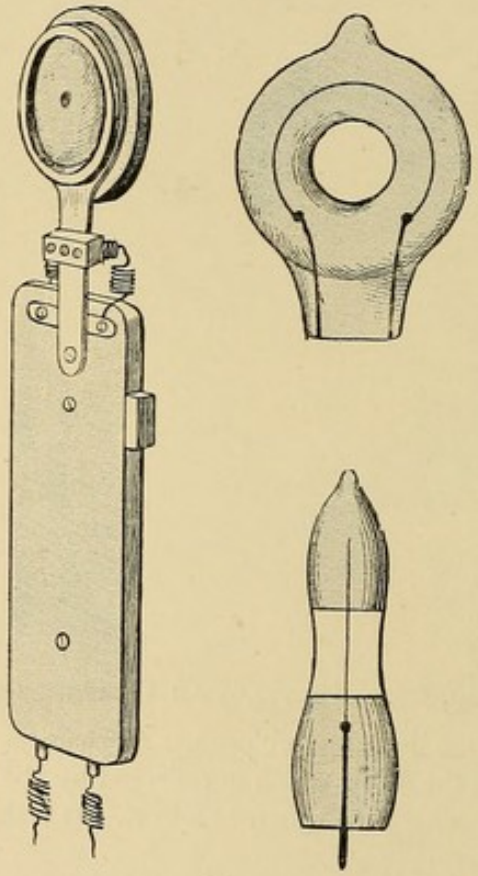


FIG. 58.—SCHUTZE'S DIAPHOTOSCOPE.

(3) Nyrops's electro-urethroscope.

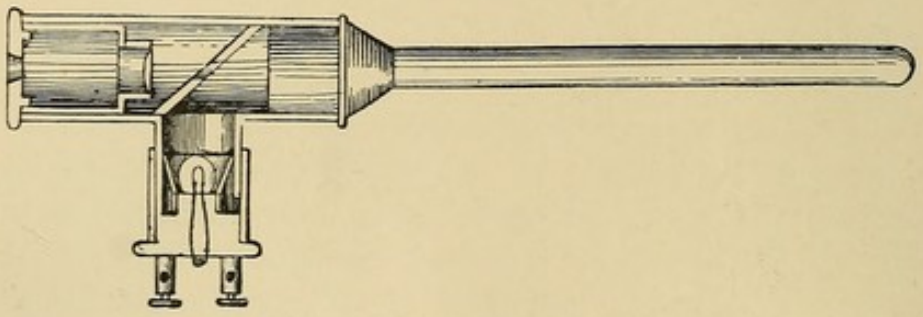


FIG. 59.—NYROPS'S ELECTRO-URETHROSCOPE.

[1] Horteloup, *Urétrite Chronique*, Paris (Masson), 1892, p. 43.

(4) Lang's urethroscope.

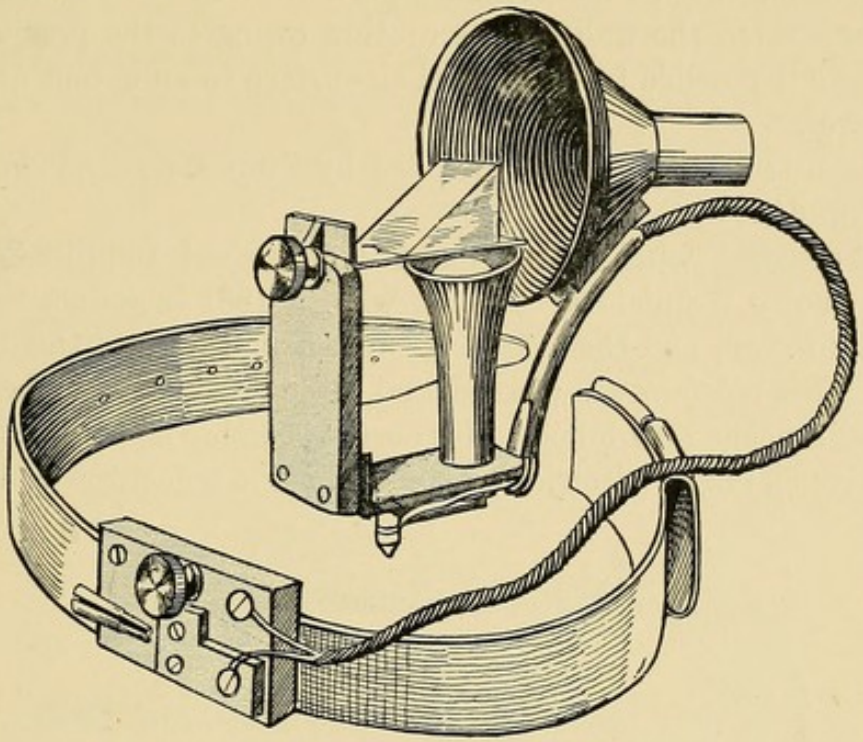


FIG. 60.—LANG'S URETHROSCOPE.

(5) Otis's urethroscope.

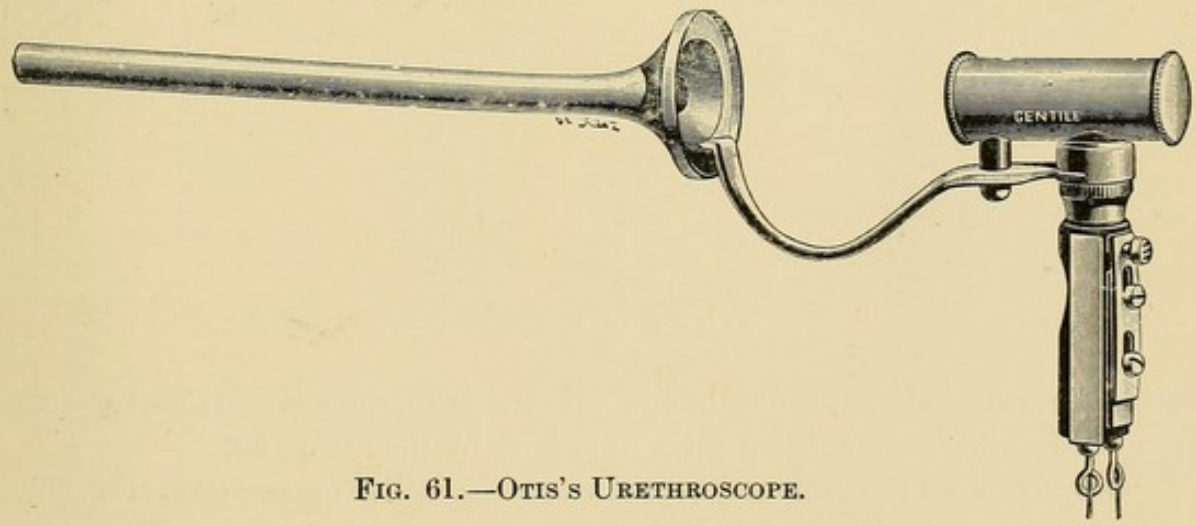


FIG. 61.—OTIS'S URETHROSCOPE.

(6) Casper's electroscope (see p. 126).

(7) Von Antal's aero-urethroscope (see p. 127) was a distinct advance on the older instruments. It was designed with the intention of separating and unfolding the walls of the urethra, in order to obtain a more thorough view. The outer end of the endoscopic tube was closed by a glass window, and fitted with a tap through which air could be blown into it by means of bellows. During the urethroscopic examination, the window prevented the air from escaping without interfering with the view. An assistant com-

pressed the far end of the urethra by pressing on it *per rectum*, thus obliterating it either at the membranous portion or at the perineum. This technique separated the walls of the urethra owing to the pressure of the air, and made it possible to examine their surface to an extent of a couple of centimetres.

(8) This instrument has been modified by Professor Hurry Fenwick of London (Fig. 64).

2. **Urethroscopes with External and Independent Illumination.**—This method is due to Grünfeld of Vienna, who in 1881 introduced a hollow tube into a urethra, and then projected luminous rays into this tube from a reflector. His reflector was pierced, and through this opening he observed the urethral mucous membrane. As sources of light, he made use of daylight and artificial light (electric, gas, petrol). The reflector was fitted with

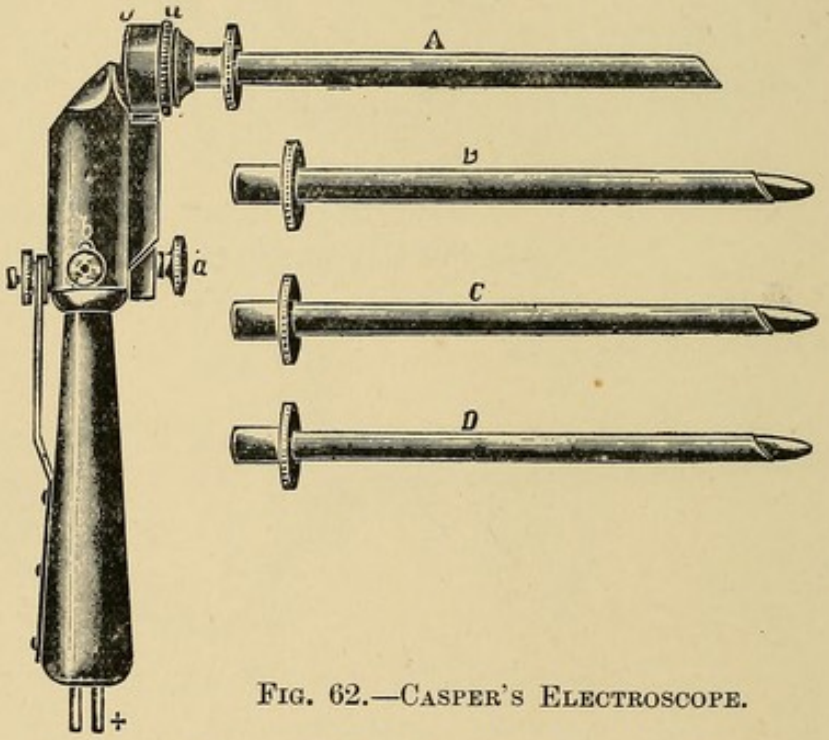


FIG. 62.—CASPER'S ELECTROSCOPE.

a handle, and held with one hand. In the later models a frontal mirror was used, which was subsequently improved by Clar (Fig. 65).

Grünfeld used straight urethroscopic tubes as well as curved ones (Fig. 66). He also devised a straight tube which was fitted with a side-window and a reflecting mirror (*Fensterspiegelendoskop*). The distal end of these tubes carried a glass window about 1·5 to 2 centimetres long, and was closed by a metal stopper, to which a small mirror was fixed at an angle of 45 degrees. This terminal mirror reflected the light on to the urethral wall through the window, and thus rendered it visible (Fig. 67).

The urethroscopic tubes have since been modified by many authors. Posner, for instance, advised to cover the inside of the tubes with a black varnish, in order to prevent the operator from being dazzled by the light

reflected from the walls of the tube. Others recommended tubes made of the same material as elastic catheters, and others, again, wished to have vulcanite ones.

Auspitz invented, for the purpose of obtaining a larger visual field, an instrument with two movable valves, which were opened when the instrument was in the urethra. In this way, a larger surface of the mucous mem-

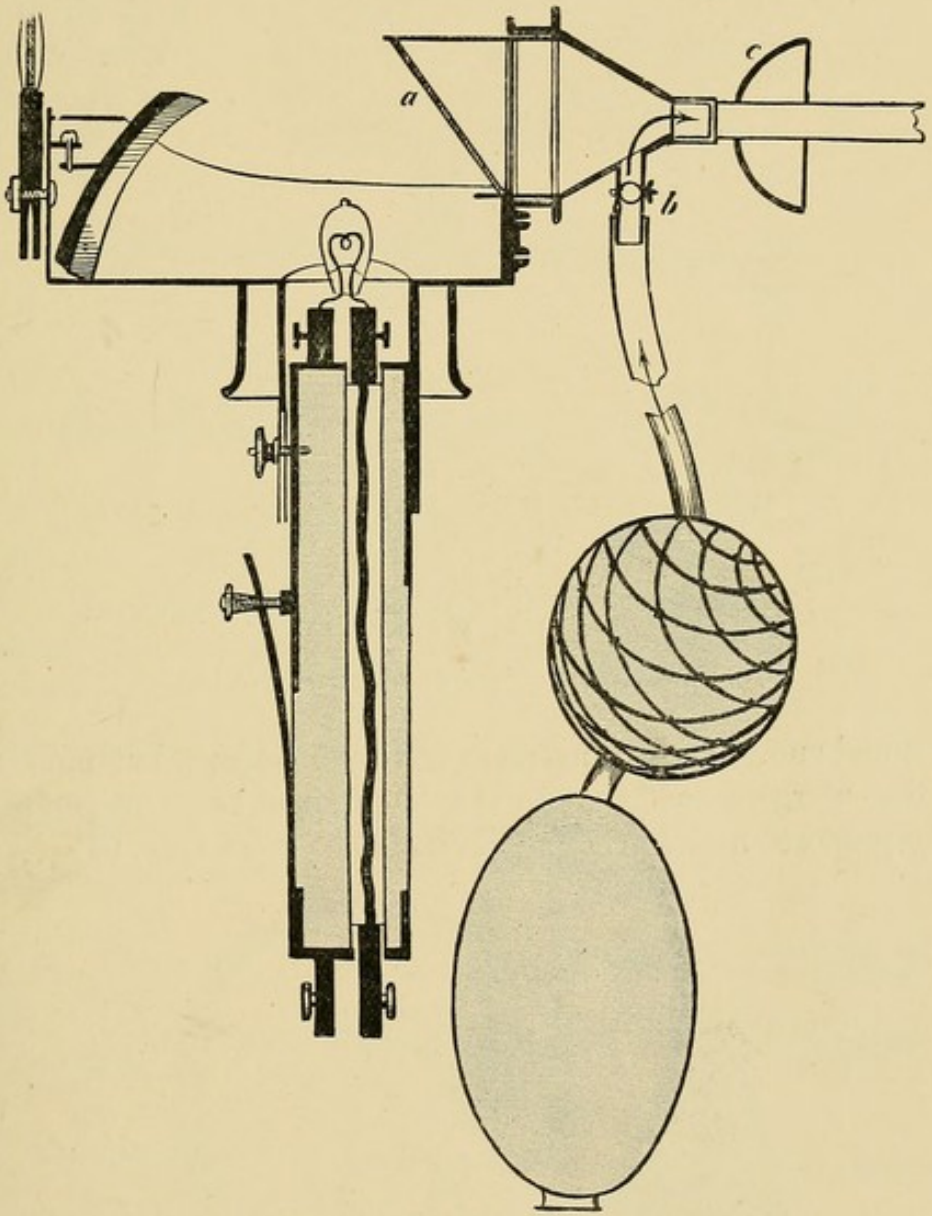


Fig. 63.—Von Antal's Aero-Urethroscope.

brane was brought into view without stretching the meatus. This arrangement has also been adopted by Oberländer and by Horteloup (Fig. 68).

Then Janet advocated a double endoscope, which consisted of two tubes one inside the other. The inner, smaller one is fenestrated, and gives a view of the neck of the bladder. The outer one is an ordinary urethroscopic tube which is open at both ends, and is handled in the usual way.

Recently Professor Kollmann and Dr. Wiehe have designed tubes which widen out at their distal end by the manipulation of a screw attached to

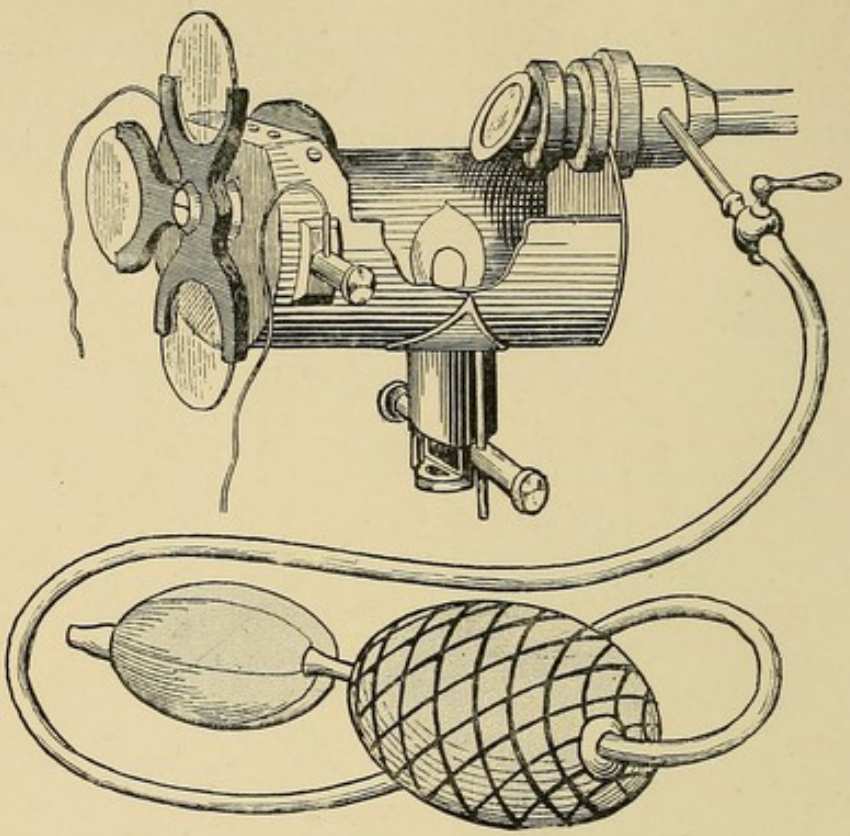


Fig. 64.—Fenwick's Aero-Urethroscope.

their proximal end. The arrangement is very ingenious, but most unsatisfactory, the enlargement of the visual field obtained being insignificant, and in no way proportionate to the intricacy of the device (Fig. 69).

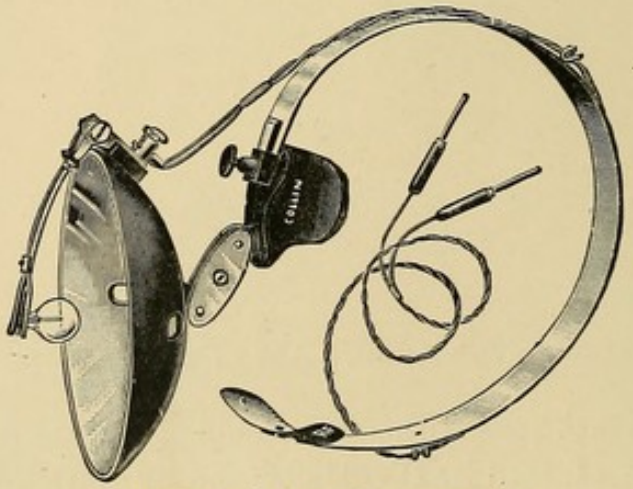


Fig. 65.—Clar's Photophore.

Advantages and Drawbacks of Urethroscopes with External Illumination.—The chief advantage of all urethroscopes with external illumination is the ease with which intra-urethral manipulations can be carried out.

Swabs and their holders and other instruments can be moved about freely in them, and there is no risk of soiling or damaging the source of light.

In addition, their field of vision is slightly wider than that of the instruments with internal illumination, because the lamps always take up some room in the latter.

They have, however, a series of defects which are not fully compensated by these advantages.

First of all, they do not give a clear and easily visible image. However strong the light may be, it is always too weak at the very spot at which

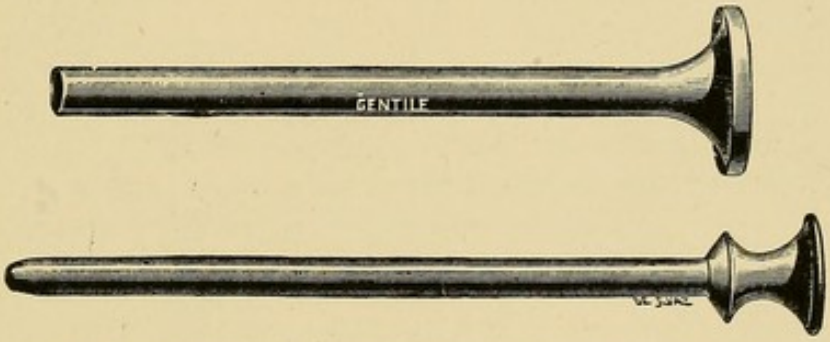


FIG. 66.—ORDINARY URETHROSCOPIC TUBE AND ITS PILOT.

it should be strongest—namely, at the far end of the tube. If one wishes to inspect an object closely, one brings the light as near as possible to it, and the same reasoning holds good for the inspection of the urethra. For this reason, instruments with internal illumination are always to be preferred.[1]

I have made a series of comparative experiments in order to satisfy myself of the truth of this statement, and they have decided in favour of

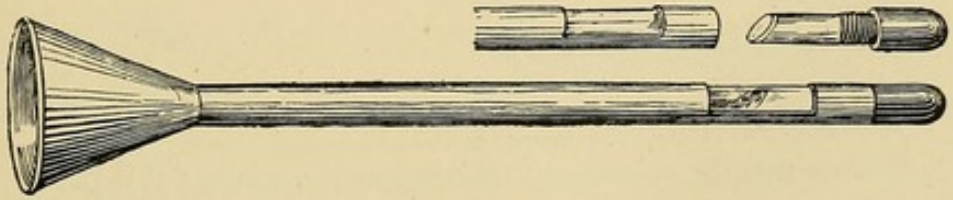


FIG. 67.—GRÜNFELD'S FENESTRATED TUBE WITH REFLECTING MIRROR.

internal illumination. The nearer the light is to the object which one desires to inspect, the better are the conditions for obtaining a good image, and *vice versa*. Even a powerful lighthouse throws less light on a very distant surface than a small electric lamp in its immediate neighbourhood.

Then, again, all the instruments with independent illumination, such as Clar's photophore, require great experience and manipulative skill for directing the rays into the urethroscopic tubes. Moreover, they condemn

[1] Luys, *Bull. de la Soc. de l'Internat*, February 22, 1905, p. 23.

the surgeon to an attitude of rigidity and immobility, as the slightest movement upsets the whole optic system. This is a great inconvenience.

When the lamp is attached to the proximal end of the urethroscopic tube, this opening is hidden, and one has to look through a hole in the

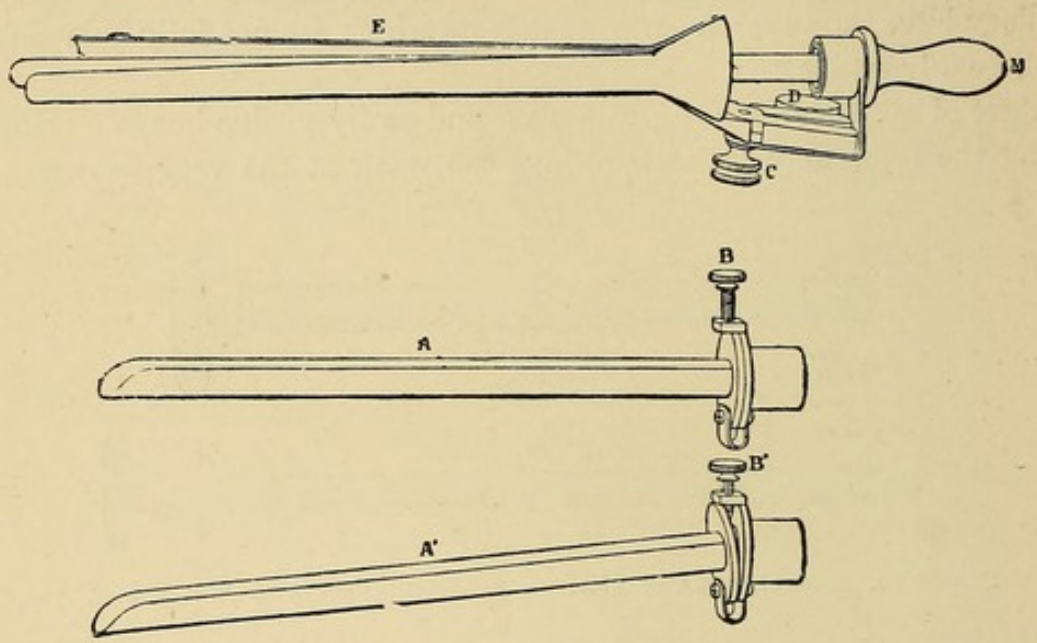


Fig. 68.—Horteloup's Bivalve Speculum.

mirror. Or the handle of the instrument is fitted with an elaborate system of lenses and mirrors, which render it very clumsy and heavy—uncomfortable for the patient, and difficult to handle as far as the surgeon is concerned.

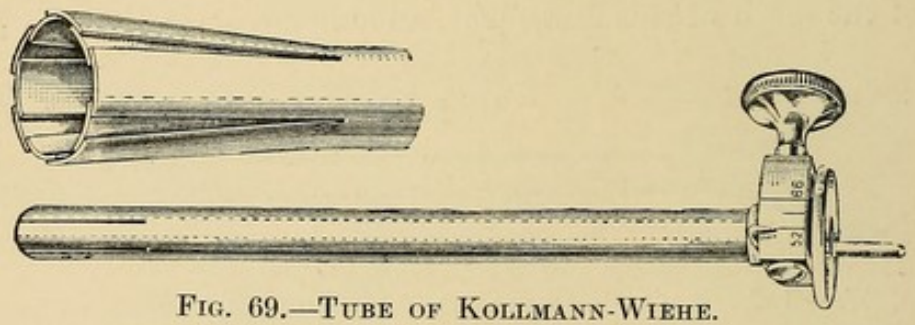


Fig. 69.—Tube of Kollmann-Wiehe.

Lastly, it is impossible to use any straight instruments. One requires a special outfit of *coudé* instruments—another unnecessary complication.

For all these reasons, it does not seem as if the urethroscopes with external illumination could ever become practical instruments which can be handled with ease.

2. Urethroscopes with Internal Illumination.

Nitze, in 1879, was the first to realize the advisability of placing the light at the far end of the urethroscopic tube, close to the surface under examination.[1] This is the best arrangement, for "if one wishes to light up a room, one takes a lamp along."[2]

Nitze's instrument consisted of an ordinary urethroscopic tube, which contained in its walls three small secondary channels. One of these carried

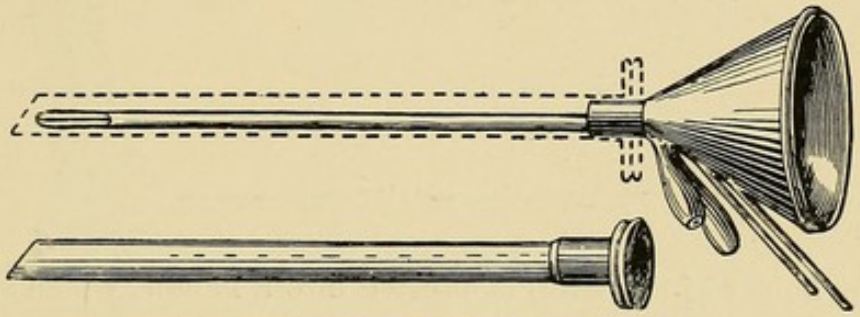


Fig. 70.—Nitze's Urethroscope.

an electric wire which led to the illuminator, an incandescent platinum wire placed at the far end. The other two channels formed part of a water circulation system. A constant flow of cold water through the instrument was necessary, owing to the intense heat of the illuminator. This primitive instrument was not of much service. Its incandescent part took up too much room, and thus rendered the field of vision very small.

Nitze's ideas were taken up by Leiter and by Oberländer, who devised an instrument which outclassed all others at the time.

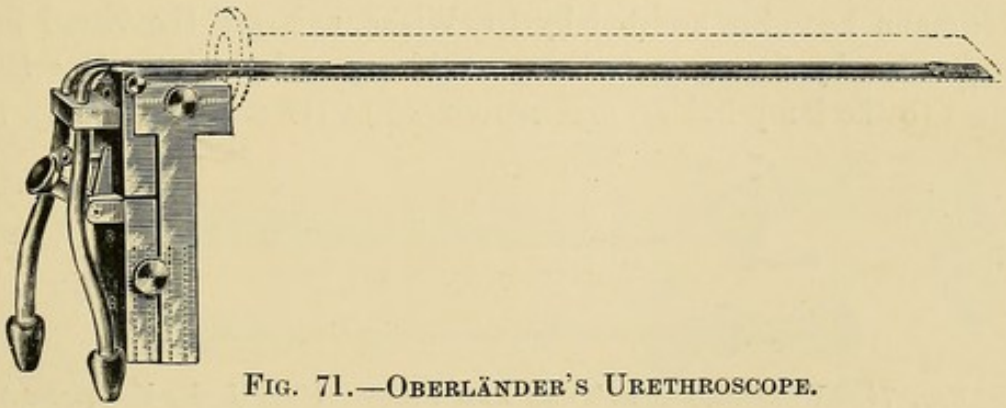


Fig. 71.—Oberländer's Urethroscope.

His instrument gave a very good view of the urethral mucous membrane, but it had two drawbacks—firstly, it required a circulation of cold water to cool the incandescent wire; and, secondly, it compelled the operator to

[1] Nitze, "Eine Neue Beleuchtungs und Untersuchungsmethode für die Harnröhre," *Wien. Med. Woch.*, 1879, No. 24.

[2] Nitze, *Lehrbuch der Kystoskopie* (2nd edit., 1907, p. 8).

withdraw the light every time he wished to swab the urethral mucous membrane.

Valentine of New York remedied these defects by replacing the incandescent wire by a tiny electric lamp mounted on a long slender metal tube of sufficient length to reach the margin of the far end of the urethroscopic

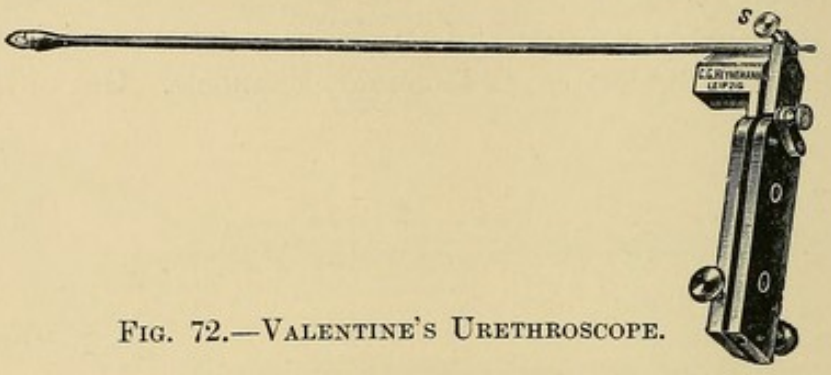


Fig. 72.—Valentine's Urethroscope.

tube. The holder of the lamp is inserted into a handle, which is provided with a switch for the electric current.

Apart from this considerable improvement, Valentine's instrument is practically the same as Oberländer's. Both instruments have tubes and pilots of the same pattern (Fig. 74).[1]

Fig. 73.—Lamp of Valentine's Urethroscope.

Professor Kollmann has adapted this instrument to the requirements of urethro-photography, and has obtained photos of the urethral mucous membrane in this way.[2]

Kollmann has also, assisted by Dr. Wiehe, enlarged the visual field of his apparatus by fitting it with a movable optical portion. The latter is attached to the lamp-holder, and introduced at the same time (Fig. 77).

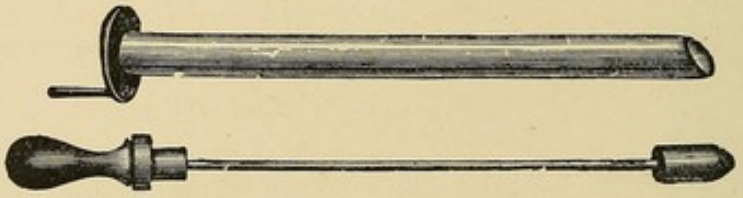


Fig. 74.—Urethroscopic Tube and Pilot. (Oberländer-Kollmann.)

Dr. Wasserthal of Karlsbad converted Valentine's urethroscope into an aero-urethroscope, based on the same principle as Von Antal's; and Dr.

[1] Oberländer and Kollmann, *Die Chronische Gonorrhoe der Männlichen Harnröhre*, Leipzig, 1910, p. 64.

[2] Kollmann, "Die Photographie des Harnröhreinnern," *Centralblatt f. n. Krankheit. d. Harn. u. Sexualorg.*, 1891, vol. ii., p. 227, No. 391.

Gordon of Vancouver has recently devised an instrument which is very similar.[1]

Dr. R. Kaufmann added a telescope to the handle of Valentine's instrument, which thus becomes very heavy and clumsy, and difficult to use.

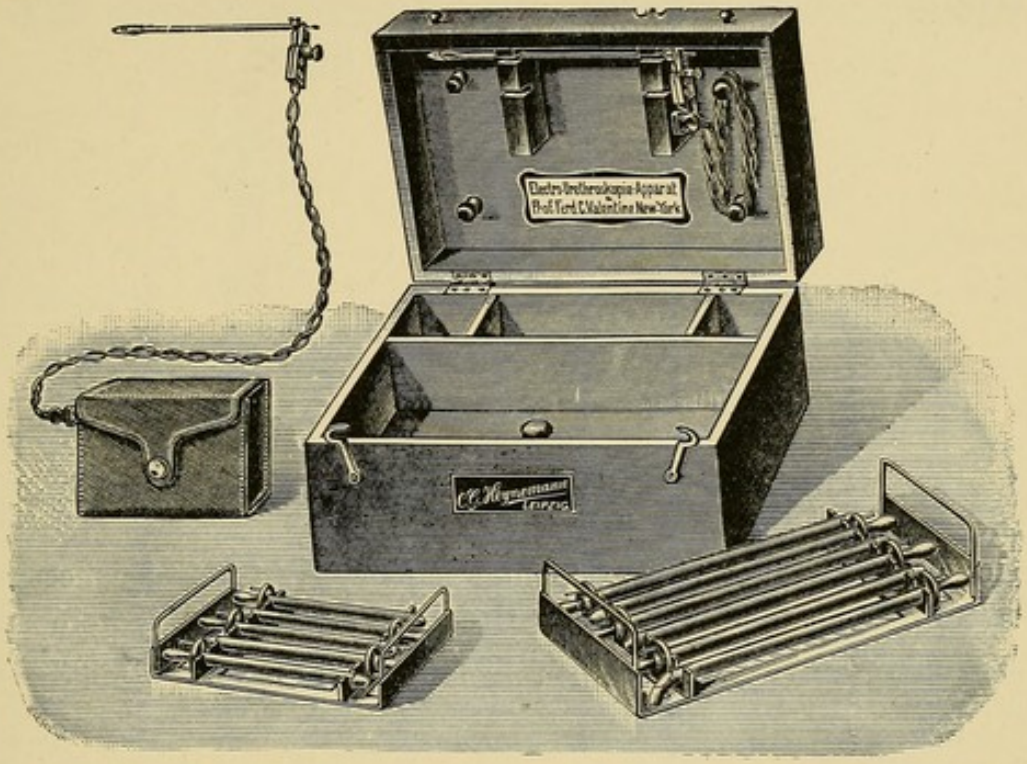


FIG. 75.—VALENTINE'S COMPLETE URETHROSCOPIC OUTFIT.

Valentine's original instrument was defective in several ways: (1) The exchanging of the lamps was a difficult and tedious matter, when they had to be replaced owing to breakage or to fusing of the incandescent wire.

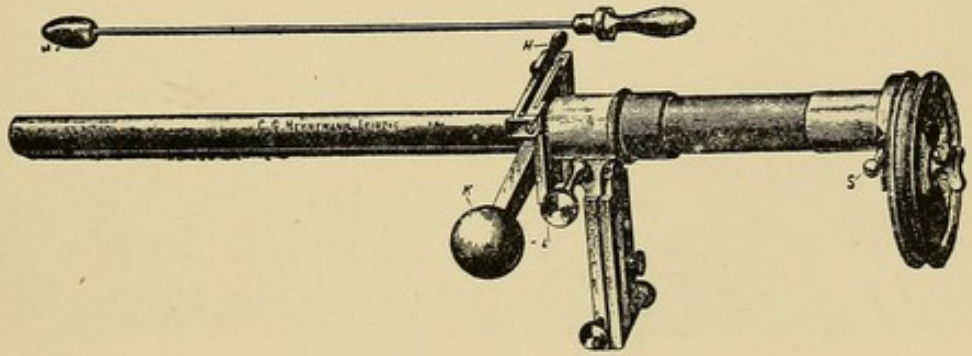


FIG. 76.—KOLLMANN'S PHOTOGRAPHIC URETHROSCOPE.

(2) The lamp itself was so delicate that a drop of fluid, which happened to enter its metal socket, was often sufficient to set up a short circuit and to extinguish the light. (3) There was no device which enlarged the images.

[1] *The Canadian Medical Assoc. Journ.*, December, 1911.

Lesions which were within the field of the instrument were thus easily overlooked. (4) The small lamp and its holder took up a considerable portion of the lumen of the tube, and thus reduced the field of vision considerably.

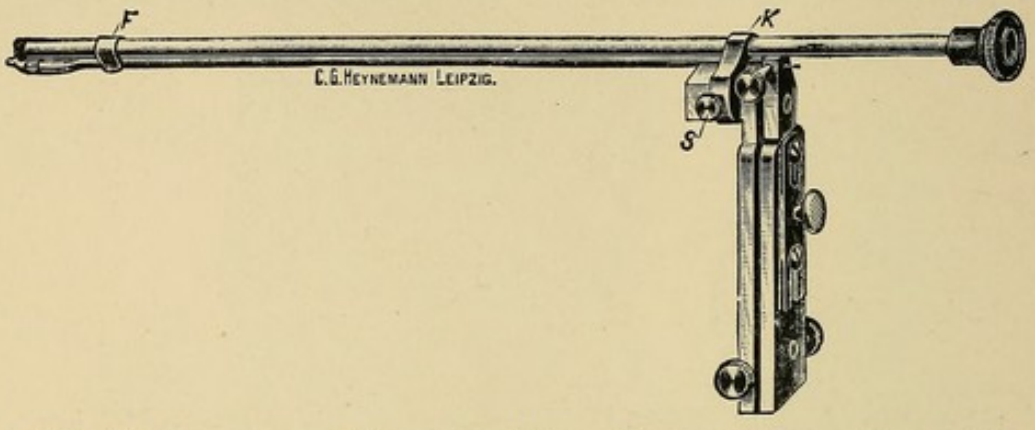


Fig. 77.—Handle of the Kollmann-Wiehe Urethroscope, with its Lamp and its Optical Portion.

I have introduced a series of important modifications in order to remedy these defects. The first improvements were presented at the meeting of the Société de Chirurgie in Paris on December 24, 1902, and were subsequently brought to the notice of the Académie de Médecine by my former teacher, Professor Le Dentu.[1]

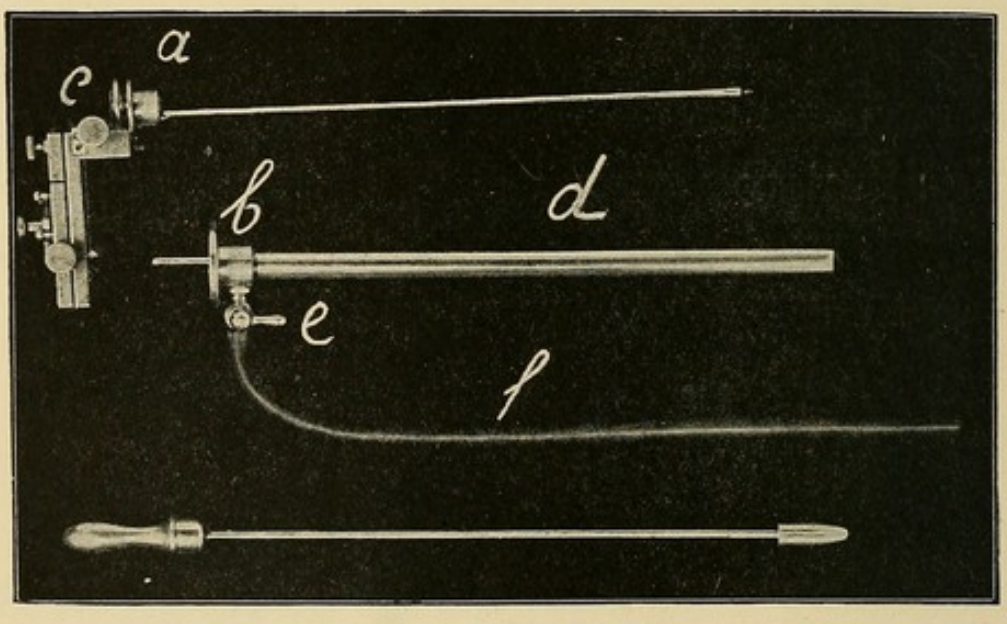


Fig. 78.—Wasserthal's Aero-Urethroscope.

1. I have firstly added a movable magnifying-glass to the handle. The focal length of the lens corresponds exactly to the length of the urethroscopic tube. The lesions observed in the urethra are thus magnified, and cannot

[1] Le Dentu, *Bull. de l'Acad. de Méd.*, July 4, 1905.

be overlooked. The presence of a magnifying-glass is a great advantage, and it is, to say the least, strange that some should refuse to use it. The urethroscope is, in the first place, an instrument for diagnosis, and as the lens allows one to see details which are invisible to the naked eye, it is indispensable.

In my instrument the lens is movable, and can be easily exchanged for any other one. The individual surgeon can therefore always have the lens fitted which suits his eyes best, whether his sight be normal or not.

2. The socket which carries the lamp has been improved. The space between the metal cup and the bulb of the lamp has been filled with an insulating mass. Short-circuiting is thus obviated, should any moisture reach the lamp and its holder.

3. The lamps can be exchanged with the greatest ease and rapidity.

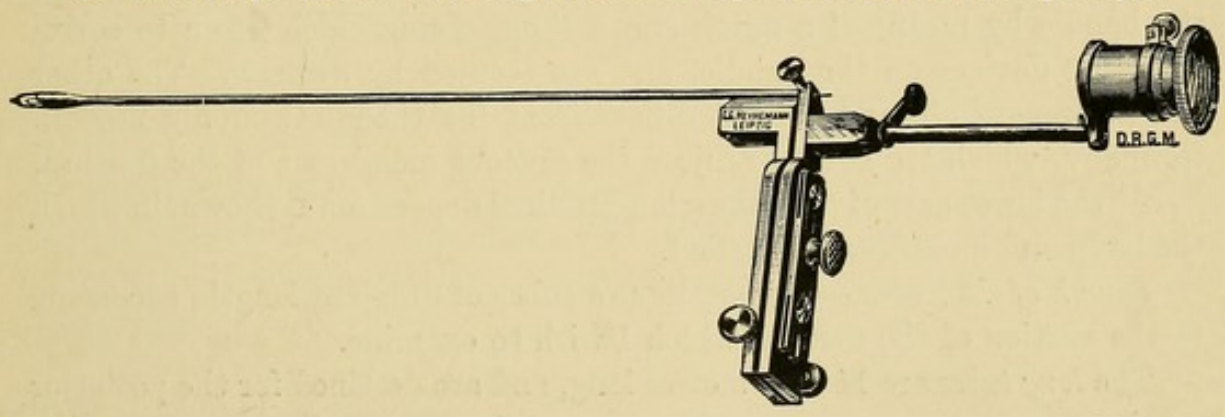


FIG. 79.—HANDLE OF KAUFMANN'S URETHROSCOPE, WITH ITS TELESCOPE.

4. The various lamps are mounted on holders of different lengths to match the different urethroscopic tubes for the anterior and for the posterior urethra.

5. Every tube has a longitudinal groove which carries and conceals the lamp and its holder.

Amongst the most interesting publications on urethroscopy, those of Keersmaecker and Verhoogen,[1] Clado,[2] Fenwick,[3] Kollmann,[4] Valentine,[5] Azevedo Albuquerque,[6] Frank (of Berlin), Gouvea (of Rio de Janeiro),

[1] Keersmaecker et Verhoogen, *Urétrites Chroniques d'Origine Gonococcique*, Bruxelles, 1898.

[2] Clado, *Traité d'Hystéroscopie*, 1898.

[3] Fenwick, *Obscure Disease of the Urethra*, London, 1902.

[4] Kollmann, "Die Photographie des Harnröhreinnern," *Centralblatt für die Physiol. und Path. der Harn und Sexualorgan*, 1891.

[5] Valentine, *The Irrigation Treatment of Gonorrhea*, New York (William Wood and Co.), 1900, p. 188.

[6] Azevedo Albuquerque, *Endoscopia do Appareilho Urinario* (Thèse de Porto, 1903).

Ch. Stern[1] (of Hartford), Paul Asch[2] (of Strassburg), Luys,[3] Wossidlo,[4] Von Frisch,[5] Wormser,[6] Suarez de Mendoza[7] (of Madrid), Oberländer and Kollmann,[8] and of Fraisse,[9] deserve special mention.

Description of Luys's Urethroscope.

My urethroscope consists of two distinct portions—the urethroscopic tubes with their metal pilots, and the handle, or illuminator.

1. **Urethroscopic Tubes.**—My tubes are not perfectly cylindrical. A longitudinal groove runs along one of the walls, which receives the lamp and its holder. The lamp is thus hidden within the wall of the instrument, instead of protruding into its lumen. This arrangement increases the field of vision.

One of the two extremities of the urethroscopic tube articulates with the handle by means of a notch and a short stem, which fit on to corresponding devices on the handle, and are secured by a screw. The other end is *rounded off*, and thus it differs from the tubes commonly used in Germany, which are liable to injure the mucous membrane of the urethra.

At the lower part of the tube a longitudinal depression is shown, in which the lamp and its holder are carried.

Length of the Tubes.—I generally use tubes of different length, according to the portion of the urethra which I wish to examine.

The *long tubes* are 14 centimetres long, and are destined for the posterior urethra.

The *short tubes* for the penile urethra measure only 7 centimetres.

The *medium-sized tubes*, which are most often used, are 13 centimetres long, and allow one to explore the whole anterior urethra.

[1] Ch. Stern, "On the Use of the Urethroscope in Diagnosis," *Transactions of the Connecticut State Medical Society*, 1906, pp. 137-145.

[2] Paul Asch, "Urethroskopische Beiträge zur Diagnose Therapie und Prognose des Trippers und seiner Folgen," *Zeitschrift für Urologie*, 1907, Bd. i., Heft 4.

[3] Luys, "Diagnostic et Traitement Urétroscopique des Urétrites Chroniques," *Presse Médicale*, April 22, 1903; *Compte Rendu de l'Association Française d'Urologie*, 1903, p. 789; *Endoscopie de l'Urètre et de la Vessie*, Paris (Masson), 1905, épuisé; *Exploration de l'Appareil Urinaire*, 1st and 2nd edit., 1909, Paris (Masson).

[4] Wossidlo, *Die Gonorrhoe des Mannes und ihre Komplicationen*, Berlin (Otto Emslin), 1903; et Zweite Auflage, Leipzig (Georg Theime), 1909.

[5] Von Frisch et Zuckerkandl, *Handbuch der Urologie*, Erster Band, p. 550 et suiv. Wien (Hölder), 1904.

[6] Wormser, *Journal des Praticiens*, August 4, 1906.

[7] Suarez de Mendoza, "Diagnostico y Tratamiento de las Enfermedades de las Vias Urinarias," Perlado, Paez, Madrid, 1908.

[8] Oberländer et Kollmann, *Die Chronische Gonorrhoe der Männlichen Harnröhre, und ihre Komplicationen*, Zweite Auflage, Leipzig (Georg Thieme), 1910.

[9] Fraisse, *Gonorrhée Chronique de l'Homme*, Paris (Maloine), 1910.

Their Lumen.—Oberländer and Kollmann have examined 300 patients[1] for the purpose of ascertaining the best width for urethroscopic tubes; 2 to 3 per cent. of their cases had too narrow a meatus to admit No. 23. In most instances (69 to 70 per cent.) a tube No. 27, or even No. 29, could be passed.

One therefore has to use No. 23 in 10 per cent. of all cases, and No. 25 in 25 per cent.

It follows that most patients have a meatus of sufficient width to admit at least No. 25. My personal observations are in complete agreement with these figures, and I usually select a tube No. 26.

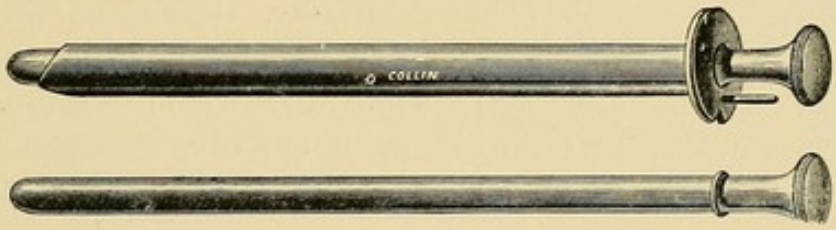


Fig. 80.—Luys's Long Urethroscopic Tube, with its Pilot.

Generally speaking, it is of advantage to use the largest size possible. One thus obtains a larger field. The folds of the mucous membrane are spread out better, and allow one to see lesions which would remain hidden otherwise.

Material used.—My tubes are made of metal, and are nickel-plated. They are thus easily cleaned, sterilized, and handled.

Some authorities recommend glass tubes, because this substance is a non-conductor of electricity. It is true that a short circuit is apt to be

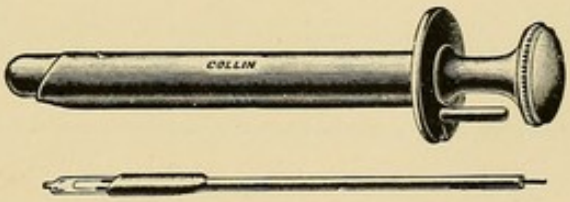


Fig. 81.—Luys's Short Urethroscopic Tube, with its Lamp.

made if one moves live wires about within the urethra, and happens to touch the wall of the metal tube; but this little accident is avoidable by careful manipulation, and it certainly is in no way comparable to the danger of breaking the glass tube when it is inside the urethra. A misadventure of this kind might easily lead to a serious calamity.

I also cannot share Grünfeld's predilection for vulcanite tubes.

The metal pilots of my tubes differ from those made in Germany by being solid nickel-plated rods. They are easier to handle, and can be

[1] *Vide* De Keersmaecker and Verhoogen, *loc cit.*

withdrawn more readily once the tube has been introduced. In the first models my pilots had a longitudinal groove running along their whole length, which allowed the air to enter when the pilot was withdrawn. This arrangement prevents the aspiration of the mucosa into the tube, and avoids injury and pain. It has become unnecessary, and has been discarded in the recent models, since the tubes have been fitted with a groove for the lamp.

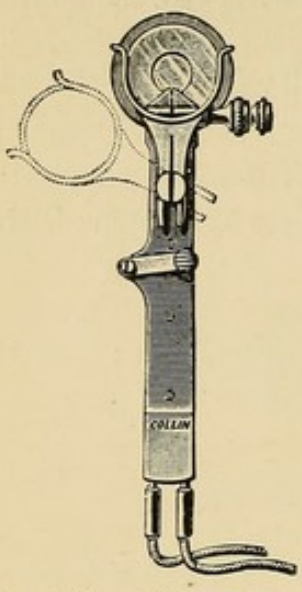


FIG. 82. — HANDLE OF LUYS'S URETHROSCOPE, WITH ITS LENS AND ELECTRIC WIRES.

2. **The Handle.**—The handle of my urethroscope consists of a metal stem of sufficient length to be held comfortably. It is fitted with a switch, which allows one to cut off the current. At its lower end are two holes which receive the electric wires, and its upper end carries a magnifying-glass which can be easily moved to the right or to the left. The lens is supported in a metal clip, from which it can be easily removed if one wishes to use a longer or a shorter tube. One substitutes the lens required, which has a focal length corresponding to the length of the tube about to be used.

The small electric lamp is fixed to the upper extremity of the handle. For the different tubes, lamps mounted on holders of different lengths are supplied. The length of a holder is such as to bring the lamp exactly opposite the end of the endoscopic tube without touching the urethral mucous membrane.

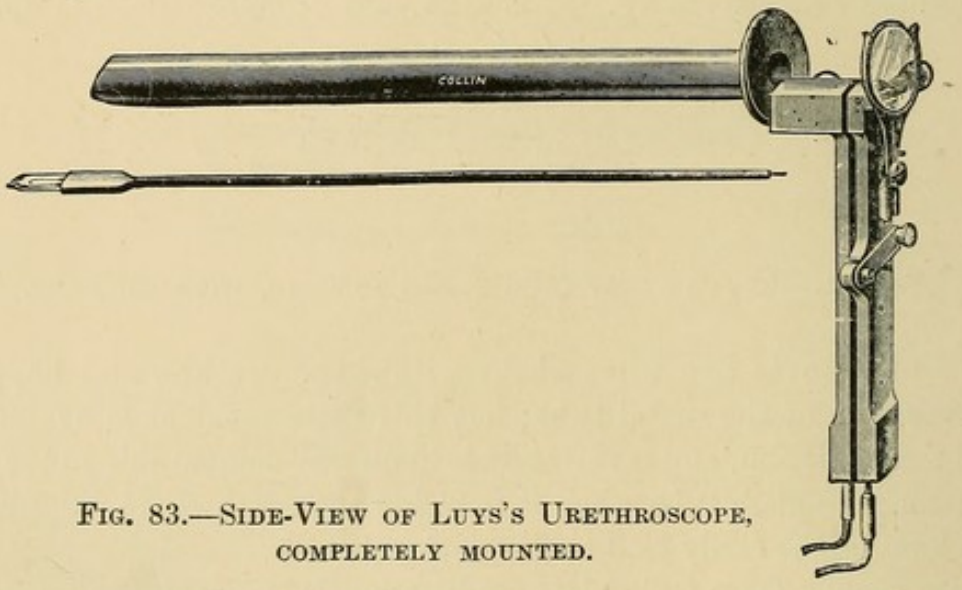


FIG. 83.—SIDE-VIEW OF LUYS'S URETHROSCOPE, COMPLETELY MOUNTED.

The lamps are interchangeable within a few seconds, and are disinfected in the same manner as an ordinary cystoscope—namely, by the action of formalin vapours—whilst the endoscopic tubes are sterilized by boiling.

This is the instrument with which I have always operated, and with success. There is no danger of burning the patient. The lamps which we use are so-called *cold* lamps, which give off no appreciable heat when they are new. During my long experience I have never come across a patient who complained of a disagreeable sensation of heat during the urethroscopic examination.

It is advisable to change the lamps frequently, and to keep a stock of them in hand; for they "go" quickly, and after prolonged use they cease to be *cold* lamps, and give off heat. When purchasing the lamps, it is well to select the smallest ones, and to make sure that they are *cold* when burning.

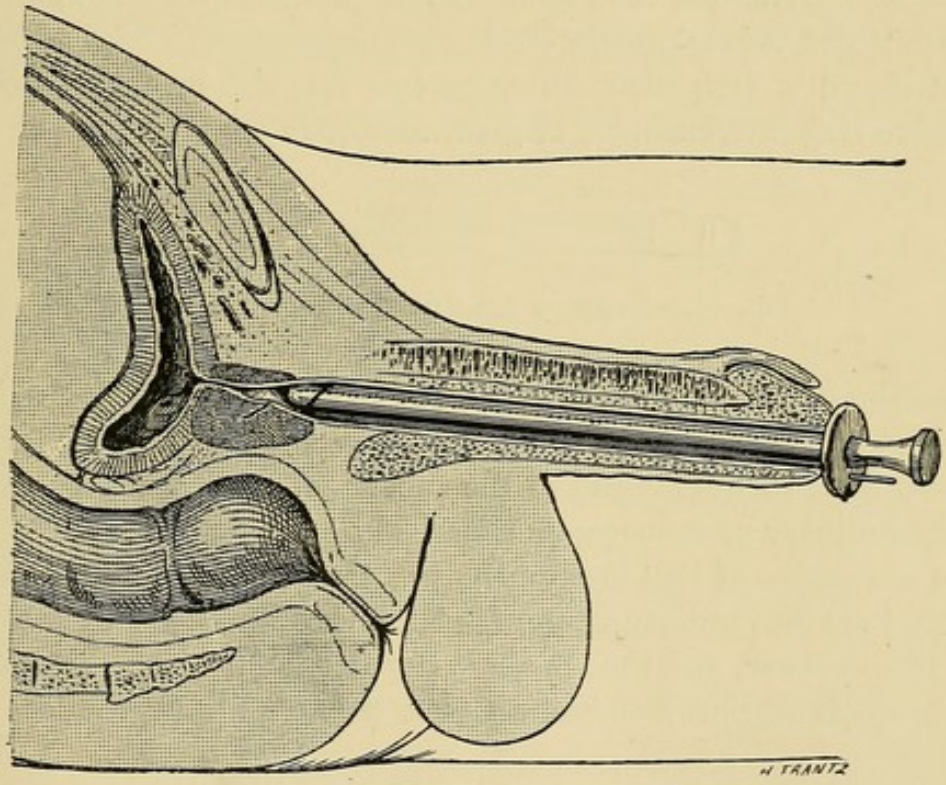


FIG. 84.

This figure shows how the endoscopic tube is caught and stopped by the projecting verumontanum.

With my instrument, intra-urethral manipulations can be carried out without having to withdraw the lamp. They are therefore comparatively easy, and are constantly controlled by sight.

The illumination of the urethral mucosa is perfect, and infinitely more powerful than that obtained by instruments with external illumination.

Special Urethroscopes for the Posterior Urethra.

Owing to the projection of the verumontanum, the examination of the posterior urethra presents special difficulties.

An ordinary straight tube is caught when it reaches the verumontanum,

and makes it bleed a little (*vide* Fig. 84). This hemorrhage is of no consequence, but generally there is also some bleeding from the rest of the posterior urethra in these cases, and then one may be unable to see anything.

For this reason a number of authors have endeavoured to introduce improved instruments, which unfold and separate the walls of the posterior urethra. Goldschmidt used water for this purpose; Wossidlo inflates the urethra with air, like Von Antal.

After having given these various urethroscopes a trial, I have given them up. I much prefer my simple endoscope to these complicated instruments, and I find that it answers just as well if handled carefully, not to mention its advantages, such as its simple and solid construction, and the ease with which it is manipulated.

Goldschmidt's Irrigation Urethroscope for the Posterior Urethra.—This interesting instrument is of great service in examinations of the pos-

FIG. 85.—LAMP OF LE FÜR'S URETHROSCOPE.

terior urethra. Its construction reminds one of an older apparatus invented by Le Für. This author showed in 1903 a new urethroscope, in which the lamp was fixed to the far end of the tube. This arrangement was copied from the ordinary cystoscope, and marked a new departure.

The advantage of this instrument was that the lumen of the tube was perfectly free; but, unfortunately, the lamp threw its light directly into the eye of the observer, and thus made it impossible for him to see the details of the urethral mucous membrane distinctly.[1]

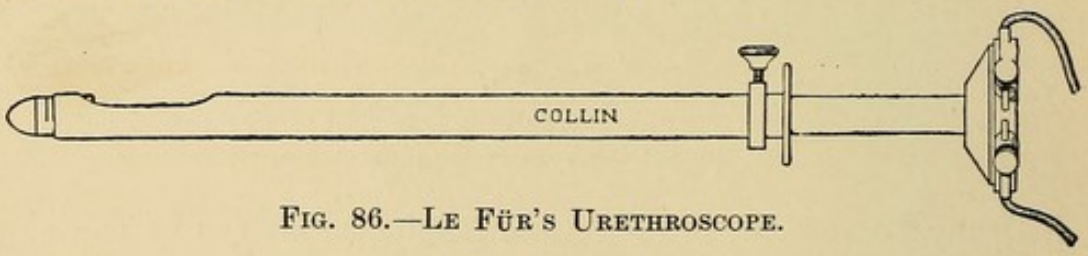


FIG. 86.—LE FÜR'S URETHROSCOPE.

Goldschmidt of Berlin[2] adopted the principle of this instrument, and combined it with that of the irrigation cystoscope. He thus invented an apparatus which in certain special cases gives excellent results. The urethra is distended by a current of water running from an irrigator, and is then examined.

[1] Le Für, *C. R. de l'Ass. Franç. d'Urologie*, p. 784.

[2] Goldschmidt, "Die Endoskopie der Harnröhre," *Berl. Klin. Woch.*, 1906, No. 6; "Die Irrigations-Urethroskopie," *Folia Urologica*, von James Israel, vol. i., 1907, Nos. 1 and 2.

His outfit comprises two instruments, one for the anterior and one for the posterior urethra. Each one has its optical portion, which enlarges the visual field and magnifies the images.

The instrument is used as follows: The patient empties his bladder in the normal way, and is put into the position for cystoscopy—head down, body horizontal, the pelvis up to the edge of the table, the thighs flexed, and the heels supported by stirrups.

The urethroscope is sterilized by boiling, and fitted with its pilot. It

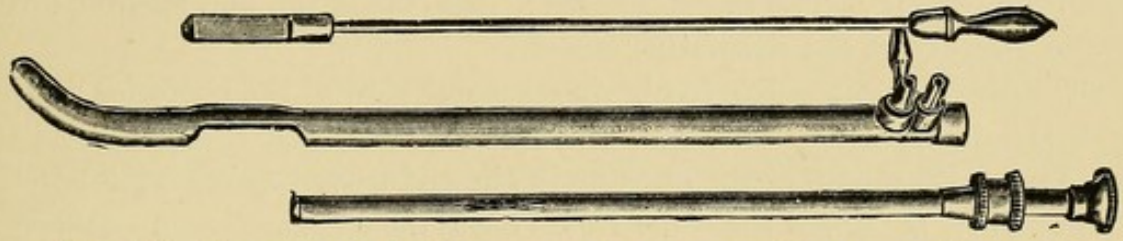


Fig. 87.—Goldschmidt's Urethroscope for the Posterior Urethra.

is then lubricated with glycerine, and passed into the posterior urethra, which it enters without difficulty, owing to its curve.

The electric wires are attached, and the tap at the upper part of the instrument is connected with a reservoir which contains lukewarm water, and is placed about 6 feet above the level of the bed. The pilot is then withdrawn, and replaced by the optical portion. One now opens the tap, switches on the light, and examines the posterior urethra. By drawing the optical portion gently to and fro, the posterior urethra can be examined in its entire length. The circulating water naturally flows into the bladder,

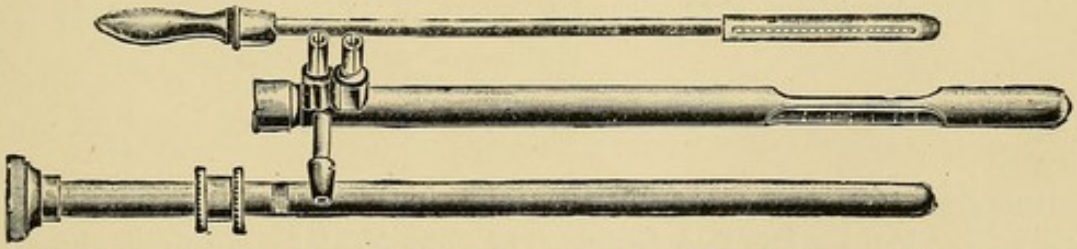


Fig. 88.—Goldschmidt's Urethroscope for the Anterior Urethra.

and thus the patient finds it necessary after a certain time to empty his bladder. One switches off the current, withdraws the optical portion, and allows the water to run out.

The principle of the urethroscope for the anterior urethra is similar.

Advantages.—The great advantage of this instrument is that a complete examination of the posterior urethra can be made, which is not interfered with by the presence of blood. The latter is constantly washed away by the circulating water. Moreover, the walls of the urethra are well separated, and are thus well shown.

Lastly, the images obtained are considerably magnified. Even the smallest details are thus visible. Small polypi float in the water, and are very easily recognized.

Drawbacks.—Unfortunately, the drawbacks are more numerous than the advantages.

Firstly, the apparatus is very complicated. The handling of the optical portion and the circulation of water render its use somewhat difficult.

Secondly, the urethroscopic images do not correspond to the actual condition present. The whole mucosa is pale, bloodless, and anemic, owing to the pressure of the circulating water.

Thirdly, it is impossible to obtain a general view of the posterior urethra with this instrument. One wall only can be seen at a time, because the lamp takes up a part of the opening in the endoscopic tube.

Fourthly, *the upper wall—the region above the verumontanum—cannot be examined at all.* This is the chief drawback of the instrument.

Fifthly, local treatment of the posterior urethra (local applications, cauterizations) is very difficult to carry out with Goldschmidt's apparatus.

To resume: Goldschmidt's irrigation urethroscope is an excellent diagnostic instrument, but it should be reserved for special cases in which a very accurate investigation of the posterior urethra is necessary.

This instrument has undergone some interesting modifications in the hands of Dr. Alfred Rothschild.[1]

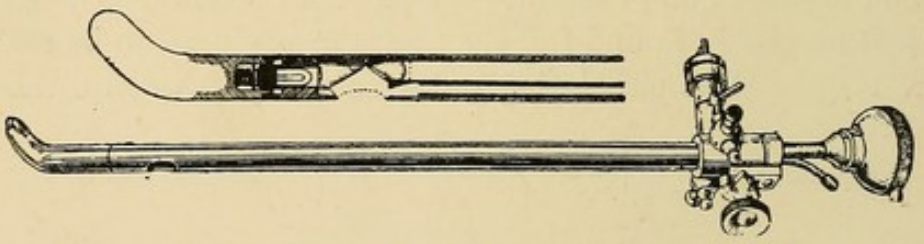


FIG. 89.—BUERGER'S CYSTO-URETHROSCOPE.

Buerger's Cysto-Urethroscope.—Goldschmidt's method has been developed further by Dr. Leo Buerger, of New York.[2] He finds that Goldschmidt's instrument is difficult to handle, and that it is apt to injure the posterior urethra. Moreover, its field of vision is too small, and its images are distorted.

His own instrument is based on the same principle as Nitze's cystoscope, and is free from some of the defects mentioned. The images are enlarged by a prism placed on the upper wall of the far end, as shown in Fig. 89, which gives a view of the optical portion.

[1] Rothschild, *Zeits. f. Urologie*, 1908, vol. ii., p. 1000; *Verhandlung. d. Deutsch. Gesell. f. Urol.*, April, 1909, p. 458.

[2] Leo Buerger, "On Methods of Posterior Urethroscopy, with a Description of a New Cysto-Urethroscope." (Reprinted from *Amer. Journ. of Surgery*, May, 1910.)

The instrument and its pilot are introduced into the bladder, which is irrigated through the former. The optical portion is then introduced. The circulation of water is assured through a side-tube, which is connected with an irrigator. The trigone of the bladder and the posterior urethra are inspected, small quantities of water being injected on and off; 50 to 150 c.c. of boric acid solution are sufficient.

Owing to the small size of the window, the apparatus can be turned in all directions.

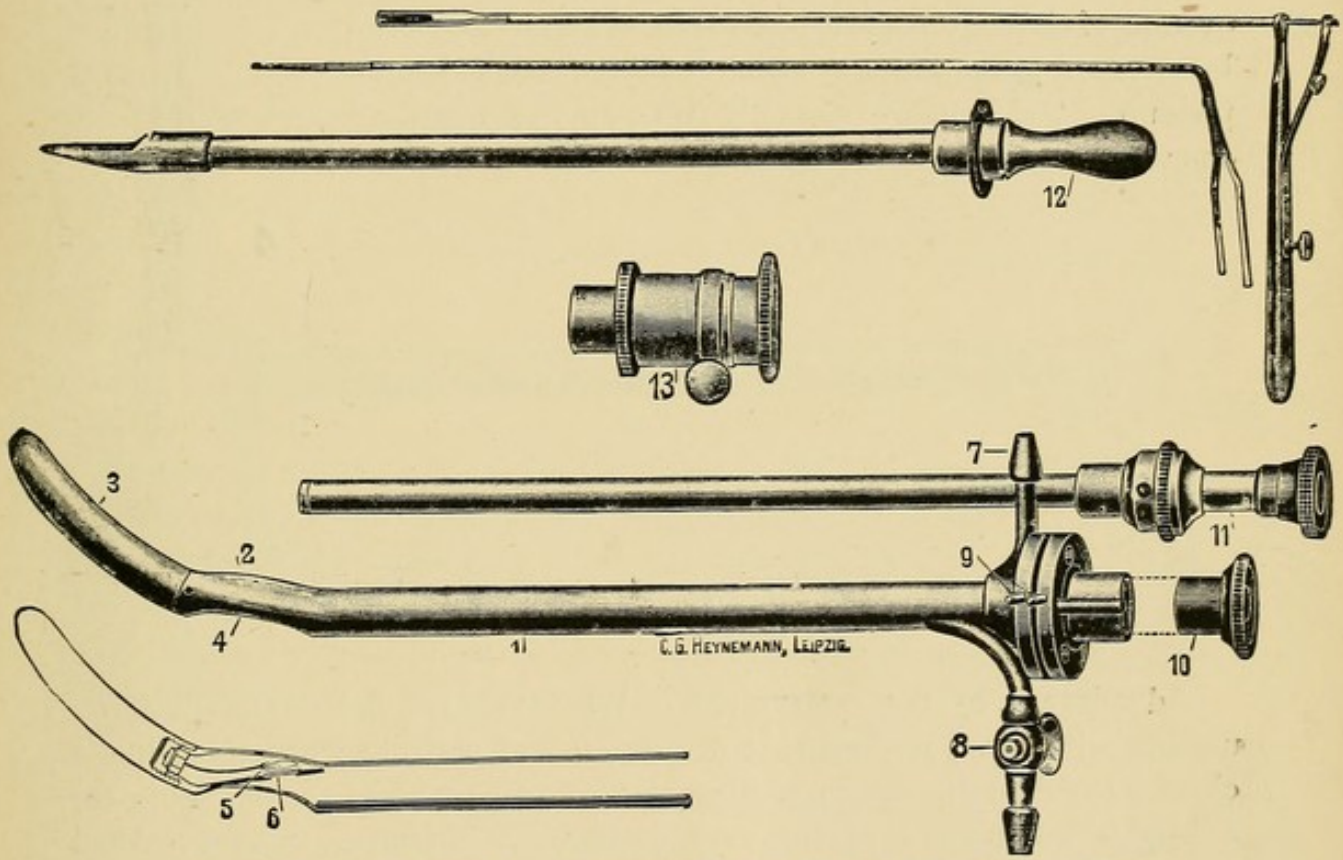


FIG. 90.—WOSSIDLO'S URETHROSCOPE FOR THE POSTERIOR URETHRA.

Wossidlo suggested in 1908[1] an instrument for the posterior urethra which inflated the passage with air. In his last models he adopted the water circulation.

Personal Experiences on the Urethroscopic Examination of the Posterior Urethra.

The excellent results which I had obtained with my direct vision cystoscope for the bladder, and with my rectoscope for the rectum, led me to adapt the same principle to the examination of the posterior urethra. I

[1] Wossidlo, *Zeits. f. Urologie*, 1908, p. 243; *Deutsch. Med. Woch.*, 1910, No. 7.

thus undertook a series of experiments and researches for the examination of the posterior urethra.

I had a tube made which was similar to that of my direct vision cystoscope—*i.e.*, a tube fitted on its under-surface with a very narrow channel which had an opening at the far end of the urethroscopic tube, and was fitted with two taps at its other end. Through it liquids could be aspirated by means of a filter pump, or air could be insufflated by means of bellows. The illumination was effected by means of a small lamp on a long holder. The outer opening of the endoscopic tube was closed hermetically by a small glass window which adapted itself by pressure. This window was only to be applied when one wished to inflate the posterior urethra with air.

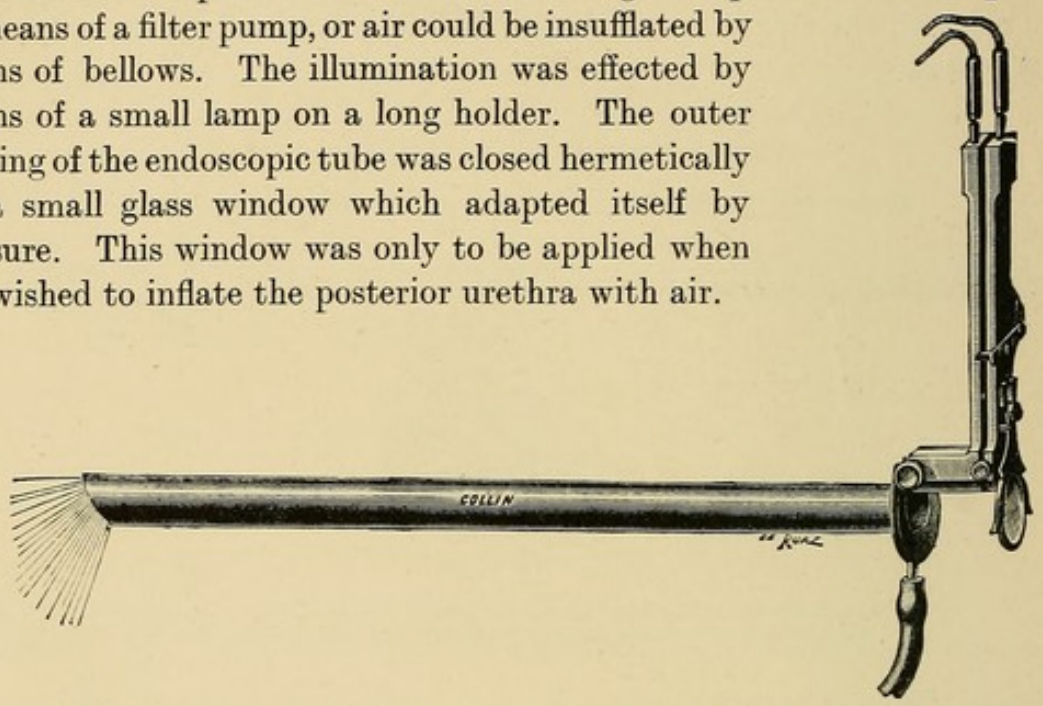


Fig. 91.—Luys's Direct Vision Cystoscope (Male Pattern).

Advantages of the Instrument.—Whenever I inflated the posterior urethra with air, I noticed that the vision was perfect. Something like a cloud seemed to disperse; a shadow seemed to pass and to make room for a bright illumination of the verumontanum. Moreover, I very seldom

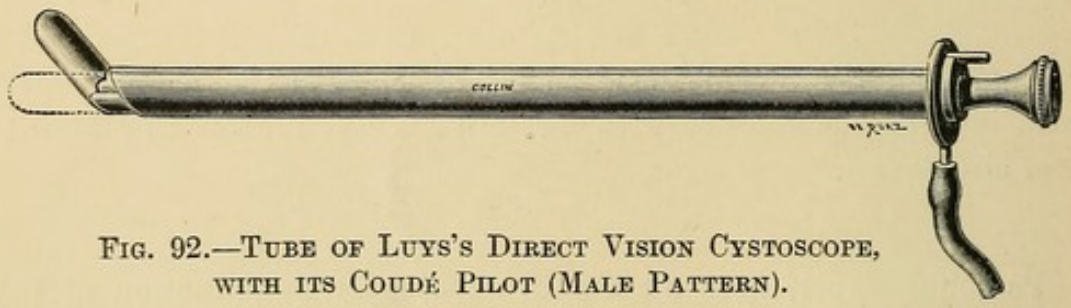


Fig. 92.—Tube of Luys's Direct Vision Cystoscope, with its Coudé Pilot (Male Pattern).

required now mounted swabs. The pressure of the air was sufficient to check any oozing and any pathological secretion. As the walls of the posterior urethra were well separated, I obtained a splendid general view of it. Lastly, there was this advantage over the urethroscopes for the posterior urethra which are worked with a water circulation—that there

were no air bubbles in the water to interfere with the clearness of the pictures. The colour of the mucosa was hardly altered. It was practically normal, and not anemic, as in the case of the instruments with a water circulation.

Drawbacks.—The chief drawback was that the air used for dilating the posterior urethra found its way into the bladder. This viscus soon became distended, and the desire to micturate supervened. In cases with a small prostate, nothing was then easier than to push the urethroscopic tube into the bladder and to relieve the distension. But when the gland was large, I encountered considerable difficulty in trying to reach the bladder. The prostate and the verumontanum formed a kind of valve. The air entered, but it did not come out again.

I remedied this defect by modifying my original design, and by making a small opening at the vesical end. In this way the air which was under pressure in the bladder could escape through the taps on the outer end of the urethroscopic tube.

This instrument gave a very good view of the posterior urethra; but one must admit that such exploratory measures are exceptional, whether one uses this instrument or another model.

In the overwhelming majority of cases, my simple straight tube is sufficient for a complete examination of the posterior urethra, providing one uses it *after having previously dilated the urethra with curved metal sounds.* One then obtains a good view, and can work under practically the same advantageous conditions as with special instruments, without having to suffer from their drawbacks.[1]

The Supply of Electric Current.

The electric current required for the urethroscopic lamps may be obtained from a variety of sources.

One can take it directly from the main which supplies the house, in which case a resistance has to be interposed, such as one of the rheostats shown in Figs. 93, 94, and 96.

Or a small portable battery (Fig. 95) may be used. These small cells are rapidly exhausted, but they can be replaced easily, and take up so little room that one can carry them in one's pocket.

Another apparatus which may be of interest to those who have no electric light in their house is the portable dynamo devised by Dr. Sigurta of Milan.

The instrument consists of a case which encloses a small dynamo which

[1] *Vide*, as regards the technique in the case of man: Luys, *Exploration de l'Appareil Urinaire*, 2nd edit., Paris (Masson), 1909.

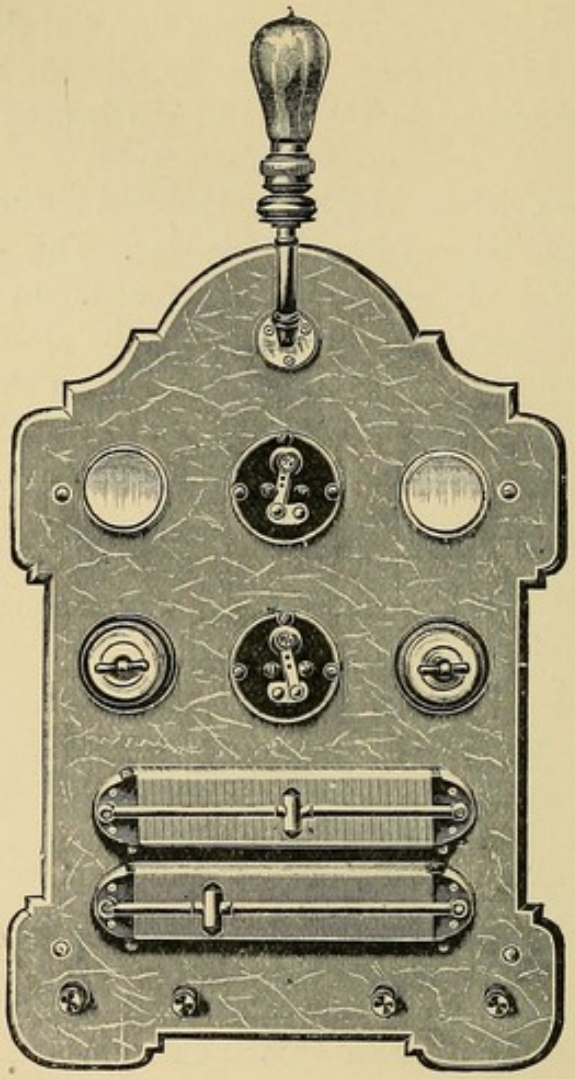


FIG. 93.—RHEOSTAT FOR LIGHT AND CAUTERY, SUITABLE FOR THE CURRENT FROM THE MAIN.

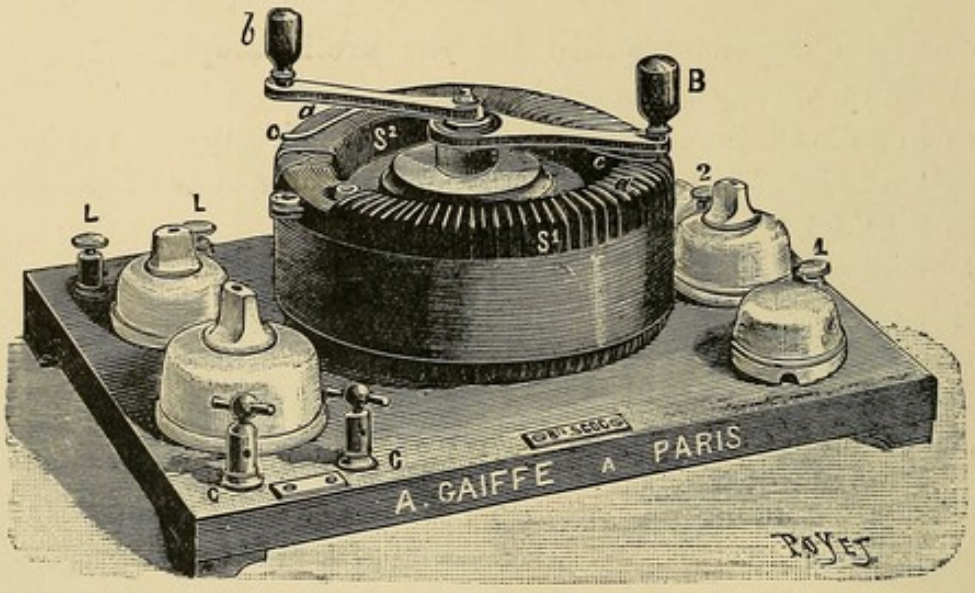


FIG. 94.—RHEOSTAT FOR LIGHT AND CAUTERY, SUITABLE FOR THE CURRENT FROM THE MAIN. (Gaiffe.)

is worked by turning a handle. This duty can easily be performed by an unskilled assistant.[1]

I hope that the manipulative ease of my urethroscope, its precision,

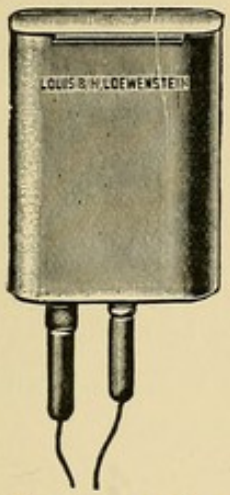


FIG. 95.—SMALL PORTABLE POCKET BATTERY.

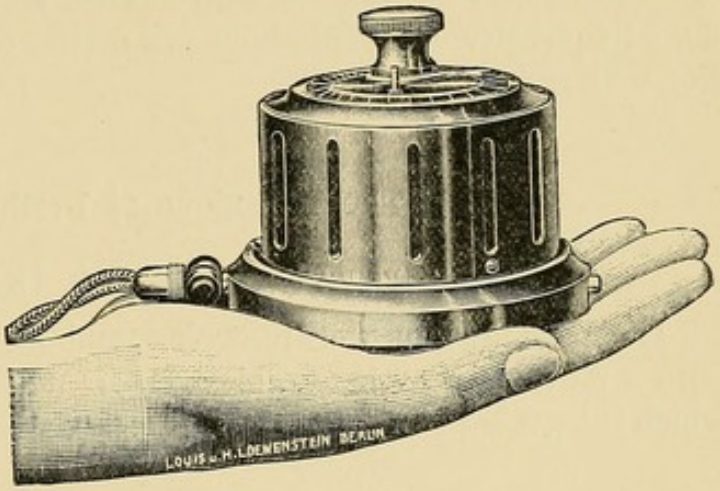


FIG. 96.—RHEOSTAT FOR LIGHT ONLY, SUITABLE FOR THE CURRENT FROM THE MAIN. (Lowenstein.)

and the accurate diagnostic information obtained through it, will induce many medical men to devote their attention once more to urethroscopy. Even firm believers in this method of investigation have given it up after

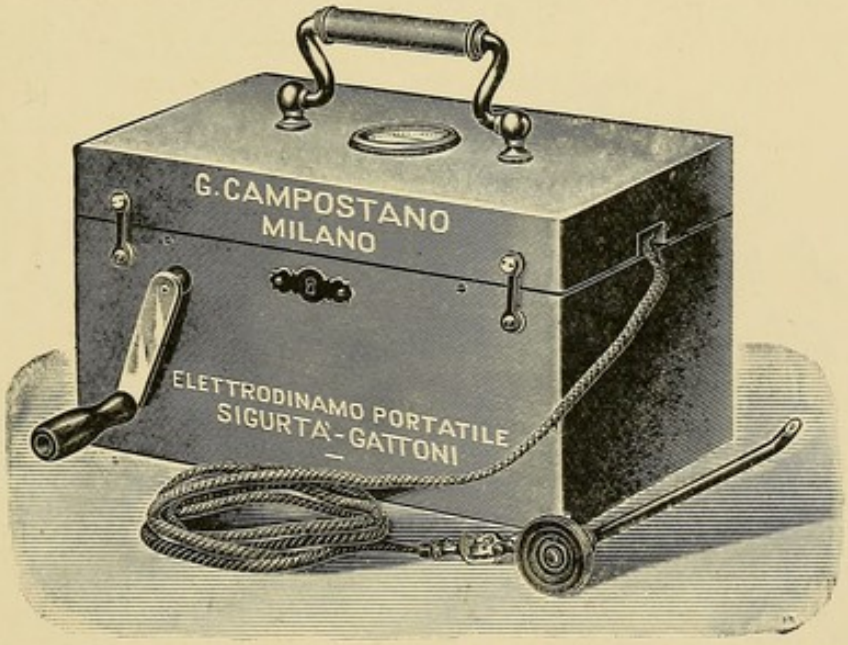


FIG. 97.—DR. SIGURTA'S PORTABLE DYNAMO FOR ELECTRIC LIGHT.

their first attempts, owing to the difficulties encountered with the earlier instruments.

Up to now very little urethroscopic work has been done in France,

[1] Sigurta, *Estratto dagli Atti della Società Milanese di Medicina e Biologia*, vol. iii., fasc. v.

mainly for the reason that the apparatus at one's disposal has been so complicated and clumsy.

My urethroscope is simple and practical, and gives a good view of the urethral lesions. This diagnostic method should therefore be resorted to more frequently. It should become a matter of routine, just as the exploration with the olivary bougie.

The Technique of Urethroscopy.

Preparation of the Instruments.

The *couch* used for urethroscopic examinations should be high, and fitted with a movable back if possible. Its front legs should carry foot-rests on which the patient can put his feet (Fig. 98).

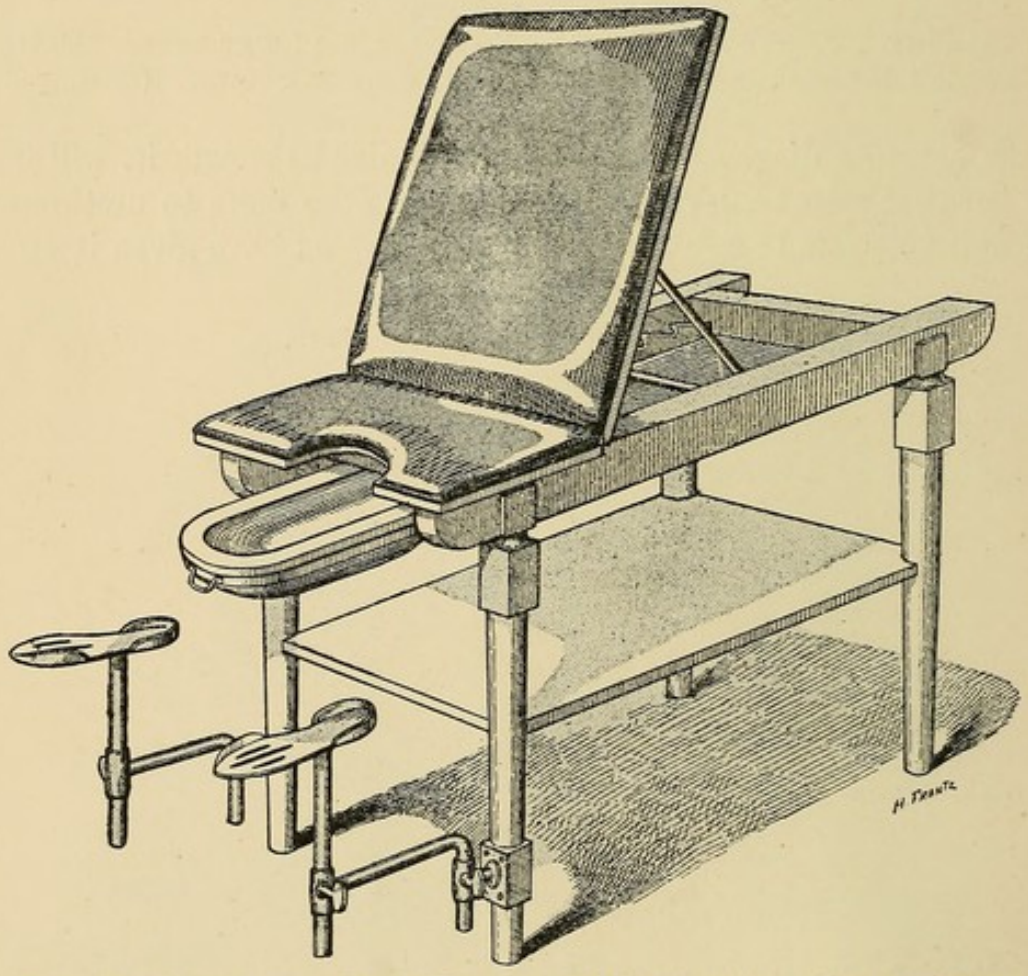


Fig. 98.—Consulting-Room Table for Urethroscopic Examination.

The *urethroscope* is mounted and tested. The end of the lamp-holder which fits into the handle carries a little notch, which should be in the free part of the groove on the handle. The lamp is then in its proper position, and the special screw is screwed down.

One should also see that the lamp and its holder form a straight line. Any curve or bend reduces the field of vision. In addition, the bulb of the lamp should be horizontal, and closely applied to the wall of the urethroscopic tube. If these precautions are neglected, the surface visible is reduced, and the endoscopic manœuvres become difficult.

The *electric current* is best taken from the main, in which case a resistance has to be inserted (*vide* Figs. 93, 94, and 96). One can also use an accumulator or a portable battery. The lamp is gradually made incandescent until it gives a white light.

The *endoscopic tubes* are carefully chosen for each case. If one only wishes to examine the penile portion of the anterior urethra, a short tube,

FIG. 99.—SWAB MOUNTED ON A CANE HOLDER.

about 7 centimetres long, is best. For the whole anterior urethra, tubes 13 centimetres long should be chosen. For an examination of the posterior urethra and of the prostatic lesions, 14-centimetre tubes are required.

One naturally selects a lamp which has a holder of the same length as the tube about to be used.

The sizes most commonly used are No. 24, No. 26, and, if possible, No. 28.

The *lens*, which corresponds to the length of the tube which one wishes to use, is fitted on to the handle.

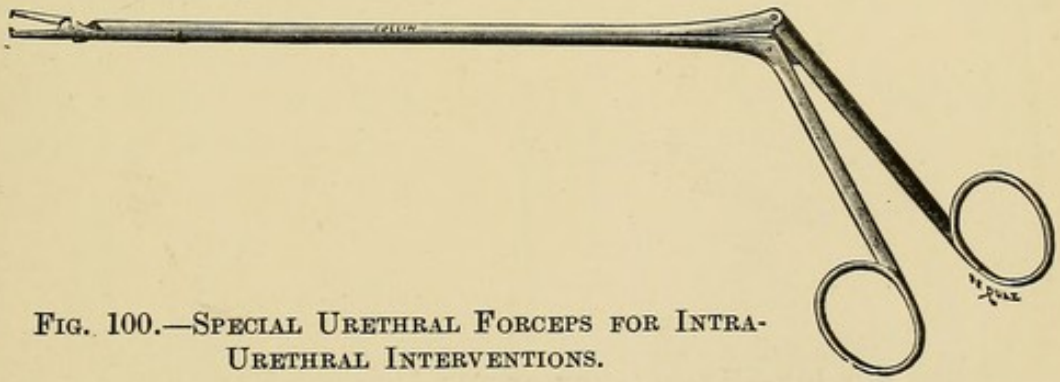


FIG. 100.—SPECIAL URETHRAL FORCEPS FOR INTRA-URETHRAL INTERVENTIONS.

To the right of the surgeon the necessary special instruments are placed in order to enable him to treat as well as to diagnose. The instruments required are—Mounted swabs (Fig. 99),[1] long urethral forceps (Fig. 100) for collecting any swabs which may come off their holders, caustic on a holder, galvano-cautery points, and Kollmann's electric needle.

[1] These mounted swabs are made of wood, or cane, or bamboo, surrounded at their ends with cotton-wool, and are best sterilized by dry heat. Formalin vapours are not well borne by the urethral mucous membrane.

Preparation of the Patient.

The patient should take off all his clothes except his shirt, and should not have made water for several hours. He should lie on the couch in such a way that his feet rest on stirrups and that his legs hang down. The pelvis should touch the edge of the couch. For the examination of the posterior urethra the position of the body should be almost horizontal, and this position may be retained for the exploration of the anterior urethra.

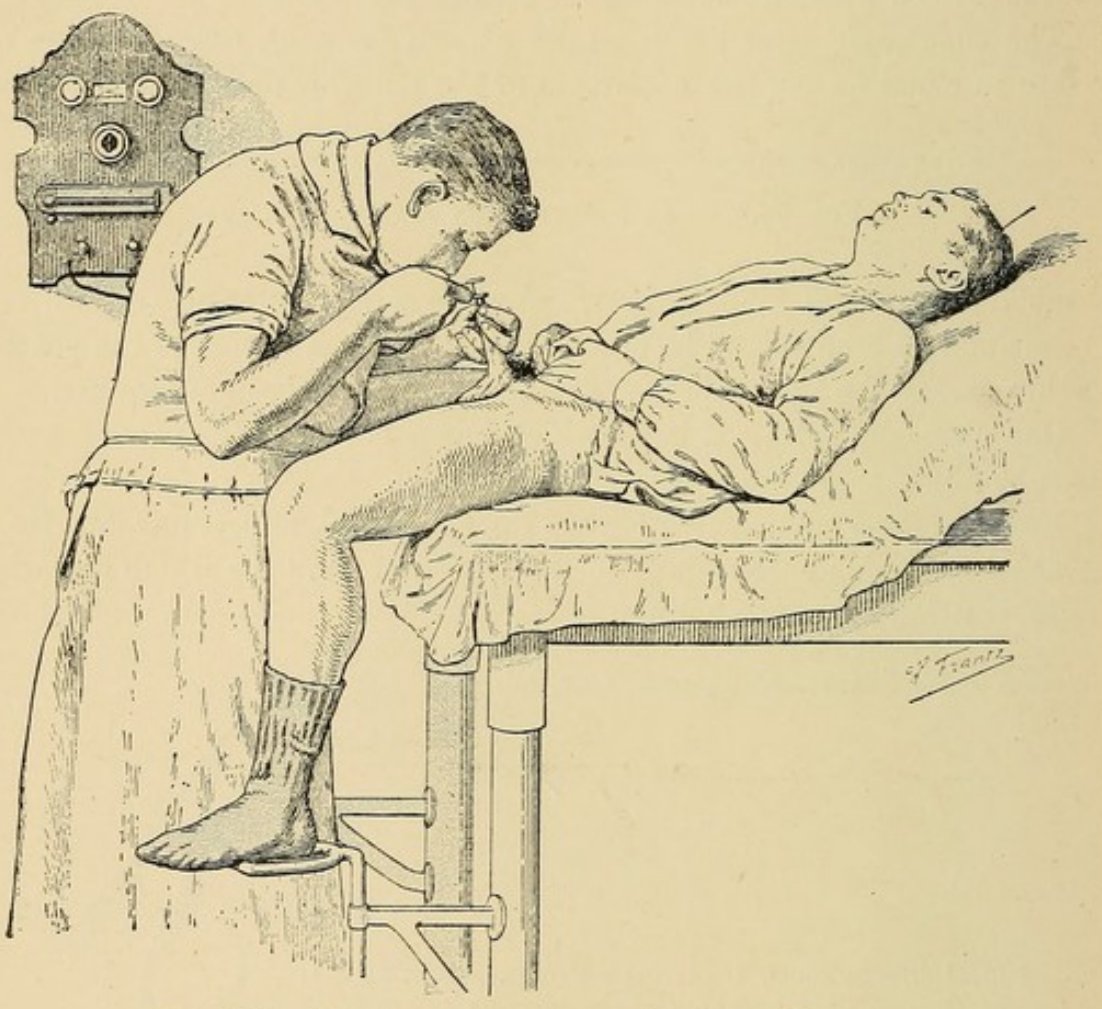


Fig. 101.—Examination of the Anterior Urethra.

However, if one wishes to examine the posterior urethra very thoroughly, it is advisable to raise the thighs and legs until they are on a level with the pelvis—*i.e.*, the patient should be in the position which is recommended for ordinary cystoscopy.

The glans and meatus are then cleansed.

In a previous visit one should have ascertained that the meatus is sufficiently large, and that there are no strictures present which would interfere with the passing of the urethroscopic tube. In a normal organ the meatus is always the narrowest part of the urethra. In cases of atresia

of the meatus, a meatotomy should be done previously in order to allow the urethroscopic tube to pass easily and without pain.

Unless there are special indications, no fluid should be injected into the urethra, because it would wash away pathological secretions, such as

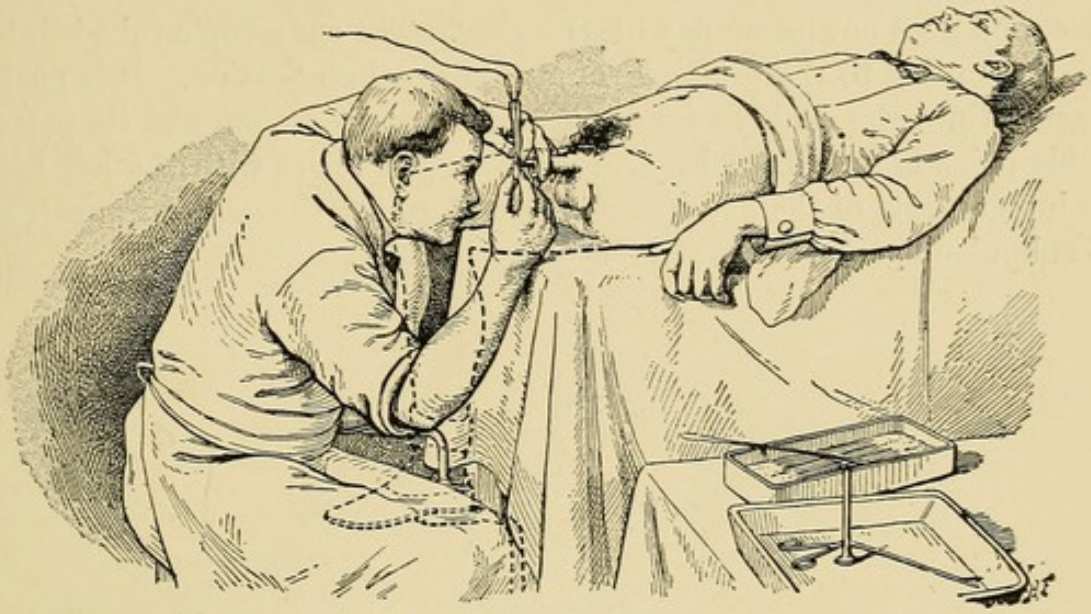


FIG. 102.—EXAMINATION OF THE POSTERIOR URETHRA.

those of Littre's glands, which it is well to see. The urethroscopic examination should therefore be carried out before the patient has made water. Once the investigation is terminated, the patient should cleanse his urethra by a normal micturition.

Some nervous and highly sensitive patients require their urethral mucous membrane to be anesthetized, and it seems to us best to inject into the

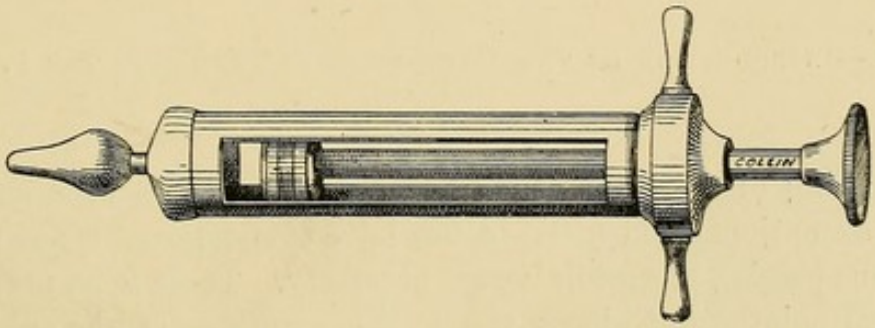


FIG. 103.—SYRINGE OF 10 C.C. CAPACITY, WHICH CAN BE STERILIZED BY BOILING, FOR THE INTRA-URETHRAL INJECTION OF STOVAIN OR COCAIN.

closed canal 8 to 10 c.c. of a 1 per cent. solution of stovain for that purpose. One should, however, avoid this procedure, which is carried out by means of a special syringe, whenever possible. The stovain produces a temporary anemia of the mucosa, and thus alters its aspect.

Operative Technique.

The tube and pilot which have been selected for a given case are freely lubricated with sterilized glycerine. This substance is to be preferred, because it does not affect the transparency of the urethral mucous membrane, and does not interfere with the view. The endoscopic tube is introduced according to the principles of straight catheterization. It is pushed on gently into the penis as far as the membranous region, and its passage at this point is facilitated by firm downward pressure with the left hand. The integuments of the hypogastric region are thus drawn downwards, and the subpubic ligaments are stretched and lowered.

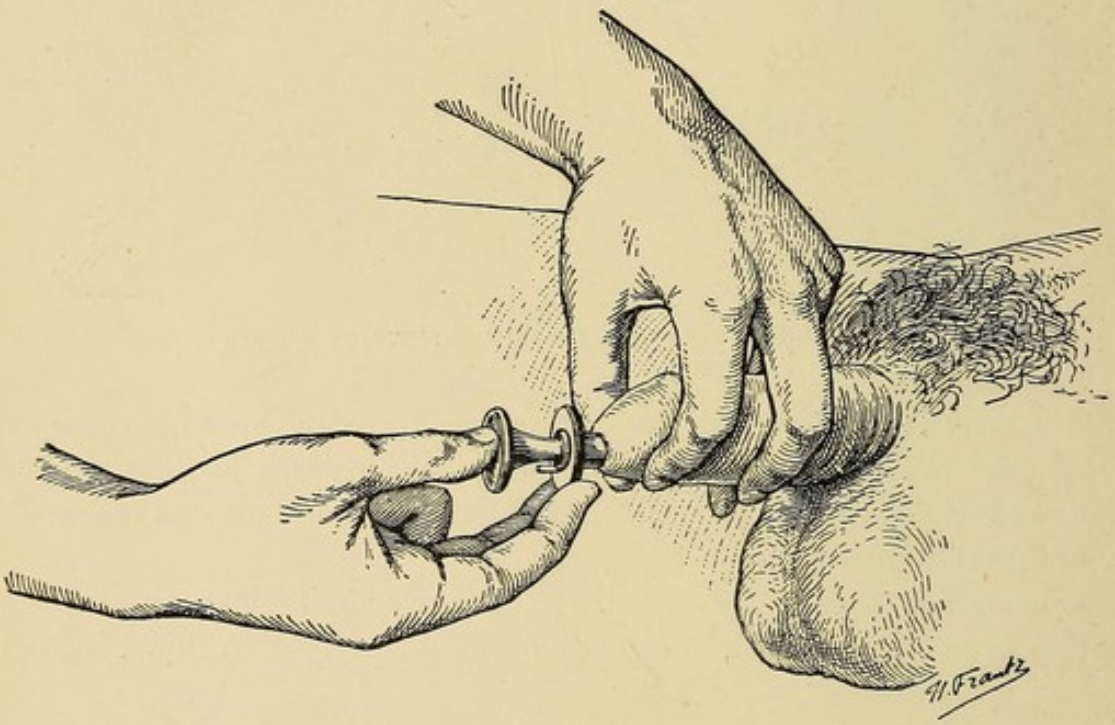


Fig. 104.—Introduction of the Urethroscopic Tube into the Posterior Urethra.

The passing of a straight tube has been considered by some to be a matter of exceptional difficulty. A few have even gone as far as to declare the previous passing of a whip bougie necessary. There is no need for this. As we have pointed out above, the urethra should never be submitted to urethroscopic examinations unless it has been sufficiently dilated previously. It is useful and successful only under that condition.

Furthermore, one should not forget to put the patient in the proper position: he should lie on the couch with his pelvis on the edge of the table, and his feet supported by foot-rests. The surgeon should stand between the legs of the patient, and should hold the penis vertically whilst he introduces the instrument into the penile urethra. As the tube passes down the

urethra, the direction is made to approach more and more the horizontal plane, and when the tip of the pilot has reached the membranous urethra, the instrument is pushed on horizontally. After a few gentle tentative efforts it enters the posterior urethra with great ease. Suddenly all resistance ceases. One now stops, for one has gone slightly too far and reached the bladder, as proved by the flow of urine from the tube.

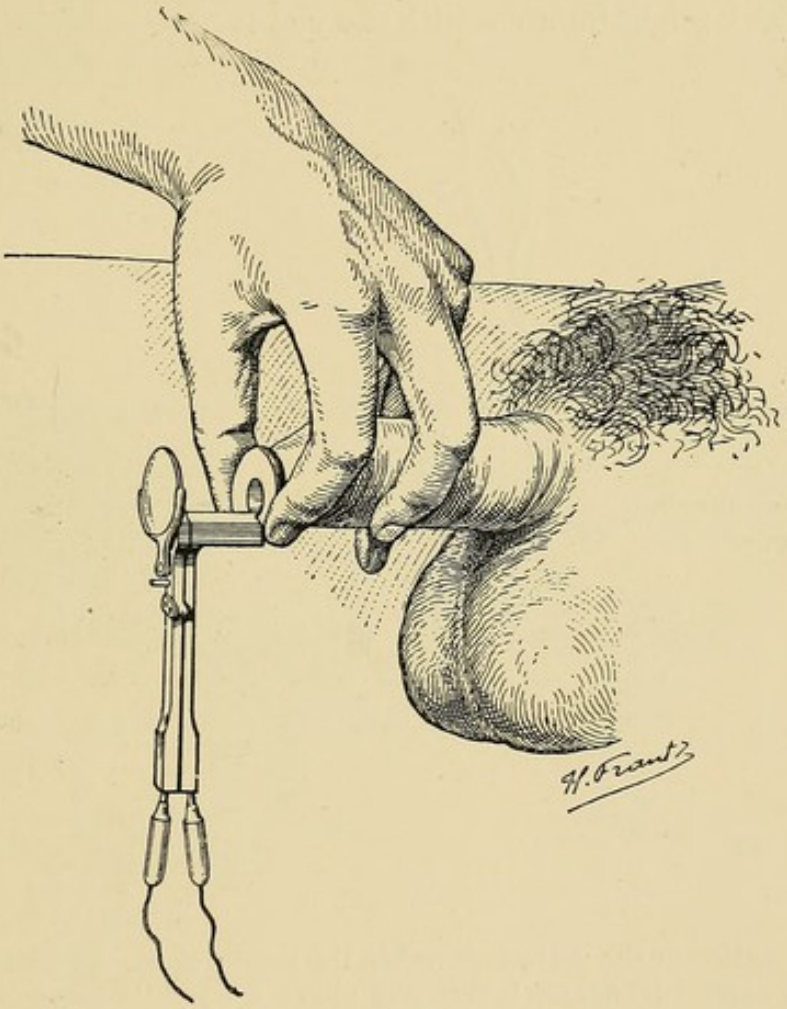


FIG. 105.

The urethroscopic tube having been introduced, the pilot is withdrawn and the handle is attached (lamp downwards).

The instrument is then gently withdrawn for a slight distance, until no more urine comes away. The end of the tube is outside the bladder again, and the pilot is removed. Any secretions which may be present in the posterior urethra are then wiped away with mounted swabs, and once the canal is sufficiently dry, one inserts the lamp, the handle pointing downwards. In this position the introduction of the lamp is easiest.

It is, however, desirable that the lamp should be on the upper wall of the tube, and therefore one turns the latter by means of its handle through

an angle of 180°. Omitting this, the lamp hides a portion of the lower and more important wall of the urethra, and comes into contact with any secretions which may have collected there. This could interfere with the light.

When the lamp is above and in its proper position, it inundates the whole fundus of the tube with light. The verumontanum, which lies below, can be swabbed clean under the control of the eye, and be freed from any secretions which might interfere with the view.

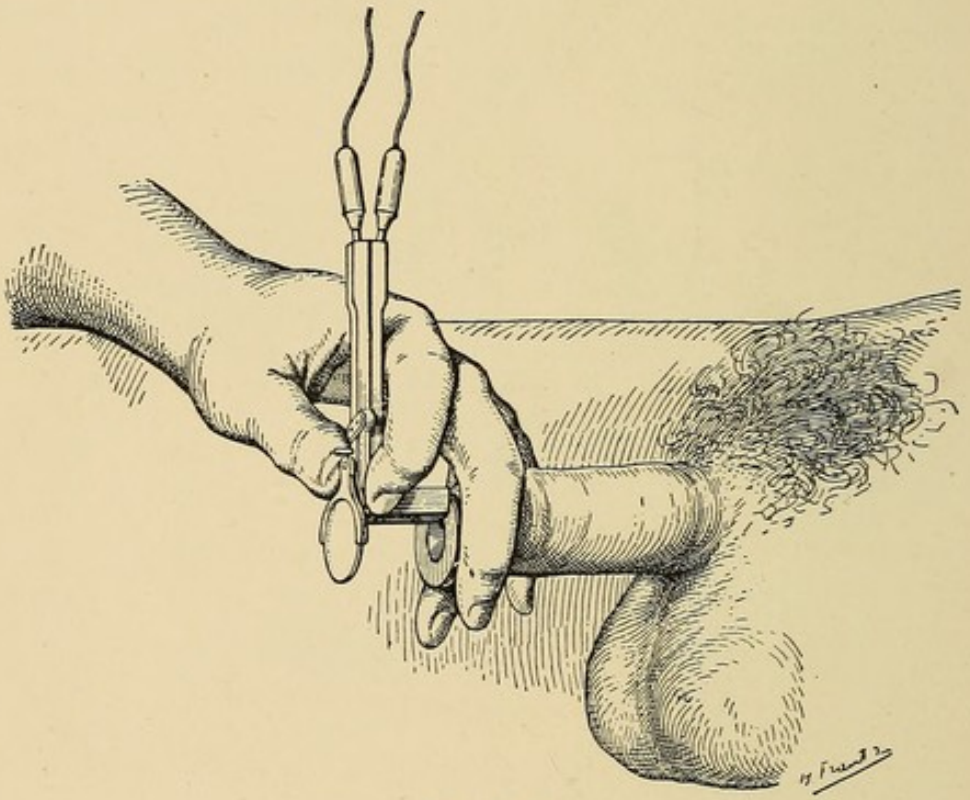


FIG. 106.

For the examination of the posterior urethra the handle of the urethroscope should be turned upwards. The lamp is then also above, beyond the reach of the secretions from the urethra, which by gravity collect in the lower part of the tube.

One then gently and gradually withdraws the tube and inspects the different parts of the passage.

The ease with which the mucous membrane of the urethra can be cleaned by means of swabs is remarkable. There is no need to withdraw the lamp each time one wishes to touch the mucosa. This is a great advantage over the older instruments, such as Oberländer's. All intra-urethral manipulations (swabbing, cauterization, etc.) are carried out under the control of the eye. They thus become easy and accurate.

Contra-Indications.

Urethroscopy should not be resorted to indifferently in all cases of urethritis. When a recent or acute inflammation is present, one should follow the general rule, and refrain from passing an instrument into the urethra. All urethroscopic examinations should be postponed until all pain during micturition and erection has disappeared, and until the urine has become clear.

One should also wait if the urethra is still very tender as a result of an energetic treatment.

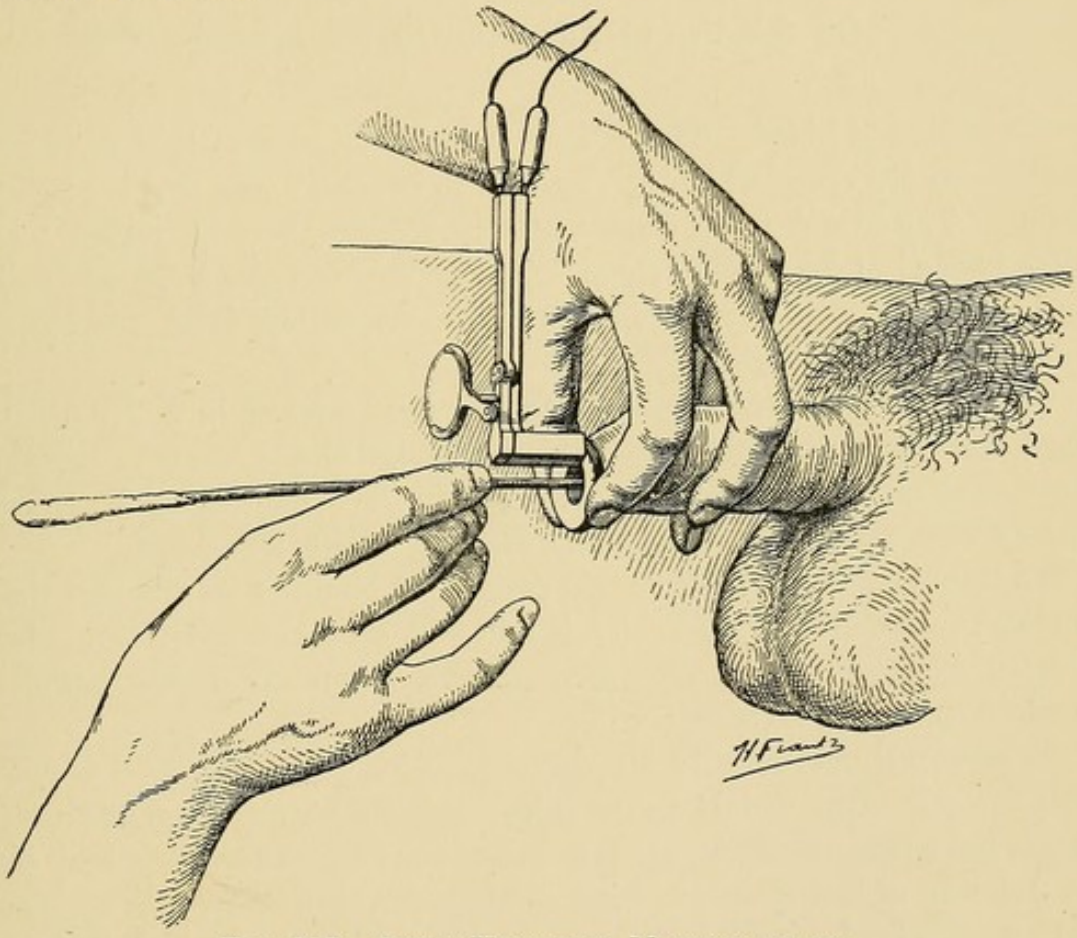


FIG. 107.—INTRA-URETHRAL MANIPULATIONS.

The mucous membrane is being dried by means of a mounted swab.

It should also be a general rule *never to urethroscope a patient unless one is acquainted with the lumen of his urethra.*

It is reckless to urethroscope immediately a patient whom one sees for the first time. A small meatus or an unsuspected stricture within the urethra might easily veto the intervention, and cause unnecessary pain and hemorrhage.

Before passing an endoscopic tube, one should always have examined the urethra with an olivary bougie at a previous visit. In many cases it is

also necessary to devote a few visits to dilatation with metal sounds in order to prepare the urethra for the endoscopic examination.

If these precautions be taken, a good number of accidents, such as edema of the lips of the meatus, hemorrhage from the penis, etc., will be avoided.

Urethroscopic examination is also contra-indicated if there are any inflammatory complications present in connection with the posterior urethra, such as epididymitis, acute prostatitis, etc.

To resume: *One should never urethroscope a urethra which one has not examined and well dilated previously.*

On the Use of Adrenalin in Urethroscopy.

In certain cases the urethroscopic examination is rendered impossible by the oozing of blood. This is a great nuisance, especially if the bleeding comes from the focus which one intends to examine, and if it is more than trifling. The swabbing one instinctively resorts to often makes matters worse instead of improving them. The application of a little adrenalin to the bleeding spot is strongly indicated in cases of this kind, and stops the hemorrhage very quickly.

One uses a mounted swab which has been soaked in a 0·1 per cent. solution of adrenalin, and sees that one touches the right spot. Swabbing about at random in the urethra is useless, in the same way as forcipressure is ineffective, unless the vessel which actually bleeds is secured.

An important drawback of this drug is to be found in the fact that its excellent vaso-constricting action is followed by a vaso-dilatation, once its primary effect has worn off. Disagreeable secondary hemorrhages may therefore supervene after its use.

Adrenalin should only be employed in small quantities, as it is not free from danger. One should never inject a big dose into a closed urethra. Only a few drops should be used, as otherwise serious accidents may result. Dr. Johnson of San Francisco[1] has published a case in point. His patient had an attack of hemorrhage after urethral dilatation, which he tried to stop by filling the anterior urethra with a 1 : 4,000 solution of adrenalin hydrochloride. Suddenly the patient became motionless and livid. His eyes became glassy, and nausea and vomiting supervened. Finally he collapsed, his respirations becoming very shallow, and his pulse and heart sounds imperceptible. This condition lasted for ten minutes or so, but Johnson managed in the end to revive him by the hypodermic injection of strong stimulants. The patient remained in a state of great weakness for several hours, and was unable to stand on his legs for fully three hours after the event.

[1] Johnson, *Journ. Amer. Med. Ass.*, October 7, 1905, p. 1086.

Urethroscopy of the Urethra in Health and in Disease.

1. Urethroscopy of the Healthy Urethra.

General Remarks.—A few introductory remarks, which apply to the urethra in all its parts, will be of assistance.

The *consistence* and the *thickness* of the mucous membrane of the urethra vary in different individuals. The mucosa is thinner and more delicate in individuals who have small or atrophied genital organs than in vigorous subjects.

The *coloration* also differs to a large extent. Normally it varies from a reddish-grey to a blood red, according to the degree of vascularity. It differs, also, according to the size of the endoscopic tube used. If the diameter of the latter is at all large, it presses on the wall of the urethra, and renders the mucous membrane anemic. If it exerts more pressure in one place than in others, a localized pale patch is seen, which an inexperienced observer could easily mistake for a diseased area. By changing the position of the tube such artefacts are readily recognized. It should also be remembered that the colour of the interior of the urethra changes under the influence of certain drugs, like cocain and stovain, which render it pale.

My lengthy experience of urethroscopy has led me to the discovery of an interesting phenomenon: The colour of the urethral mucous membrane appears to correspond to that of the face. I have noticed frequently the urethral mucous membrane to turn pale suddenly, and this observation allowed me to predict that the patient himself would turn pale immediately, and enabled me to tell that he was about to faint.

All images seen with the urethroscope consist of two essential parts:

The *central figure.*
The *mucous surface proper.*

The *central figure* is formed by an orifice which corresponds to the lumen of the urethra. Normally the walls of the urethra are in apposition, and the lumen is merely a potential one. When the endoscope is passed, the walls separate from each other in a symmetrical fashion, and give the appearance of a long narrow funnel, the central figure representing its neck, and the walls of the urethra its walls.

This funnel is more or less evident and well shaped according to the position of the urethroscopic tube. When the tube is unsupported, the funnel can hardly be made out. If one attempts to push the tube farther down the urethra, the mucous membrane begins to bulge over the edge of the tube into its lumen. The funnel then becomes very short and almost disappears. On the other hand, if one withdraws the tube, the funnel

becomes deeper. When the tube is in the penile portion, the funnel becomes almost cylindrical if one pulls simultaneously on the penis and the instrument with a certain amount of force.

These different positions can be taken advantage of for urethroscopic examination.

For instance, if one allows a certain portion of the mucous membrane to bulge into the lumen of the urethroscope, one obtains a very good view of its details.

If one stretches penis and tube simultaneously, a much greater surface of the mucosa becomes visible. One obtains a more general view, and sees any lesions present which project slightly into the lumen of the urethra. This profile view is of great value for detecting small chronic glandular lesions.

For a complete examination both methods should be used alternately.

When it is desired to examine a special point of the mucous membrane, the endoscopic tube is inclined on the axis of the urethra; its position is *excentric* if the central figure is still visible, and *parietal* if it has disappeared.

The aspect of the *central figure* varies with the different portions of the urethra. At the glans its shape is that of a small oval slit. In the penile portion it is like a point. At the level of the bulb its form is that of a vertical fissure (*vide* Coloured Plate I., Fig. 4). At the level of the verumontanum its aspect is quite peculiar owing to the projection of this structure (*vide* Plate I., Figs. 1 and 2).

The *surface of the mucosa proper* shows *longitudinal folds*, which radiate like the spokes of a wheel. These folds are more or less marked according to the amount of stretching, and thus they vary with the size of the tube employed. In the healthy urethra they are well marked, but they are modified under pathological conditions.

The healthy urethral mucous membrane presents also *reddish longitudinal striæ*. They form bright red rays, contrasting with the background of the mucosa, which is paler and of a yellowish-red colour.

Lastly, the surface of a normal mucous membrane is smooth and glistening in its whole extent. Under the influence of disease it becomes irregular and dull.

Normally the orifices of the lacunæ of Morgagni are hardly visible. They are tiny points, somewhat like pin-pricks which have not closed, and are found on the upper surface. Similarly, the glands of Littre are almost invisible during health. Whilst these two types of orifices escape notice under normal conditions, they become prominent and congested when affected by disease. They then become easily visible, and their recognition is often facilitated by a red zone surrounding them.

EXPLANATORY TEXT TO PLATE I

Fig. 1.—Normal Aspect of the Verumontanum.

This figure gives a full view of the verumontanum where it is widest. The prostatic utriculus is not visible. In the upper part of the figure the mucous membrane is finely folded, bolster-like. This anatomical arrangement is a valuable landmark for a correct appreciation of the size of the verumontanum and of its limits.

Fig. 2.—Normal Verumontanum on which the Orifices of the Ejaculatory Ducts are Far Apart.

There is no median utriculus in this case. Each ejaculatory duct opens separately on one of the lateral aspects of the verumontanum. The whole presents a most striking appearance, which is not unlike that of a diver's helmet.

Fig. 3.—Normal Aspect of the Prostatic Fossette, which is situated between the Neck of the Bladder and the Verumontanum.

Below, one sees the dome of the posterior part of the verumontanum. Above, the neck of the bladder is visible, from which well-marked longitudinal folds slope downwards in a fan-like manner. On either side, and at the top of the figure, one notices the origins of the bolster, which comes to lie over the verumontanum, and is shown in Figs. 1, 2, and 4 in its full extent.

Fig. 4.—Normal Aspect of the Prostatic Utriculus.

This figure is practically the same as Fig. 1, but it differs inasmuch as the orifice of the prostatic utriculus is visible in the middle of the verumontanum. Above, the bolster is again shown; and below, the origin of the urethral crest can be made out.

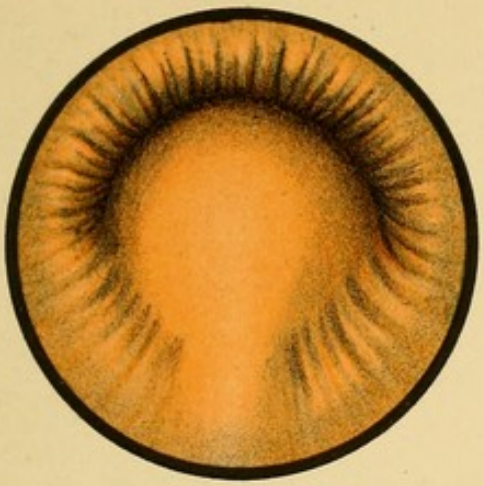
Fig. 5.—Normal Aspect of the Bulb of the Urethra.

The central figure has the shape of a vertical slit. The aspect of this region is characteristic.

Fig. 6.—Normal Aspect of a Large Lacuna of Morgagni (Guérin's Valve).

The lacuna is V-shaped, the point of the V being directed downwards, and forms a regular pouch in the mucous membrane of the penile urethra.

To face page 158.



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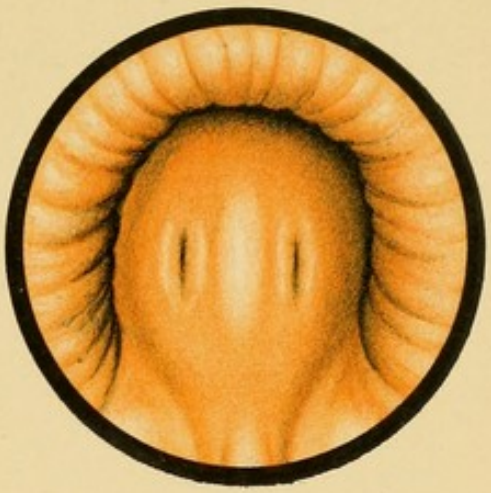
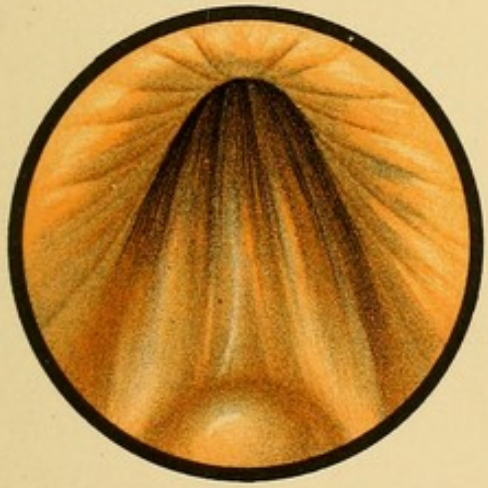


Fig. 2



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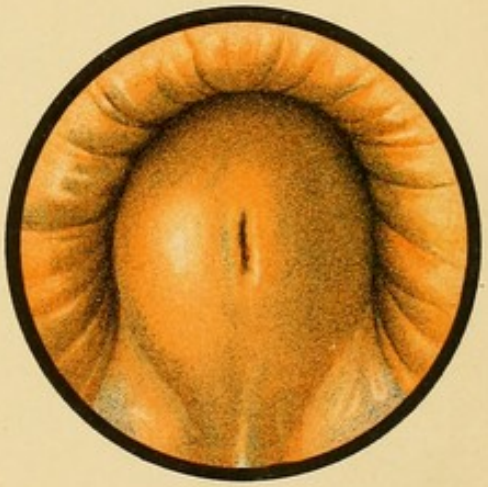

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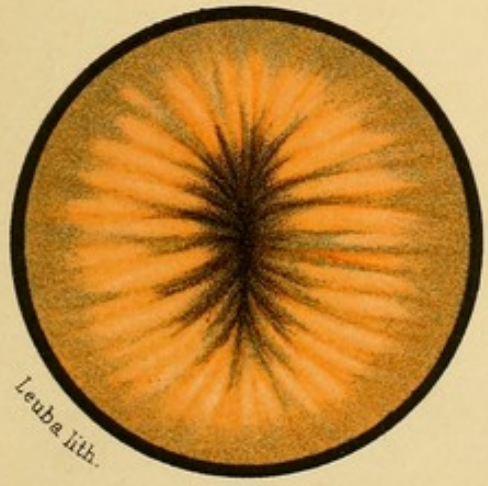

Fig. 5.

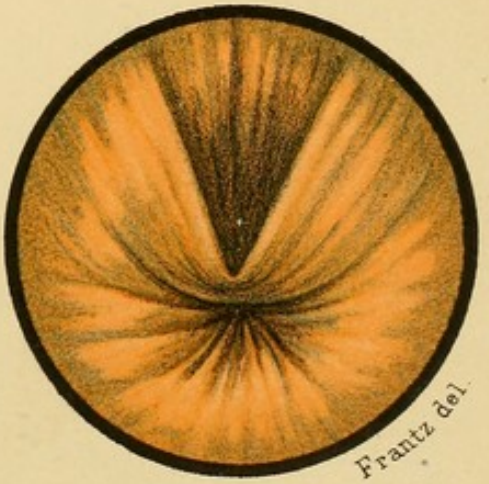

Fig. 6.

Imp. L. Lafontaine, Paris.

2. Urethroscopy of the Normal Anterior Urethra.

The *central figure* shows little variation in the anterior urethra. It assumes, however, the aspect of a vertical, rounded-off slit in the glans. In the penile portion it is a point, but widens out now and then, taking the form of a transverse, somewhat jagged fissure.

The *longitudinal folds* are seen to radiate like the spokes of a wheel, except in the region of the glans, where the mucous membrane is smooth. Their number usually varies between four and ten, and they are best seen with a small tube.

The *longitudinal striation* is due to vascular ramifications, and is best observed in vigorous subjects.

The *lacunæ of Morgagni* open along the upper wall of the urethra. Their orifices are little fossæ, which do not differ in their colour from the surrounding parts. In health their walls are flush with the rest of the mucous membrane.

The large lacunæ are easily recognized, when they are examined in the parietal position, by the fact that they form a **V**, the point of which is directed downwards (Coloured Plate I., Fig. 5). The branches of the **V** correspond to the walls of the pouch.

Littre's glands are found in large numbers all over the surface of the urethral mucous membrane. In health they are practically invisible; they only become prominent when they are inflamed.

Cowper's glands open into the urethra by two orifices, which are nearly always concealed by the folds in the mucous membrane.

3. Urethroscopy of the Normal Posterior Urethra.

When the endoscopic tube has been introduced very far, one can tell if it has entered the bladder by the sudden ease with which the instrument can be moved to and fro, and by the fact that urine escapes when the pilot is withdrawn. The tube is then gently retracted, and the urethra is swabbed dry.

When the urine ceases to flow, and the swabs are no longer moistened, one may be certain that the far end of the instrument is outside the bladder.

One now attaches the handle and the lamp, and turns them into their proper position (*vide* p. 154).

One then sees a characteristic picture of this region, which is represented in the Coloured Plate I. and in Fig. 108. At the top one sees an infundibulum—the neck of the bladder. From it descend the folds of the mucous membrane as regular and divergent lines. They imitate a fan, the wide portion being below, and its handle above.

If one withdraws slightly the endoscopic tube, the posterior extremity of the verumontanum comes into view. Just behind this hindmost part of the verumontanum is a small depression which should be thoroughly examined. This "prostatic fossette" is very often affected in chronic urethritis. It is frequently the seat of an inflammation which cannot be discovered by any other means. Fig. 108 shows its limits. In front it extends as far as the posterior border of the verumontanum, and behind as far as the neck of the bladder.

It has been said that this structure could not be explored properly through a straight tube. This statement is inaccurate, for it is sufficient to press the end of the urethroscope down slightly by raising the handle. The bulk of the verumontanum is then out of the way, and a most complete view of its posterior end is obtained.

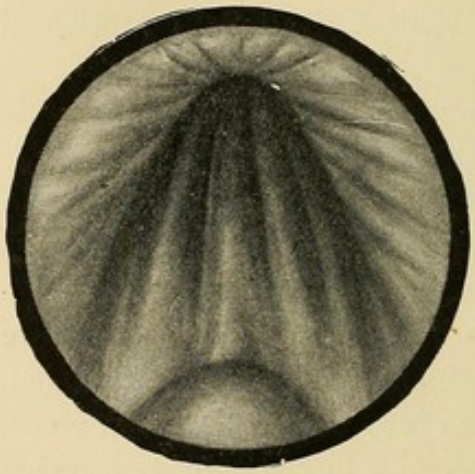

FIG. 108.—URETHROSCOPIC VIEW OF THE "PROSTATIC FOSSETTE."

Normal aspect of the part of the posterior urethra which is limited below by the verumontanum, and above by the neck of the bladder.

These structures having been examined, one continues to withdraw the endoscopic tube farther and farther. The body of the verumontanum then comes into view; it resembles an elongated spindle, and is represented in Plate I. The three figures (1°, 2°, 3°) in the plate show its most common aspects. Sometimes it can be seen in its middle part as a smooth rounded eminence which occupies nearly the whole lumen of the tube; in other cases one can only see the anterior part when the tube has been withdrawn farther. The prominence of the verumontanum is then much less both in height and in width, and is continuous in front with the urethral crest.

As a rule the utriculus is not visible. Occasionally, however, it is quite distinct, as the coloured plate shows.

In most cases it is single and occupies the middle line. It is, however, not infrequently double. Each sinus then corresponds to the opening of

an ejaculatory duct, and is situated to one side of the middle line. The whole verumontanum has then a most striking resemblance to a *diver's helmet* (*vide* Chapter IX., Catheterization of the Ejaculatory Ducts).

Urethroscopic examination of the verumontanum is of considerable importance, because this structure is always involved when the seminal vesicles are diseased, so much so that one has a right to call the utriculus "the mirror of the seminal vesicles."

Above the verumontanum the urethral mucous membrane is thrown in delicate folds, forming a kind of crescent-shaped bolster. This aspect is

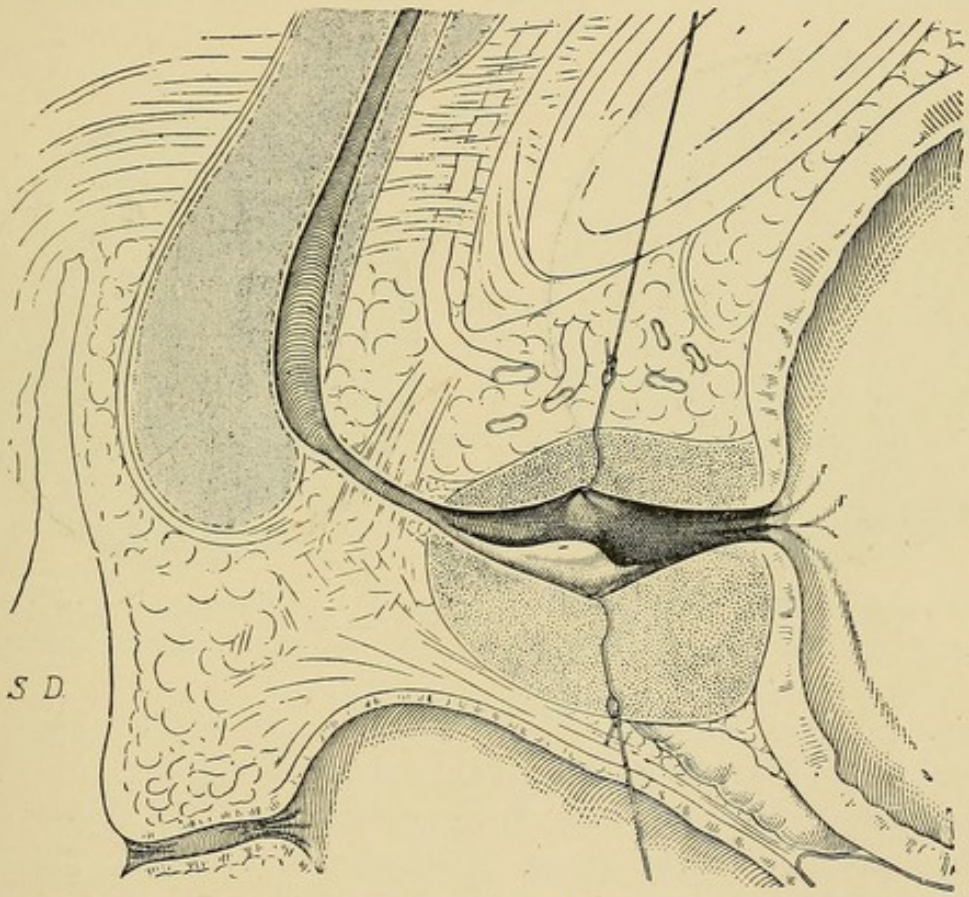

FIG. 109.—NORMAL ASPECT OF THE "PROSTATIC FOSSETTE" BETWEEN THE POSTERIOR END OF THE VERUMONTANUM AND THE NECK OF THE BLADDER.

characteristic. The concavity of this crescent is directed downwards, and thus this bolster, which occupies the upper part of the urethroscopic tube, forms a kind of frame for the verumontanum. It is an important landmark for a correct appreciation of the shape and the limits of the verumontanum.

In front of it, the urethroscopic picture changes completely. The anterior extremity of the verumontanum becomes more and more pointed, forming the urethral crest, and finally disappears completely. The bolster which filled the upper part of the lumen of the tube increases until a regular figure is formed which is characteristic of the membranous portion.

Diagrammatically, this portion of the urethra is composed of a central point, representing the lumen of the membranous urethra, and folds which radiate from it in all directions. The latter correspond to the spokes of a wheel, whilst the lumen represents the hub.

As long as the tube is in the membranous portion, it is gripped firmly; it becomes freer once it leaves this portion.

When the tube is on the point of leaving the posterior urethra, the handle of the urethroscope should be raised. Omission of this little precaution is only too readily followed by a sudden spontaneous correction of the position of the instrument. This unexpected readjustment is likely to give the

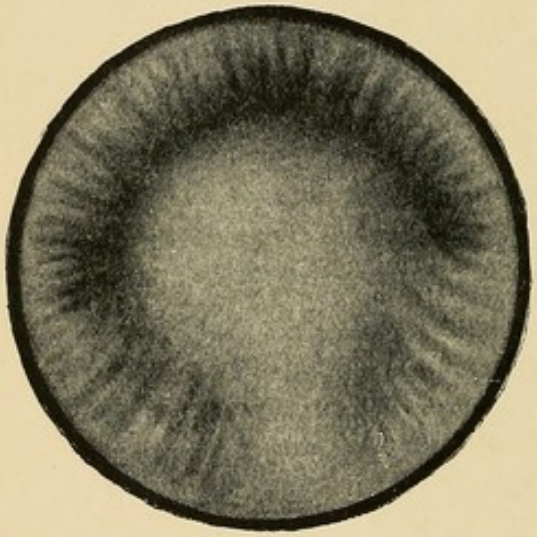

Fig. 110.—Normal Verumontanum on which the Utriculus is not Visible.

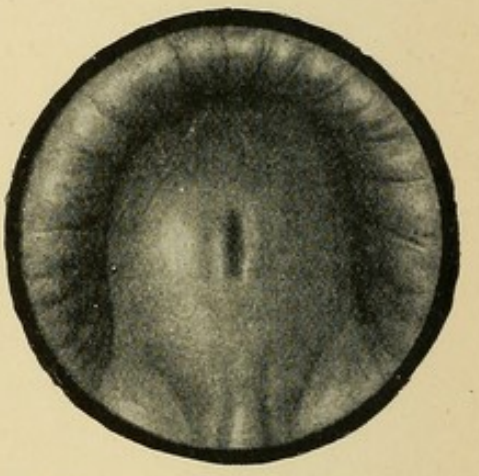

Fig. 111.—Normal Verumontanum with a Visible Single Utriculus.

patient pain, and should be avoided. The operator, who has been in the position shown in Fig. 101, assumes the one shown in Fig. 102.

The urethroscopic picture now changes completely. The present region, the bulb, is characterized by a long, well-marked vertical slit. This lateral compression of the central figure is due to the bulbo- and ischio-cavernosi muscles present at this level. On either side, the mucous membrane shows well-marked folds where it covers these muscular swellings.

The urethroscopic aspect of the bulb is a kind of miniature of the intergluteal fold.

4. Urethroscopy of the Anterior Urethra in Disease.

General Remarks.—The lesions of chronic urethritis as they appear under the urethroscope have been described in a masterly fashion by Oberländer in 1893, and again by him in 1910 in collaboartion with Kollmann.[1] Further valuable contributions to this study have been made by

[1] Oberländer and Kollmann, *loc. cit.*

Keersmaecker and Verhoogen,[1] Wossidlo,[2] and in France by Janet[3] and Fraisse.[4]

In harmony with Oberländer, we distinguish two distinct types of chronic inflammatory lesions in chronic urethritis.

The first is the *soft infiltration*, which is characterized macroscopically by a swelling of the mucous membrane, and microscopically by an infiltration of the submucosa with small embryonic cells, the whole process being accompanied by vascular dilatation.

The second one, which follows upon the former in the evolution of the morbid process, is the *hard infiltration*. Here the mucous membrane is especially pale, and of a greyish-yellow colour. The histological examination shows the submucosa to be invaded by connective fibrillæ which gradually take the place of the embryonic cells found in the soft variety, and convert the submucosa step by step into fibrous tissue. This fibrous tissue interferes with the circulation by strangulating the bloodvessels—hence the characteristic pallor of the urethral mucous membrane.

In its slightest degree, this hard variety corresponds to Otis's wide strictures, whilst its more advanced forms represent the strictures in the usual sense.

The soft infiltration follows upon, and even accompanies, the inflammatory lesions of acute urethritis. It is chiefly found in the first stages of chronic urethritis. It is subsequently replaced by hard infiltration as the disease progresses.

Although these two varieties of lesions are distinct urethroscopically and histologically, they are merely successive phases of one and the same morbid process. Moreover, they often exist in the same urethra at the same time.

Chronic urethritis is characterized by its localized chronic inflammatory lesions. Every one of the diseased areas may take a course of its own, and independently of the other lesions present. Thus, in a given urethra one may find in alternation healthy mucosa, soft infiltrations, and hard infiltrations.

The distinction between hard and soft infiltrations is convenient and practical for descriptive purposes. One should, however, not gain the impression that they are absolutely distinct morbid entities, and that one urethra suffers from hard infiltration, and another from the soft variety. As a rule both types of lesion are present at the same time.

We will now examine these different varieties and their relation to the anterior and the posterior urethra.

[1] Keersmaecker and Verhoogen, *loc. cit.*

[2] Wossidlo, *loc. cit.*

[3] Janet, *Ann. des Mal. des Organes Génito-Urin.*, 1891; "Endoscopie Urétrale" in *Leçons Cliniques* de Guyon, Paris, 1903.

[4] Fraisse, *Gonorrhée Chronique de l'Homme*, Paris (Maloine), 1910.

The commonest sites for the lesions of chronic urethritis are—the middle of the penile portion, especially the peno-scrotal angle, and the membranous region. Very often several different places are affected simultaneously.

Soft Infiltration.—A urethra which presents only soft infiltrative lesions, opposes no resistance to the passing of an endoscopic tube. The worst that can happen is slight bleeding when the instrument is being introduced, or when one dries the mucosa with swabs.

The *general aspect* of a mucous membrane which is affected with soft infiltration is that of an inflamed, hyperemic, and swollen mucous surface. It is usually smooth and shiny (*vide* Plate II.), and is not unlike a mass of hemorrhoids.

The *colour* varies from a dark pink to a blood red or bluish red.

The *seat* of the soft infiltrations is most often in the prostatic and membranous portions. The lesions are present as localized irregularly disseminated patches.

Their *size* is variable. Sometimes they are small semicircles; on other occasions they are big patches extending over an area of several centimetres.

Their *number* is also subject to variations. In some cases only one soft infiltration is present, but as a rule several lesions are found, which are separated from each other by areas of healthy tissue.

Their *shape* is irregular; their borders are ill-defined, and gradually merge into the neighbouring healthy parts.

In the beginning, the *epithelium* has its lustre; but when the lesions are of some standing, desquamation takes place, and it becomes thinner and more friable. Its polish disappears, and it becomes rough and opaque. It tends to become deficient in places; the exposed papillary layer then proliferates, and forms small granulations which are analogous to those found in skin wounds. They are, however, less pronounced, and are visible as small reddish spots of irregular outline. They have a bright red surface, and bleed easily. They are very common about the bulb.

The *longitudinal folds* of the mucous membrane are effaced to a considerable extent. Instead of the great number present in health, one only sees two or three ill-defined lines which project into the lumen of the passage, and may even obliterate the central figure.

The *longitudinal striation* becomes almost invisible owing to the swelling and hyperemia of the mucosa, which shows a uniform smooth surface.

The *central figure* is nearly always effaced. It no longer gapes, and no cavity is visible, not even if one withdraws the tube.

The *lacunæ of Morgagni* and the *glands of Littre* are always affected in soft infiltration. Their irritation is followed at first by an increase in their secretion. The mucosa which covers them is red and somewhat puffy.

Their excretory ducts appear as little red projections of the size of a pin's head, with raised and glassy borders. A mucous or purulent discharge is seen to issue from them. Professor Kollmann has devised a special pipette for aspirating their secretions for microscopical examination.

The lacunæ of Morgagni form on the surface of the mucous membrane projections which may reach the size of a small pea. Very often they appear as red nodules of the size of a pin's head. Their orifice may be visible on the top or on the side of the swelling. The borders are congested and translucent, and from the orifice a mucous or a purulent secretion is discharged.

In the posterior urethra the verumontanum is dark red, swollen, and enlarged, when it is the seat of a soft infiltration. The orifice of the utriculus is inflamed, gapes, and yields a mucous or purulent discharge. Very often the swelling of the verumontanum, which becomes perfectly smooth, is so marked that the utriculus and the orifices of the ejaculatory ducts disappear in the substance of the mucous membrane, and are concealed from view.

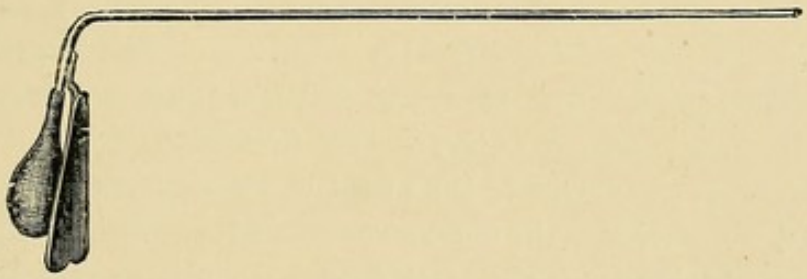

Fig. 112.—Kollmann's Pipette for aspirating Glandular Secretions from the Urethra.

When these openings are visible, they are, as well as those of the prostatic glandules, red and swollen, and surrounded by a sharply projecting border.

In some cases one can see on its lateral walls the ejaculatory ducts, which are filled to a greater or lesser extent with pus. In one of my patients, for instance, who was suffering from a left gonorrheal epididymo-orchitis, I saw with the greatest ease that the left ejaculatory duct discharged pus, and that it was surmounted by a highly congested and deviated verumontanum.

The congested membranous region often appears cyanosed and loses its lustre. Its folds become coarser and swollen, and the mucous membrane bulges, or even prolapses, into the lumen of the urethroscope.

Papillomata often accompany soft infiltrations. Sometimes they are small and isolated; on other occasions they are long, slender, and fragile, or they may be short and thick, and project into the lumen of the urethroscopic tube.

These papillomata are nearly always similar to those found on the

prepuce. They are due to an excessive proliferation of the chorion at the point where the desquamation of the epithelium has exposed the papillæ.

Occasionally they form little agglomerations, and they may reach such a size that they obstruct the canal. They are most common in the regions of the bulb and of the verumontanum. Oberländer has met with a case in which they extended all along the urethra into the bladder. Grünfeld has published numerous examples in his work on endoscopy.[1] I have shown several in the coloured plates of this book (*vide* Plate II.).

In a patient, aged twenty-six—sent to me by Professor Henri Hartmann—who had been suffering from a gleet for two and a half years, the urethroscope allowed me to discover on the upper wall of the penile portion, near the root of the penis, a large lacuna, which was reduced to two loose flaps. At the bottom of the lacuna was a small polypus close to the insertion of the flaps (Fig. 113).

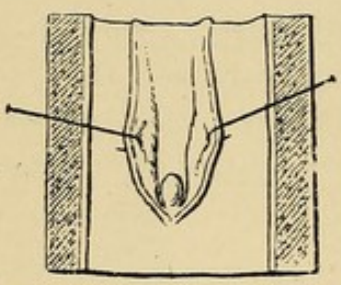

FIG. 113.—DIAGRAM OF THE LESION SHOWN IN PLATE II., FIG. 5.

Hard Infiltration.— Unlike the soft variety, which does not interfere with the passing of a tube, the hard infiltrations always oppose a certain resistance to the introduction of an instrument. The difficulty depends on the degree of the infiltration, and is sometimes so considerable that even the smallest urethroscopic tube cannot pass. One is then confronted with a tight stricture.

Absence of suppleness is the characteristic feature of all hard infiltrations. It is the result of sclerosis. The small infiltration cells are gradually replaced by connective tissue, and as the latter becomes more dense and firmer, the circulation is interfered with. The mucosa thus loses its colour and its elasticity, and ultimately it is converted into a tough and rigid tissue.

When the mucous membrane has undergone hard infiltration (*vide* Plate II.), it becomes *pale and anemic*. In mild cases its colour is less bright than normally; in more advanced ones it becomes whitish-grey or yellowish. Confirmed strictures are of a uniform whitish-grey tint. These colour changes depend upon the more or less active formation of fibrous tissue, which gradually destroys the circulation.

This strangulation of the bloodvessels by fibrous tissue is the cause of the pale, greyish and mortified aspect of genuine strictures, which require a course of dilatation treatment before they can be urethroscoped.

The *seat* of these lesions is most often found in the middle part of the penile urethra, at the peno-scrotal angle, and in the membranous portion. The lesions are disseminated as localized patches. Histologically, the fibrosis is most marked around the glands of the urethra, but it is also found,

[1] Grünfeld, "Die Endoskopie der Harnröhre und Blase," *Deutsch. Chir.*, 1881, Lief. 51.

although less often, within the substance of the mucosa. Small cicatrices about 1 to 2 centimetres long, or small stellate scars of 1 to 2 millimetres, are then present.

Measuring Hard Infiltrations.—It is extremely difficult, if not impossible, to gauge the exact extent of any hard infiltration, because the process varies in intensity.

Oberländer recognizes three degrees:

In the first the lumen of the urethra retains its normal width.

In the second the lumen is constricted, but it still admits a tube No. 23.

In the third the infiltration is so advanced that this instrument cannot pass.

This classification is obviously arbitrary, but it is practical and useful.

A simpler but less accurate classification would consist in recognizing two kinds only—the mild forms, which correspond to Otis's "wide strictures"; and the advanced forms, comprising the strictures in the general sense.

In practice one meets with so many intermediate forms that a sharp distinction between the mild and advanced types cannot always be made.

The pathological changes in the *epithelium* are due to a deficient nutrition.

In the first stage the epithelium loses its lustre and its normal transparency, and becomes dull. When the lesions are more accentuated, proliferation of epithelial cells and desquamation take place. These phenomena are chiefly noticeable at the points where the disease is most pronounced. The epithelial surface is then covered irregularly with little lumps; small projections about 1 millimetre high are visible, and next to them one finds a loss of substance—more or less extensive raw patches, which bleed readily. The epithelial proliferation gives rise to small areas which are usually round and of a pearl-grey colour. In some cases they are minute, no bigger than a pin's head, and hardly distinguishable from the neighbouring mucosa; whilst in other instances they are several millimetres thick, 1 centimetre long, and very different in their aspect from the neighbouring tissues.

Instead of forming these little islands, the epithelial proliferation may extend over a huge portion of the urethra. A horny change then takes place in the urethral epithelium; it becomes thick and keratinized—*pachydermia* or *leucoplasia*.

The mucosa is dull and greyish in this condition, and only shows its normal pink colour here and there. It is as if the mucous membrane were covered by a thick layer of dust.

Urethral leucoplasia is most often localized in the shape of patches of variable size, which are brilliant white, or yellowish white, or greyish in colour, and present a typical aspect. Their surface is granular or wrinkled, instead of being smooth. Their outline is oval, and their long axis follows that of the urethra. These patches are adherent; it is impossible

to rub them off with a swab; however, with a certain amount of energy one can manage to detach a small piece. The underlying mucous membrane is then found to be dark red, rough, and dull, but it does not bleed easily.

The *longitudinal folds* of the mucous membrane diminish considerably in hard infiltration, and even tend to disappear completely in the advanced cases which terminate in the formation of tight strictures. The urethroscopic appearance of the passage is that of a rigid tube, which continues to gape after the instrument is withdrawn. It is composed of an inelastic tissue with uniformly stiff walls.

The *central fijure* nearly always resembles an elongated funnel with rigid walls. In cases of stricture this funnel may easily measure 1 to 2 centimetres. The picture then seen is absolutely typical. The urethral walls are kept in position by the fibrous tissue which surrounds them, and fail to meet. They form a regular tunnel or funnel with pale and foldless walls which have the same consistency as cardboard.

Fig. 2 on Plate II. shows a characteristic hard infiltration. The cardboard-like walls of the urethra are seen to gape widely.

Lesions of the Lacunæ and of the Glands.—The lacunæ of Morgagni and the glands of Littre are always affected to some extent when hard infiltrations are present. With Oberländer we distinguish two different types.

If the gland duct remains pervious, the gland can discharge its contents. This is the *glandular* variety. Or the duct may be obliterated, either by compression due to the surrounding structures or by the contraction of its own walls. The secretion is then pent up, and accumulates within the gland, which is converted into a cyst. This is the *follicular* or *dry* form. The term "dry" is here only used owing to the aspect of the mucous membrane after it has been deprived of its glands. A more or less purulent and persistent discharge nearly always accompanies this condition.

(*a*) In the *glandular* type the orifices of Littre's glands are enlarged, and surrounded by an inflammatory ring. These openings are like craters, and frequently give issue to a liquid secretion. Very often slight pressure with the end of the endoscopic tube causes the glandular orifices to gape, and to discharge a clear or a purulent fluid, as the case may be. In some instances these openings become enormous, and flood the urethroscopic tube with their products when it presses on them.

Morgagni's lacunæ show similar changes (*vide* Plate III., Fig. 4). The edges of their orifices become crater-like, and yield a mucous or a purulent discharge. If the perilacunar infiltration predominates, the excretory channels project beyond the level of the mucous membrane as little red bosses.

In patients who have been dilated a few times, the enlarged lacunar and glandular orifices sometimes burst, and their walls fissure.

EXPLANATORY TEXT TO PLATE II

FIG. 1.—TYPICAL URETHROSCOPIC IMAGE OF A SOFT INFILTRATION AFFECTING THE BULBOUS PORTION OF THE URETHRA.

The mucosa forms puffy and oozing masses which are not unlike a bunch of hemorrhoids.

FIG. 2.—URETHROSCOPIC ASPECT OF A URETHRAL STRICTURE.

The walls of the urethra are invaded by fibrous tissue, and present the appearance of cardboard. The mucous membrane is abnormally pale, and the central figure is enormous owing to the rigidity of the urethral walls. As the latter cannot meet, and as the intensity of the fibrosis varies in different places, an irregular tunnel is formed with asymmetrical walls. In places encysted purulent glands of Littre are visible.

FIG. 3.—PHALLUS-SHAPED POLYPUS ARISING FROM THE UPPER ASPECT OF THE VERUMONTANUM.

FIG. 4.—LESIONS OF THE PROSTATIC FOSSETTE BEHIND THE VERUMONTANUM.

(This figure should be compared with Fig. 3 on Plate I.) Below, an elevation, the posterior end of the verumontanum, is visible. Above, one notices, instead of a well-folded and regular mucous surface, a number of small abscesses and muco-purulent masses in which the organisms find shelter for a considerable time. Lesions of this kind are relatively common in chronic gonorrhea, and cannot be diagnosed by any other method than urethroscopy. The condition shown in this figure, which is original, cannot be seen with instruments fitted with an optic portion which conceals the upper part of the prostatic fossette.

FIG. 5.—EXTRAORDINARY ASPECT OF THE EJACULATORY DUCT.

This figure refers to the case described on p. 177, in which constant recurrences due to the gonococcus were only checked after the verumontanum had been cauterized. It was found necessary to destroy this structure with the cautery, and thus the ejaculatory ducts were exposed. They are seen in apposition like the barrels of a gun.

FIG. 6.—SMALL POLYPUS SITUATED ON THE TOP OF THE VERUMONTANUM.

The clinical history of this case is described on p. 176.

To face page 168.

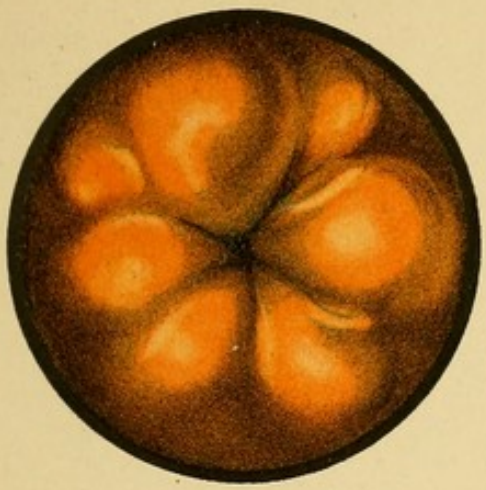

Fig. 1.

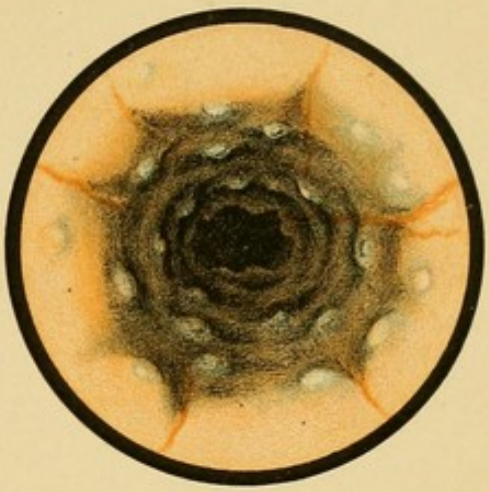

Fig. 2.

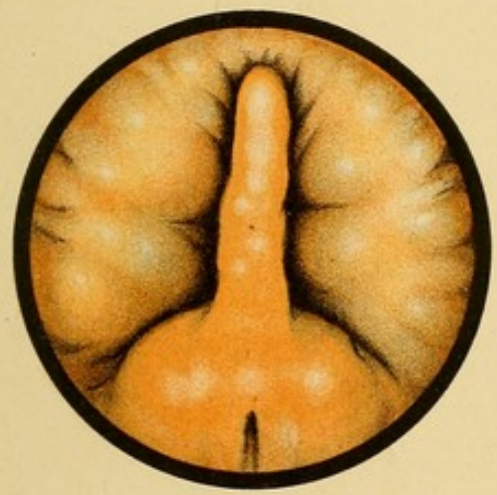

Fig. 3.

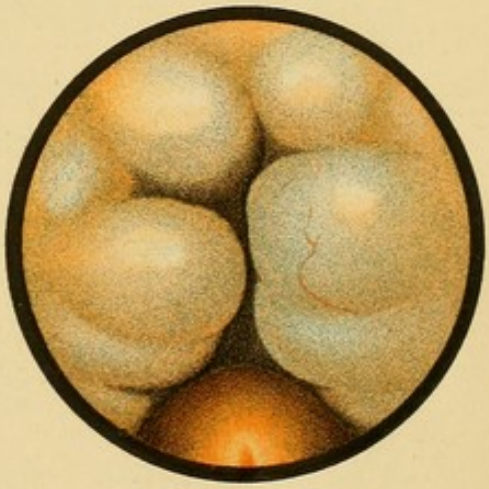

Fig. 4.

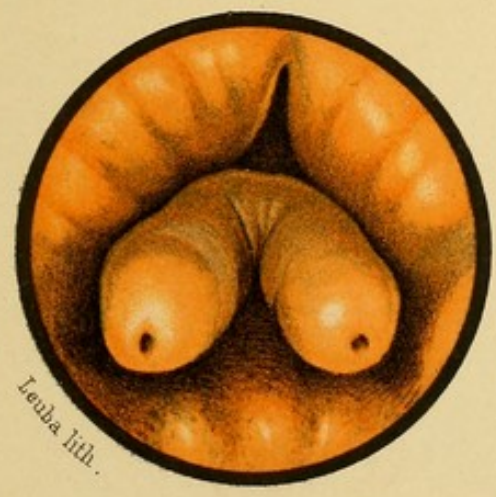

Fig. 5.

Fig. 6.

Imp. L. Lafontaine, Paris.

This phenomenon explains the exacerbations which are frequently noted after the first dilatations.

One, for instance, meets with cases like the following:

A patient comes who has very little discharge, often only a morning-drop. The urine is clear, including the specimen in the first glass. As he has no pain, and as there appears to be no other contra-indication, one explores his urethra with an olive, and then with some metal instruments, in order to discover any patch of infiltration which may be present. Two days later the patient returns; he is very angry, and has a profuse discharge which is full of gonococci. Under circumstances of this kind the patient is only too apt to blame his surgeon, and he may even accuse him of having contaminated him by using a dirty instrument. As a matter of fact, the explanation of this occurrence is very simple for those who are familiar with urethroscopic work.

One can often see by means of the endoscope glands of Littre and lacunæ of Morgagni which are represented by small thin-walled cysts. These little cysts often contain gonococci, and as long as their walls remain intact, the organisms are imprisoned within them. The introduction of a stout metal instrument into the urethra very easily breaks their walls. The cocci are then set free, and reinfect the mucous membrane.

(*b*) In the *dry* or *follicular* form the pressure of the invading fibrous tissue occludes the glands and their ducts. They thus become converted into subepithelial cystic cavities containing colloid matter.

Occasionally these glands are transformed into small purulent cysts which may be found isolated or in groups (*vide* Plate III.).

Figs. 1 and 2 on Plate III. show the condition found in a sergeant-major, aged twenty-five, who was stationed in Paris. He had been discharging for fifteen months, and showed no improvement under a treatment consisting of irrigations and instillations. Clinically, nothing but an insignificant discharge was found. The urine was clear, and contained only a few filaments in the first glass. An olive No. 21 could be passed without any difficulty. The urethroscopic examination of the penile portion showed a great number of small white purulent spots, which imparted a granular appearance to the mucous membrane. Each one of them represented an inflamed gland of Littre with purulent contents.

As they were very numerous, there could be no question of treating them individually. I therefore decided to deal with them *en bloc*. Dilatation with Kollmann's straight instrument was resorted to, and the urethra was widely dilated. After two months a considerable improvement was obtained, but not a cure.

I therefore urethroscoped the patient again, and made the following interesting discovery: All the small purulent cysts had completely disappeared from the penile urethra, which had been well dilated. The mucous membrane was here normal. The portion near the meatus, however, which had not been dilated, still contained purulent cysts. It was thus clear why a marked improvement had taken place, and why the patient was not cured. The remaining diseased points were now dilated, with the result that their mucous surfaces became normal again, and that a complete cure was obtained.

These cysts, of which a typical example is shown in Fig. 5 on Plate III., occasionally reach a considerable size and project into the lumen of the urethra. In some cases they burst under one's very eye when one presses the edge of the tube against them, and flood the tube.

This has happened to me on several occasions. One of the best examples of this kind was a patient who was sent to me by Dr. Cheurlot. A young man of twenty-six, who had been suffering from a chronic urethritis for something like eighteen months, presented a number of cysts all along his penile urethra. Methodical dilatation led to a complete disappearance of these lesions, and cured the patient.

Another still more instructive case, in which Littre's glands were converted into cysts in the same way as in the case shown on Plate III., Fig. 5, is the following:

A youth of twenty-five had had a discharge for eleven months. The microscope showed nothing but leucocytes and epithelial cells. The urine was clear, but there were heavy filaments in the first glass. The urethra admitted an olive No. 20 readily, although there was some spasm about the membranous sphincter. A series of silver nitrate instillations gave no appreciable result. The anterior urethra was now endoscoped, and in the middle of the penile portion several glands of Littre were found to be enlarged and to project into the lumen of the tube. Most of them appeared to be covered with a thin whitish skin. One of them was especially prominent, and had the features of a cyst of considerable size, as shown in the plate.

Methodical and gradual dilatation was carried out by means of Kollmann's straight dilator. At the end of three months, which were uneventful, No. 44 G was reached, and the patient was freed from his discharge. The urine contained no longer any filaments, and a fresh urethroscopic examination showed that there was nothing resembling a cyst left in the penile urethra, which presented a normal mucous surface.

Cases of the follicular or dry variety are common in which the ducts of Littre's glands are obliterated, and the glands themselves are visible under the urethroscope as appreciable swellings under the mucosa.

One, however, also meets with cases in which the proliferation of the urethral epithelium and the connective-tissue infiltration are so considerable on the surface that the glands are pushed downwards below the level of the mucous membrane. This type of lesion is much more troublesome, and resists treatment to an extent which renders a cure difficult, although the palpation of the urethra on a metal sound allows one to diagnose these lesions easily and accurately.

Urethral palpation (*vide* Chapter VII.) often reveals the presence of very definite nodules in the lower wall of the urethra. They are usually separate, and of the size of a millet-grain or hempseed. Occasionally, however, they are much larger—as big as a hazelnut or a walnut—and they may open externally and lead to the formation of a urinary fistula.

When one has located one of these swellings by palpation, and then examines the spot with the urethroscope, one often finds, to one's astonish-

ment, absolutely nothing except a smooth mucous surface. Even when one inclines the endoscopic tube one sees nothing further. In cases of this kind the gland is completely shut off, and has no longer any communication with the lumen of the urethra. A typical example of this condition is the following instance:

A young assistant in the Paris hospitals had contracted gonorrhea, for which he had been treated for three months. The discharge then almost ceased, there being only occasionally a small drop in the morning.

When he consulted me on October 5, 1903, he complained of a small swelling on the under surface of his urethra, about 5 centimetres from the meatus. This tumour, which had been noticed about three weeks previously as a shotty lump of the size of a small pea, had suddenly increased during the last six days. When I saw it first, it was of the size of an olive, and appeared to be on the point of bursting. It had also given rise to edema of the prepuce.

I now urethroscoped the patient. I introduced the instrument far, and then gradually withdrew it, until I reached the swelling. Curiously enough, there was hardly any bulging into the lumen of the urethra, although the projection on the outside was unmistakable, and of the size of an olive.

Having found the exact level of the tumour by external palpation, I brought the end of my tube exactly up to it, and thrust Kollmann's small knife through the urethral mucosa into the substance of the swelling. Despite the length of my incision, nothing but blood came away. I then gripped penis and urethroscopic tube firmly with one hand, and made strong pressure on the tumour with the other. In this way I was able to express its contents, and suddenly a big, softish, but consistent slough came away, which was not unlike the core of a boil. The size of the swelling became less, but it remained considerable owing to its thick fibrous shell.

The sequelæ were uneventful. After a few days, regular methodical dilatation of the anterior urethra with straight sounds could be instituted. It was continued until No. 60 G had been reached.

Five months later I saw the patient again; there was no trace of any discharge. The tumour, which had been as large as an olive, was replaced by a hard, fibrous nodule of the size of a hempseed.

This case is interesting in several respects, for it shows that—

1. When the glands have ceased to communicate with the surface of the urethral mucosa, the endoscopic examination gives no indication as to their seat and their condition.

2. The contents of these follicles are not liquid, but are formed by sloughs not unlike the core of a boil.

3. These cysts are mainly composed of a thick fibrous shell formed by the connective-tissue infiltration.

4. It is easy to attack these inflamed glands surgically through the urethroscope when they threaten to suppurate. This mode of operating prevents their spontaneous or artificial opening through the skin, and thus avoids the subsequent formation of a urinary fistula.

The lacunæ of Morgagni are apt to be affected similarly, by obliteration of their ducts, with engorgement and with condensation of their contents. The picture they give under the urethroscope is quite characteristic. Hardly

any or no glandular orifices are visible. Here and there one observes, instead of a lacunar orifice, a small greyish or yellowish depression, which indicates a closed follicle, and is represented by small spots of the size of a millet-seed. These follicles are sensitive when one palpates the urethra.

I have shown a case of this type (Plate III., Fig. 6) in which a lacuna of Morgagni was obliterated. This patient, a man of twenty-nine, had had a discharge for over a year, and presented multiple lesions of chronic urethritis: prostatitis, hard infiltrations at the perineum, and glandular and lacunar lesions in the penile portion. The urethroscope allowed me to distinguish clearly a small oval swelling of the size of a wheat-grain on the upper surface of the urethra. It was covered by a thick, yellow, smooth mucosa which showed a few red striæ.

This clearly defined and well-localized lesion was dilated with Kollmann's dilator up to No. 42 G, but the therapeutic effect was nil. Its aspect under the urethroscope was exactly the same as before. I therefore touched it up with Kollmann's electrolytic needle two or three times in one sitting, the needle being applied almost at the same spot every time. This treatment settled the whole matter.

One not infrequently finds both the glandular and the dry forms present together in urethræ which are affected with hard infiltrations.

This is the *mixed form*. It rarely occurs spontaneously in untreated cases. It is commonest observed in cases of the dry variety which are treated with dilatation. The cysts are then opened, become atrophic, and disappear. The excretory ducts, having been freed, open out again. In this way the mixed variety is gradually established, until it is again superseded by the pure glandular type.

5. Urethroscopy of the Posterior Urethra in Disease.

In every case of chronic inflammation of the urethra the posterior urethra should be examined, and one should not restrict one's efforts to an inspection of the verumontanum. The investigation should be complete, and should include the "prostatic fossette"—*i.e.*, it should begin at the neck of the bladder.

Even when, clinically, no symptoms point to a lesion of the posterior urethra, such lesions are often present, and they would never be diagnosed unless one resorted to urethroscopic examination.

Very often a patient has no abnormal sensations about his prostate, the urine collected in the last glass contains no filaments, the palpation *per rectum* reveals no marked change in the prostate, and even energetic prostatic massage yields only a little normal secretion, so much so that one is inclined to consider these structures healthy; and yet lesions are present, which an attentive urethroscopic examination enables one to find and to cure. Many cases of this nature will get perfectly well if they are properly treated, despite their reputation of incurability.

When no prostatic lesions are responsible for the gleet, one may be certain that there is trouble in the posterior urethra, and it becomes necessary to explore it in its entire length, from the neck of the bladder downwards.

The commonest lesions in the posterior urethra are soft infiltrations. The mucosa is hyperemic and congested, and bleeds on the slightest provocation.

It is commonly swollen to a marked degree, and displays small, more or less closely packed edematous bulgings, which bleed as soon as they are touched (Fig. 114).

The prostatic glands are very often affected. They are red, swollen, and encircled by a prominent edge. Goldschmidt has compared them very

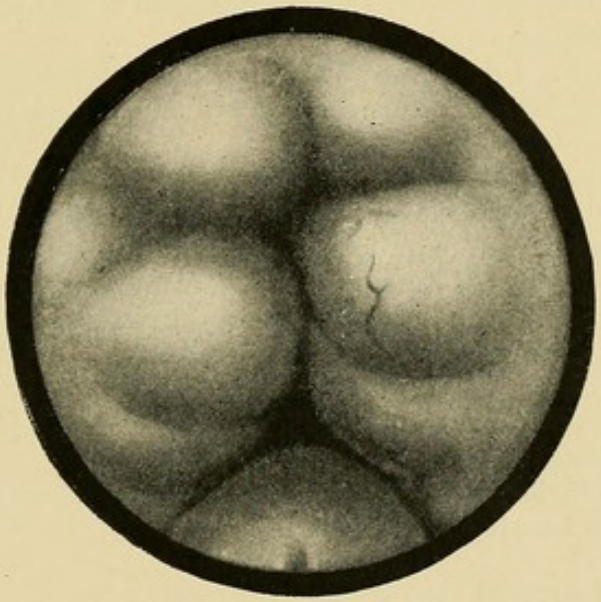

Fig. 114.—Lesions of the "Prostatic Fossette" behind the Verumontanum, as seen with the Urethroscope.

happily with frog's eyes. In certain cases they form small apposed, purulent masses not unlike little white buttons. Occasionally they are acuminated, and remind one of boils. These chronic prostatic lesions are not only to be found in the region behind the verumontanum and on the lower wall; they are also met with on the upper surface of the urethra and in the grooves to either side of the verumontanum. For this reason a straight urethroscopic tube gives a much better view than the instruments designed especially for the posterior urethra.

It is impossible with Goldschmidt's apparatus, for instance, to examine the antero-superior wall of the prostatic urethra. If one were to rely solely on instruments of this type, one would never see certain definite lesions of the posterior urethra, as the following case shows (see also Fig. 116):

Chronic Posterior Urethritis due to a Focus in the Prostate which contained Gonococci for over Ten Years.

A man of forty-four was sent to me (by Dr. Portalier) who had acquired an attack of gonorrhea when he was thirty-four. He had been treated with permanganate irrigations, had got rid of his discharge, and had remained without any appreciable discharge for ten years. Suddenly, in May, 1910, a copious discharge was noticed which contained a great number of gonoccoci. The patient, who was much surprised, began to suspect his mistress, and brought her to me for examination.

I examined her most carefully on two occasions, and failed to discover any gonococci in the urethra, which was urethroscoped, or in the para-urethral glands, or in those of Bartholin, or in the posterior vaginal fornix, or in the cervix, which was scraped with a platinum loop. The rectum was also explored, and found to be healthy.

The young woman was thus apparently quite free from gonorrhea, and the origin of the infection seemed thus inexplicable. I reduced and finally cured the discharge by means of $KMnO_4$ injections. This result was rapidly obtained, so much so that on May 27 the urine had become clear, and a urethroscopic examination could be made under favourable conditions.

To my great surprise, I discovered some definite soft infiltrations just in front of the verumontanum, whilst the region behind it, near the neck of the bladder, was perfectly healthy.

In front of the verumontanum, edematous bulgings, small polypi, and polypoid vegetations, were present, and the surface of the mucosa was raised by edema. The bulb and the penile urethra were quite normal. It was thus clear that I was dealing with a very old chronic lesion of the posterior urethra, which had given the gonococcus shelter for ten years, and which had only recently flared up suddenly for some reason or other.

The urethra was dilated, first with metal sounds, and then with Frank's three-bladed dilator, until a high degree of dilatation was reached. The lesion in the prostatic urethra was readily healed in this way, and the patient cured.

Control by means of the urethroscope after the dilatation with Frank's instrument showed that no lesions were left.

Another equally typical case is the following:

A man of forty-five had a purulent discharge containing gonococci for six months. Dr. Wormser, who treated him, irrigated him with $KMnO_4$, and then dilated his urethra methodically with curved sounds up to 56 G.

A concomitant inflammation of Tyson's gland was treated by incision, and had subsided when I saw the patient.

Despite this very methodical and scientific treatment, the discharge reappeared, and contained again gonococci as soon as the irrigations were stopped. The presence of a permanent focus was thus to be feared, and Dr. Wormser asked me to find it (June 6, 1910).

The palpation of the urethra on a sound revealed no littritis. The changes in the prostate were insignificant; Cowper's glands and the vesicles were normal. There was nothing wrong with the testicles and their epididymes, which had never been inflamed.

Urethroscopic examination proved the anterior urethra to be normal, but revealed definite lesions in the posterior. Here small, whitish, purulent vesicles were present just above the verumontanum, in the bolster of mucous membrane which covers it. It was impossible to detach them with a swab, as the latter simply passed over them without damaging their walls.

A precise lesion which contained gonococci was thus found, and I advised Dr. Wormser to continue his dilatation treatment. The patient was subsequently dilated

EXPLANATORY TEXT TO PLATE III

FIGS. 1 AND 2.—ENCYSTED PURULENT GLANDS OF LITTRE.

A glance at these two figures enables one to realize the importance of far-pushed urethral dilatations. The case in point is described on p. 169.

FIG. 3.—GLANDS OF LITTRE IN A STATE OF CHRONIC INFLAMMATION.

FIG. 4.—CHRONIC INFLAMMATION OF MORGAGNI'S LACUNÆ AND OF LITTRE'S GLANDS.

The picture is typical and often observable. Around each focus is a characteristic inflammatory halo.

FIG. 5.—ENORMOUS ENCYSTED GLAND OF LITTRE, WHICH BURST READILY UNDER THE ACTION OF A FEW DILATATIONS.

The case is described on p. 170.

FIG. 6.—CHRONIC INFLAMMATION OF A LACUNA OF MORGAGNI.

Its complete disappearance could only be obtained by means of several direct applications with the electrolytic needle. The case is described on p. 172.

To face page 174.

Fig. 1.

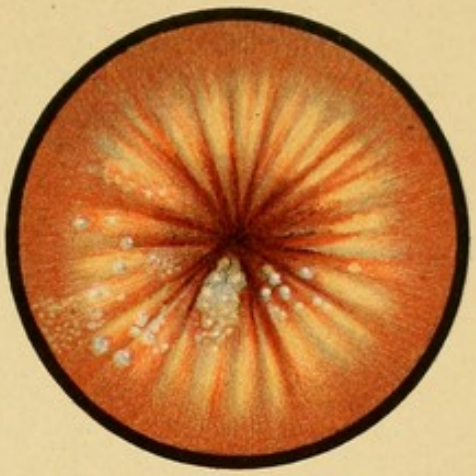

Fig. 2.

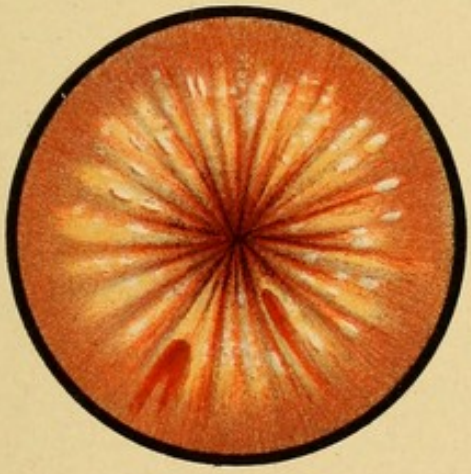

Fig. 3.

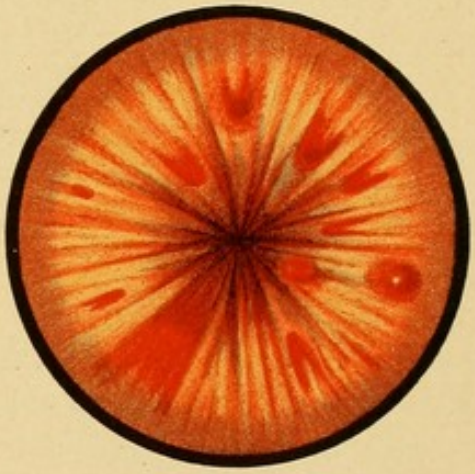

Fig. 4.

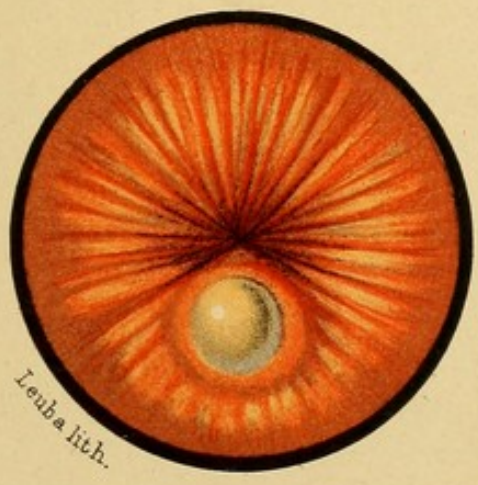

Fig. 5.

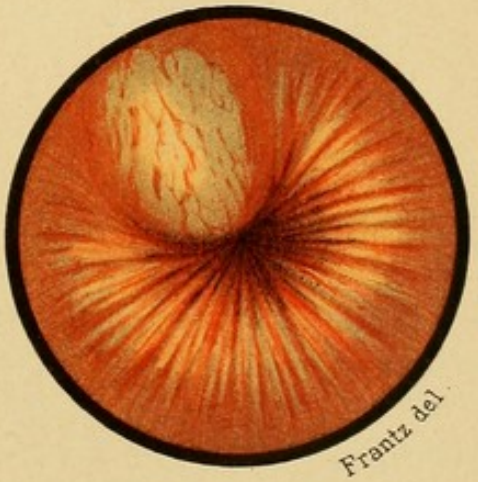

Fig. 6.

Imp. L. Lafontaine, Paris.

up to No. 60 G, but after four days had elapsed, during which the irrigations with $KMnO_4$ were stopped, a discharge containing gonococci reappeared. I therefore examined him again with the urethroscope on July 1, 1910, and found that the old focus was still present and had not altered. The recurrence was thus explained, and I proceeded, in agreement with Dr. Wormser, to dilate with Frank's dilator up to its limit, which was reached on July 13.

The patient now remained without any irrigations for six days, and wrote that his condition was satisfactory, and that there was no relapse.

This last dilatation thus appeared to have done its duty, and to have destroyed the rebellious focus in which the gonococci were lodged.

I saw the patient again on July 25, 1910. He had now been fourteen days without any dilatation or irrigation. He was free from discharge, and there were no filaments in the urine. The urethroscopic examination showed that all the purulent little cysts had disappeared from the posterior urethra, and that there was no lesion left which could harbour gonococci.

The verumontanum was still in a slight state of chronic inflammation and somewhat edematous. I therefore cauterized its apex, which projected a little more than usual, and painted its body with iodine tincture.

From this moment the cure was certain, and there was no chance of the gonococcus reappearing.

The condition of the posterior urethra in acute urethritis cannot be made out by means of urethroscopy, as this method is contra-indicated in these cases. In chronic urethritis this portion is very commonly affected, although the contrary is usually believed. *One should never fail to examine it thoroughly*, and very often cases which appeared obscure will become understood.

The "prostatic fossette," for instance, may show interesting changes. The orifices of some of the prostatic glandules open on its floor. When they are infected, this fossette is often converted into a regular cesspool; and if one urethroscopes and massages the prostate simultaneously, one is not infrequently able to see the pus being discharged into it.

The glandules which are most commonly infected open along the lateral borders of the verumontanum. In two cases of chronic prostatitis which were absolutely incurable by ordinary means, I was able to express pus by massaging the prostate *per rectum*, and I could see it come out through these orifices along the sides of the verumontanum. It seemed, however, that these openings were inadequate, and therefore I enlarged them. In the case of a patient aged thirty-four I discovered, after having increased the orifice, an enormous cavern, which I disinfected by touching its walls with silver nitrate. Both cases afford a clear proof of the necessity of resorting to urethroscopy in rebellious inflammations of the prostate. On each occasion a huge cavity was present behind a minute orifice, which certainly was inadequate for its drainage. With the exposure of the cavern and its disinfection the incurability disappeared. The solution of the problem of curing these cases of rebellious prostatitis lies in this direction.

The mucous membrane of the posterior urethra undergoes marked

changes in hard infiltration. The membranous portion assumes a reddish-grey and slightly yellowish aspect; its lustre disappears; it becomes dry and dull.

The epithelium undergoes desquamation. It is often denuded over a large area, and hence it bleeds so readily when the urethroscopic tube is being introduced.

The numerous folds which are present in health disappear almost completely owing to the fibrosis. When this process is far advanced, nothing but a rigid tube is left, which is of a yellowish-white tint or of the colour of a pearl. This latter colour, if pronounced, is practically always indicative of pachydermia.

Vegetations and *polypi* are also not uncommon in the posterior urethra,

Fig. 115.—Polypus on the Verumontanum.

and are often accompanied by neurasthenic troubles, which may assume a serious character.

Sometimes they are situated on the verumontanum, as shown in Fig. 115. In this case the condition present imitated a cock's comb, and the polypus was readily destroyed by means of the cautery. When these growths form in the membranous portion, they are usually pedunculated, and have a long pedicle. Or, again, they may take the shape of a "cauliflower growth" and occupy the whole prostatic portion, covering the verumontanum completely, or they may resemble an eel (Fig. 117) or a phallus (Fig. 118), etc.

These cases are most difficult to treat; they require energetic cauterization, and at the same time one has to avoid damaging the ejaculatory ducts.

One of my patients, a man of thirty-five, had a constantly recurring discharge which contained gonococci. This was due to a lesion in the posterior urethra, which was completely filled with raspberry-like vegetations. I dilated with Frank's instrument

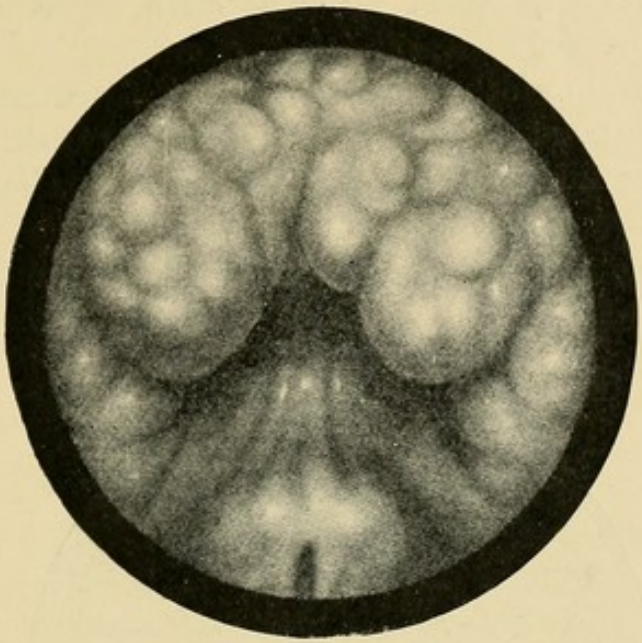

FIG. 116.—GLANDULAR LESIONS OF THE ANTERIOR PART OF THE PROSTATE, AS SEEN WITH THE URETHROSCOPE.

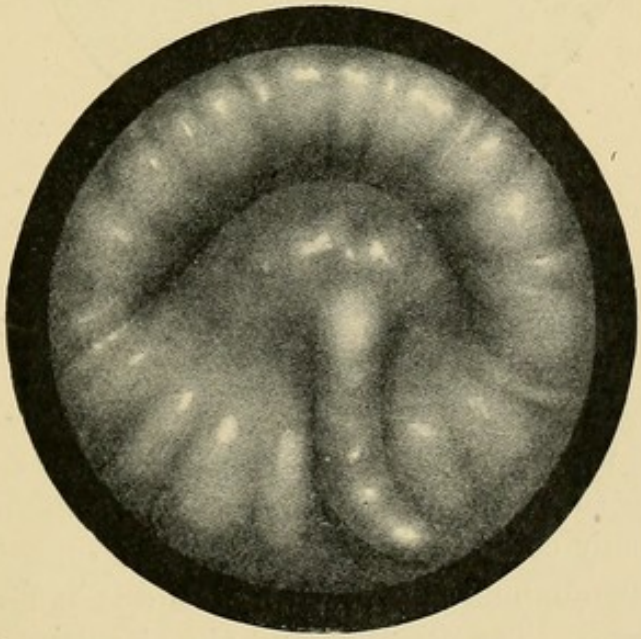

FIG. 117.—LONG EEL-SHAPED POLYPUS ATTACHED TO THE ANTERIOR ASPECT OF THE VERUMONTANUM.

up to 45 G, but the discharge recurred. I then urethroscoped him, and cauterized the whole posterior urethra with the galvano-cautery. It was impossible to spare the verumontanum, and thus the ejaculatory ducts were exposed, as shown in Fig. 5 on

Plate II. The urethroscopic image is rather curious. The verumontanum has disappeared, and the two ejaculatory ducts are plainly visible in apposition to each other, like the barrels of a gun.

The orifice of the prostatic utriculus often gapes, and occasionally seminal fluid can be seen to ooze from its hollow.

In certain cases, in which it is necessary to differentiate between secretions from the prostate and those from the seminal vesicles, it is possible, by combining the urethroscopic examination with simultaneous rectal massage, to express the contents of the vesicles from the utriculus in front of one's eye. In this way one is enabled to guide one's therapy appropriately.

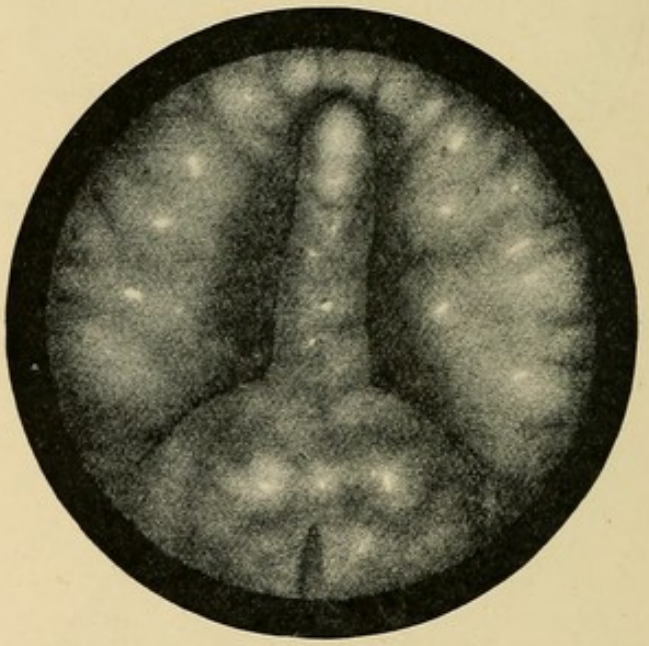

Fig. 118.—Phallus-shaped Polypus arising on the Upper Aspect of the Verumontanum.

In other instances the utriculus is more or less deviated to one side, instead of being in the middle of the verumontanum. In chronic epididymitis a purulent secretion is occasionally seen to issue from it; or its lips are congested, warty, and bleed at the slightest contact. This morbid finding corresponds to a clinical sign which patients suffering from posterior urethritis occasionally complain of: blood-stained ejaculations.

When the verumontanum is invaded by sclerosis, it becomes yellowish, shrunk, and withered. The utriculus and the ejaculatory ducts are then often narrowed or strangled. These lesions are responsible for the sudden violent pain which some patients feel at the moment of ejaculation.

Occasionally one meets with cases in which the verumontanum is uniformly enlarged and hypertrophied. It would seem that this condition were the outcome of habitual masturbation, so much so that I have

often, on finding this condition present, accused the patients of this vice and obtained a confession.

The verumontanum is swollen, and assumes the shape of a cervix uteri as one finds it in chronic metritis. The utriculus gapes, and bears a close resemblance to an os cervicis which is in a state of chronic inflammation.[1]

Lastly, urethroscopic examination is of extreme interest when the prostate is hypertrophied. One can thus ascertain the exact length of the prostatic channel, its curves, the shape of its walls, and any abnormal projections which may be present, and be responsible for the difficulty in making water complained of by the patient.

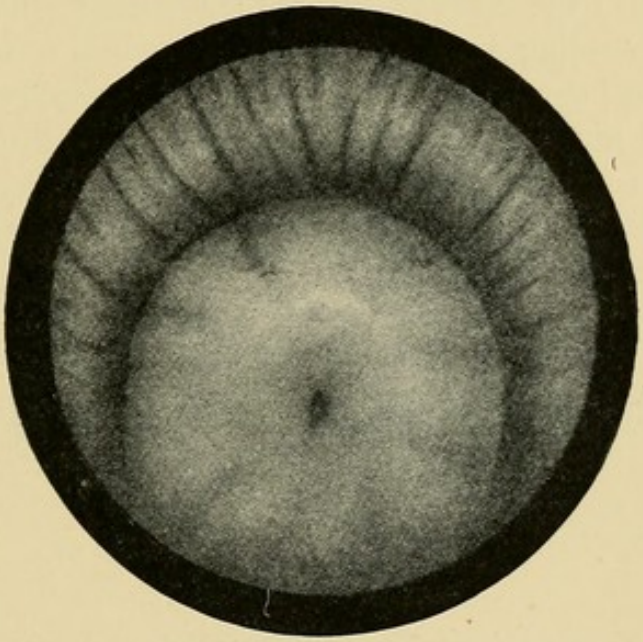

FIG. 119.—HYPERTROPHY OF THE VERUMONTANUM RESULTING FROM CHRONIC INFLAMMATION.

This condition imitates a cervix uteri, and is usually found in habitual masturbators.

Under the control of the eye these projections which interfere with micturition can be destroyed, and thus this process is of therapeutic value.

It is hardly necessary to point out that these urethroscopic interventions cannot take the place of suprapubic (transvesical) prostatectomy. But they are useful in certain cases, and they are certainly to be preferred to the blind cutting of Bottini's operation, because they are done under the control of the eye.

[1] This pathological finding has as clinical equivalent the feeling of moisture about their urethra which so many masturbators complain of, and the sensation that their semen is running away from them. To this loss of semen they often attribute their weakness, their insomnia—in fact, all their little ailments. It becomes a regular obsession, and sometimes drives them to suicide (A. F.).

6. Urethroscopic Examination of the Female Urethra.

Urethroscopic examination of the female urethra is at least as necessary as the corresponding exploration in the male.

In both sexes the urethra has to be dilated sufficiently beforehand.

For the female urethra one uses a short tube like the one shown in Fig. 81 (p. 137).

In women, the neck of the bladder is frequently involved in the course of chronic urethritis, and requires to be examined at the same time as the posterior urethra. Now, a simple urethroscopic tube gives a blurred picture if one pushes it into the bladder, because some urine enters the tube and prevents one from seeing distinctly. It is therefore advisable to have a special instrumental outfit, such as my direct vision cystoscope.

Description of my Direct Vision Cystoscope.—My direct vision cystoscope for woman consists of a hollow metal tube which is 10 centimetres long. As the female urethra can be dilated without difficulty, a tube No. 59 G is generally employed.

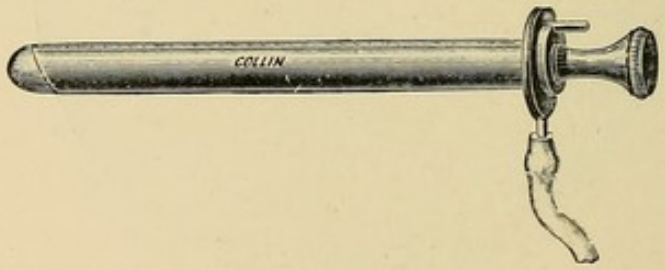

Fig. 120.—Luys's Direct Vision Cystoscope (Female Pattern).

The lower wall of the tube contains a minute channel, through which the urine collected in the badder is aspirated. Owing to a special construction, this aspiration tube is not soldered, and does not project to any appreciable extent into the cystoscopic tube. One connects it through a rubber pipe with a receiver, in which a vacuum is made and maintained by means of a filter pump.

Along the whole length of the upper wall of the cystoscopic tube runs a groove, which forms a kind of bed for the lamp and its holder. The latter, therefore, do not project into the lumen of the tube, and do not reduce the field of vision.

The instrument is introduced by means of a straight metal pilot, and is illuminated by means of a small electric lamp which is fixed to a long holder, which brings it down to the level of the mouth of the urethroscopic tube. Lamp and tube are attached to a handle, which does not differ from the handle of my urethroscope (*vide* Fig. 82).

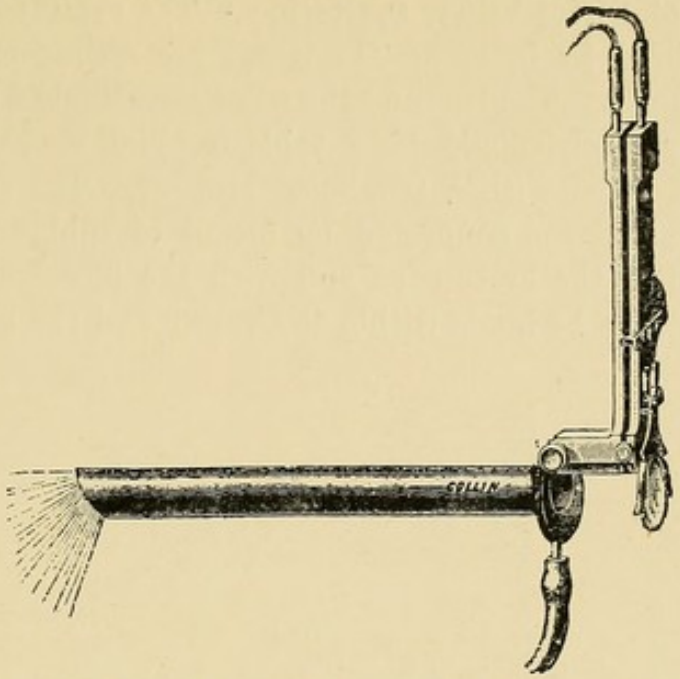

FIG 121.—LUYS'S DIRECT VISION CYSTOSCOPE COMPLETELY MOUNTED (FEMALE PATTERN).

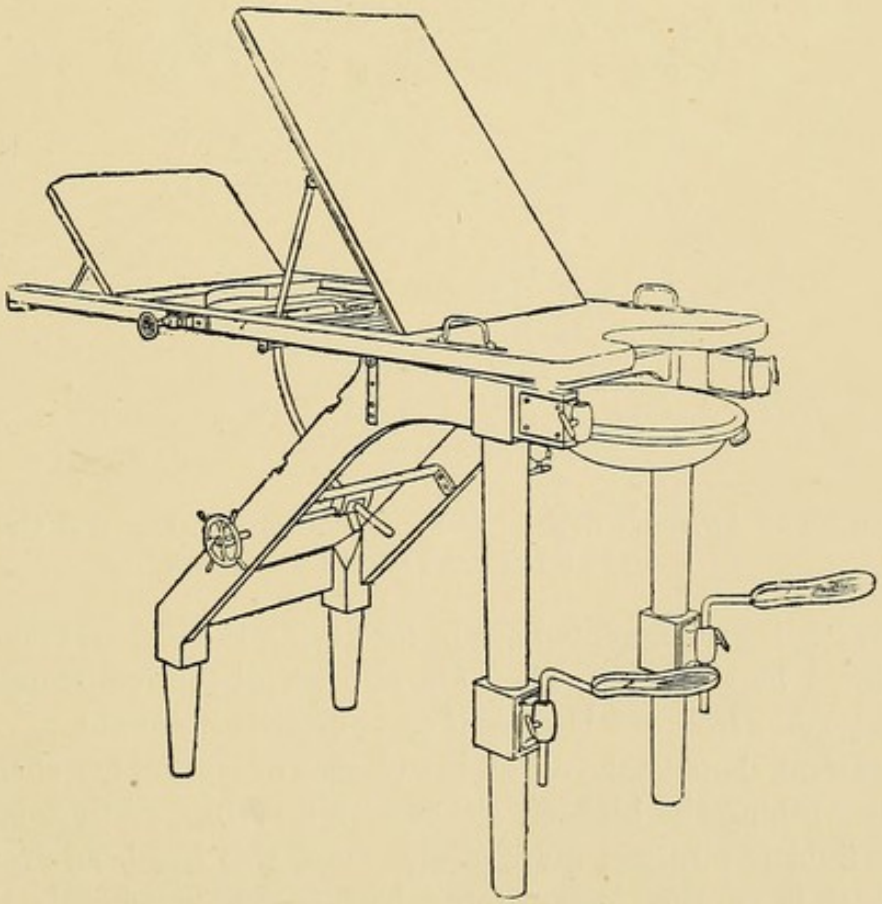

FIG. 122 —THE AUTHOR'S CONSULTING-ROOM TABLE FOR EXAMINING THE URINARY ORGANS (HORIZONTAL POSITION).

Technique of Direct Vision Cystoscopy.—The cystoscopic tube and its pilot are sterilized by boiling. The lamps are disinfected by the action of formalin vapours. The lens and the wires are attached to the handle.

Within easy reach should be a table carrying an hermetically-closed vessel which is fitted with a two-holed stopper. The tubes which pass through these holes. are connected by means of rubber tubing with the aspiration tube of the cystoscope and with the filter pump respectively. A vacuum can thus be made within the vessel, and the urine can be aspi-

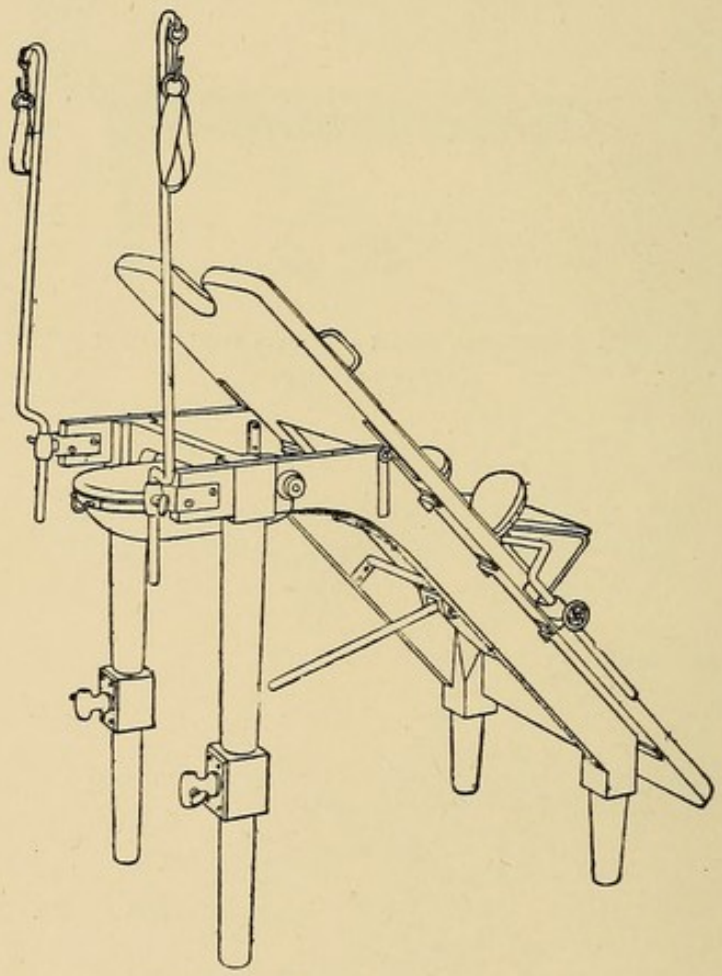

FIG. 123.—THE AUTHOR'S SPECIAL CONSULTING-ROOM TABLE FOR CYTSOSCOPY WITH THE DIRECT VISION CYSTOSCOPE.

rated into it. Sterile mounted swabs for drying the urethral mucous membrane should be at hand. They are also useful for removing any blood which may come from the bladder if some cystitis is present.

The patient should take off all her clothes excepting her chemise. One begins by washing the bladder, either with a syringe or from an irrigator, until the fluid is returned quite clear. Once this has been accomplished, the bladder is emptied completely. The patient's pelvis is then raised and brought to the edge of the table. The head is lowered, and firm supports are fitted to the shoulders in order to prevent the patient from

wriggling away from the surgeon. These rests should be firmly fixed to the table, and should be selected according to the size of the patient.

The feet should be supported by stirrups or by American leg-rests. The important point is to fix the legs and to separate them well. The head may be conveniently raised by a small pillow.

When all the preparations are finished, the cytoscopic tube is passed. If a large size has been chosen—say 59 G—it is well to begin by dilating the urethra with Hegar's bougies (6, 7, 8, and 9).[1] The cystoscope can then be passed with the greatest ease.

FIG. 124.—EXAMINATION OF THE BLADDER BY MEANS OF THE DIRECT VISION CYSTOSCOPE.

If the meatus is somewhat narrow, and if the manipulations are likely to cause pain, it is advisable to insert a piece of wool which has been soaked in a 5 or 10 per cent. solution of stovain (or other anesthetic) into the meatus, and to leave it there for a few minutes before one attempts to pass the tube. This procedure, which has been advocated by Kelly, is excellent.

The meatus having been washed and disinfected, the cystoscopic tube and its pilot are lubricated with glycerine and introduced very gently into the urethra. The instrument reaches the bladder with the greatest

[1] Or straight metal sounds of suitable size (A. F.).

ease in this way. One then withdraws the pilot. and puts the aspirator into action in order to dry the tube and to prevent the lamp from being affected by moisture.

The handle and the lamp are then fitted on to the tube of the cystoscope, and fixed by turning the special screw. Once the light is switched on, the bladder is beautiiully illuminated, and shows all its details.

In Trendelenburg's position the bladder is relieved of the weight of the viscera, which rest on it normally, and expands. The cystoscope is thus free within its cavity, and can be moved about in all directions.

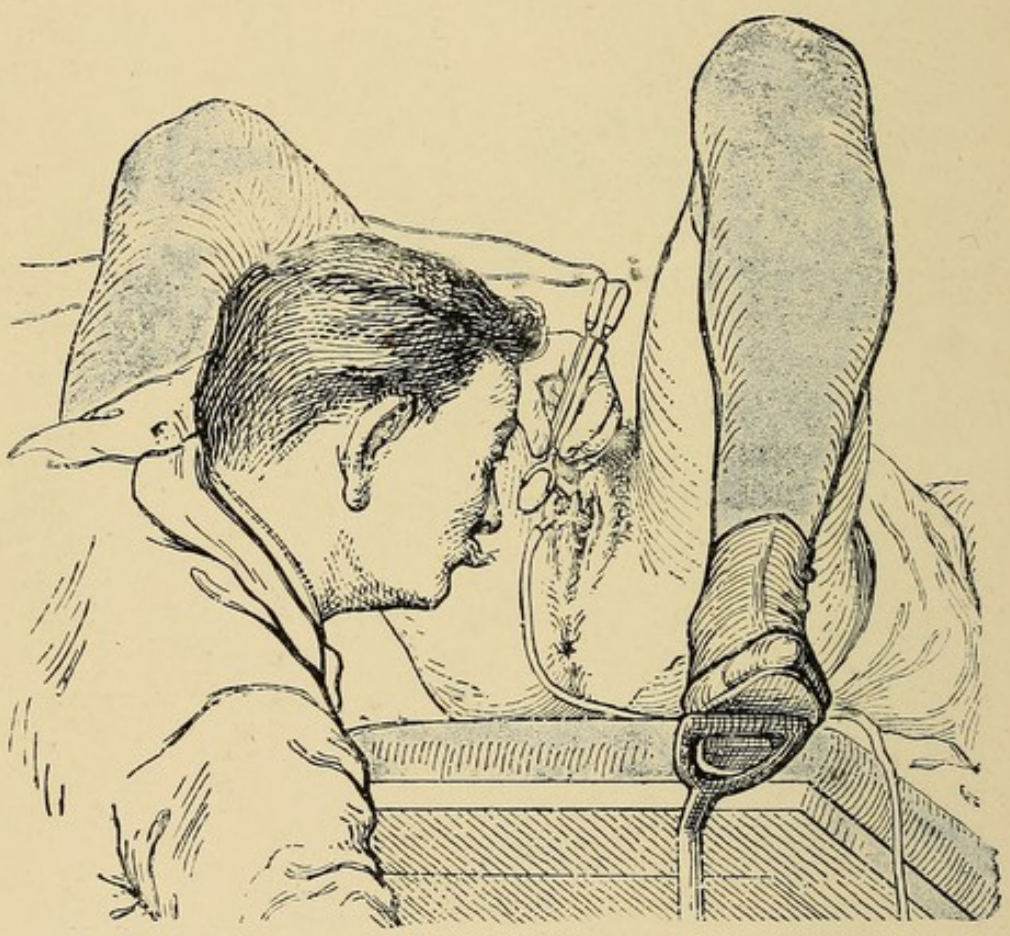

FIG. 125.—EXAMINATION OF THE BLADDER: EXACT POSITION OF THE DIRECT VISION CYSTOSCOPE DURING THE EXAMINATION OF THE FEMALE BLADDER AND URETHRA.

The examination of the lower wall of the neck of the bladder is easily carried out. One has only to raise the handle of the instrument. The mouth of the tube within the bladder is then lowered, and the whole trigone comes into view.

The upper wall is examined in a similar manner, except that the movement is reversed: one lowers the handle, and thus raises the end of the tube which is in the bladder.

It is well, once one has got to this stage, to press, or to ask the patient to press, with one hand on the abdominal wall just above the pubis. The

whole upper part of the bladder can then be made to pass in front of the urethoscope at will, and can be explored completely.

The female urethra should always be inspected in its whole length from the neck of the bladder down to the meatus, whether one uses a urethroscopic tube or my direct vision cystoscope.

Whilst the instrument is being slowly withdrawn, any small polypi and papillomatous proliferations, are carefully noted, and the openings of the urethral glands are inspected.

The female urethra is composed of two distinct portions :

1. A *posterior urethra* close to the neck of the bladder, which is chiefly muscular in structure. When seen with the urethroscope, this portion is characterized by a great number of well-marked radiating striæ, which indicate the underlying muscle fibres. It usually escapes inflammation, because it contains very few glands.

2. The *anterior urethra* is totally different. It is well provided with glands, and is literally studded with their orifices. These glands of the female urethra are constant, and are arranged in two important lateral groups. They present the features common to mucous glands, and open into the lumen of the urethra by orifices which are sufficiently large to be visible by means of the urethroscope. In their aspect and in their structure these glandular formations of the female are absolutely analogous to those met with in the penile urethra of man. They are therefore the female equivalents of Littre's glands and of Morgagni's lacunæ. Like the latter, they are prone to gonococcal infection and its consequences. Their chronic inflammation is one of the chief causes of everlasting gonorrhea in the woman.

It thus follows that gonorrheal urethritis in women deserves the same attention as gonorrheal urethritis in men, and that the treatment of the chronic cases should be similar—namely, *dilatation*.

A few examples may here find room to show how necessary it is to urethroscope the female urethra, and how this diagnostic method reveals the presence of lesions which in the ordinary course of events would never have been found :

On June 5, 1905, Professor Terrier sent me a lady of forty-four who had been operated on five years previously for a vesical tumour. Her urine was clear, and there was no frequency; but she complained of severe pain during micturition and after.

Thinking that her tumour had recurred, she had called repeatedly on Professor Albarran, who had performed the operation. He examined her, and failed to find any sign of a recurrence. She then went to Professor Terrier, who sent her on to me. Clinical examination of the bladder showed nothing abnormal. This organ had a capacity of 300 c.c. There was no pain on palpation, and the vesical walls were found to be normal.

The examination of the bladder with the ordinary cystoscope confirmed these findings. The walls were healthy, and there was no trace of a recurrence.

A little later—on June 23, 1905—I examined the patient again, but this time with my direct vision cystoscope. Again I failed to find anything wrong with the bladder. I was on the point of terminating my inspection, when I suddenly noticed, as the instrument was about 2 centimetres in the urethra, a thick, turbid, obviously purulent fluid flooding the lumen of the tube.

I at once aspirated this secretion with the filter-pump, and dried the mucous membrane with swabs. Inspection of the urethral walls now showed me, about 2 centimetres behind the meatus, an orifice which led to a para-urethral cavity. By pressing on it with the cystoscopic tube, a turbid liquid containing flakes escaped. The diagnosis was now clear. The patient had been suffering from a para-urethral abscess, which had burst owing to the pressure of the tube on it.

The following visits were devoted to enlarging the orifice by means of the electric cautery, and to applying silver nitrate to the interior of the cavity.

Under this treatment the pain complained of ceased, and disappeared entirely.

Another interesting case, which shows the vast importance of urethroscopy for the diagnosis of urethral and vesical affections in women, is the following:

A lady was sent to me in October, 1910, who complained of pain in her urethra and in her bladder during micturition, and after the act. She had been suffering in this way for seven months.

In the beginning it was extremely difficult to examine her owing to the tenderness of her urethra. However, with a little patience, I managed to dilate it gradually, and towards the end of November I was able to pass my direct vision cystoscope.

On November 22, 1910, I made a thorough examination of her bladder and her urethra. I found the former organ and the posterior urethra perfectly healthy. But as I gradually withdrew the tube, I noticed on the left wall near its middle a small edematous orifice, from which a few drops of pus escaped. The tract was so small that one could barely probe it with a stylet.

The diagnosis was certain: Para-urethral fistula.

I enlarged the opening in subsequent visits with the cautery in order to give the pus a free outlet.

A few days later the patient passed masses of purulent flakes, which were examined bacteriologically by Dr. Hallion. No gonococci were found, nor was Koch's bacillus present. The infection was due to undefined bacteria, which were present in great quantities.

CHAPTER IX

THE COMPLICATIONS OF GONORRHEA

THE complications of gonorrhea are numerous and varied; some of them are local, the others are general.

LOCAL COMPLICATIONS.

Phimosis and Paraphimosis.

A gonococcal infection which merely affects the glans and the balano-preputial fold gives rise to balanitis and balano-posthitis. This complication is especially frequent in patients with a long and tight foreskin, as they find it difficult to uncover the glans, and therefore do not keep it properly clean. In the circumcised this complication is quite exceptional.

Balanitis manifests itself by a disagreeable itching, tingling, and stinging about the glans. After a time, a whitish or yellowish discharge appears, which gradually increases. The mucous covering of the glans is swollen, claret-coloured, and granular in aspect. Later on, as the inflammation becomes more acute, the patient finds it impossible to draw his prepuce back: he suffers from phimosis. The secretion becomes more and more abundant, and is of a yellow or greenish colour, and may even be streaked with blood. The prepuce begins to swell, and the end of the penis assumes the shape of a club or of a bell-clapper. The erections become painful, and the patient cannot bear to touch his organ or to allow it to be handled. If the inflammation be allowed to continue its course, gangrene sets in ; the prepuce usually sloughs away at the dorsum, thus forming a kind of button-hole, through which the sanious discharge accumulated under it finds an outlet. Subsequently the glans itself makes its way through this opening. In other cases it becomes impossible to bring the foreskin back into position, once it has been drawn back in order to clean the glans. This condition is called " paraphimosis."

The diagnosis is usually easy. The only difficult point to decide is whether a simultaneous inflammation of the urethra is present, or some other independent disease, such as vegetations, soft sores, syphilitic chancres, mucous plaques, epithelioma, etc.

The treatment of simple cases presents no difficulties. The glans and the balano-preputial fold are cleansed with a 0·1 per cent. solution of sublimate, and are then dusted freely with a powder like the following:

Bismuth subnitrate	25 grammes.
Powdered talc	25 ,,

The prepuce is then replaced, covered by the powder, which is renewed two or three times daily.

When the phimosis is complete—*i.e.*, when it is impossible to expose the glans—subpreputial irrigations with a syringe are indicated. They should be repeated several times per day. As irrigation fluid, a 0.05 per cent. solution of sublimate, or, better, a 0·1 per cent. solution of silver nitrate (or argyrol), is used. During the rest of the time it is well to apply hot fomentations to the penis. Once the acute inflammation has subsided, the operation of circumcision should be performed.[1]

If the balano-posthitis is complicated by paraphimosis, reduction may be attempted by exerting methodical pressure on the glans, or one may try hot fomentations. On the whole it is, however, infinitely preferable to free the constriction at once by splitting the prepuce in its whole thickness until the glans can be easily exposed. Later on, when the inflammation has subsided, the cosmetic effect can be improved by means of a circumcision.[2]

Dr. Roux of Lorient utilizes the following method for reducing rapidly a paraphimosis :

He seizes the glans with the right hand, grips it with the terminal phalanges, which are flexed upon the second phalanges, and then closes the hand tightly, the thumb being crossed over the other fingers, which are flexed. With the left hand the pressure of the right hand is reinforced. The penis is thus firmly compressed until the glans has disappeared, which event takes place in a minute or so. On opening the hand, the glans is decongested, and passes easily into the prepuce.

Professor Reclus facilitates the reduction by decongesting the glans

[1] It is often advisable to circumcise at once in order to prevent further havoc, such as extensive ulceration and destruction of the glans, or the formation of firm and hard adhesions between prepuce and glans. If done properly, the operation is perfectly successful, despite the suppuration present. Many dread operating on a very septic prepuce; this fear is exaggerated. The bad results in cases of this kind are nearly always due to a too extensive removal of skin and mucous membrane. One has to allow for the edema of the parts (A. F.).

[2] The most satisfactory way of dealing with a paraphimosis is immediate operation by Legueu's method, described in Marion (Georges), *Technique des Operations Courantes*, Paris (Maloine), 1904. I have done this operation, which is too little known, and not difficult, fourteen times, with excellent results. The relief is immediate, and the cosmetic effect good. To "slit up" first, and to circumcise subsequently, is an unnecessary procrastination (A. F.).

with cocain. The vaso-constrictive effect of this drug is obtained by applying a piece of cotton-wool which has been saturated with a solution of cocain.

Inguinal Adenitis.

Inguinal adenitis is commonly present in gonorrhea. When the lymphatic reaction is due to an inflammatory complication affecting the glans or prepuce—as is the case in phimosis or paraphimosis—the inguinal glands increase considerably, and often give rise to sufficient pain and discomfort to alarm the patient. One should in these cases pay less attention to the adenitis than to its cause, and should look for any ulcerations on the glans, on the prepuce, in the balano-preputial fold, and even about the anus.

The inguinal adenitis should be treated indirectly—namely, by treating these various lesions. It then very often subsides spontaneously without requiring any local treatment.

Suppuration of the inguinal glands is not common. When it occurs, it should be dealt with in the same manner in which other collections of pus are treated—namely, by a wide incision, followed by drainage and curettage.[1]

Even when neither balanitis nor phimosis is present, inguinal adenitis is much more common in gonorrhea than is usually believed. This inflammation of the inguinal lymphatic glands is, however, an insignificant reaction. The glands seldom reach the size of a bean, and give rise to no symptoms, so much so that most patients are unaware of their adenitis.

In itself this reaction of the inguinal lymphatics is of no consequence. I have often found them enlarged when Littre's glands in the anterior urethra were in a state of acute or chronic inflammation.

Inflammation of the Glands of the Anterior Urethra.

Littritis and Folliculitis.

The glands in the penile portion of the urethra—the glands of Littre—have already been described (*vide* p. 61). Their inflammation, which is called, according to its intensity, *littritis* or *folliculitis*, is by far the most common complication of gonorrhea, and seems to be caused chiefly by clumsy injections, such as injections given with a small syringe and urethro-

[1] I have not found these long incisions satisfactory. The edges of the wound generally become infected, and take a very long time to heal. Small incisions are infinitely preferable. They are quite sufficient, if one attends to the wound daily, keeps it open, and empties it. They heal quickly, and the cosmetic effect is excellent, as they leave an insignificant and almost invisible scar (A. F.).

vesical irrigations which fail to reach the bladder, or only enter it with difficulty.

As a rule, the patient does not know that he is suffering from littritis. This complication is nearly always painless, and unless a rebellious discharge accompanies it, he does not consult a specialist, who would "touch the spot."

The pathogeny of littritis and folliculitis is nowadays well known. The glands of Littre are invaded by the gonococcus, and suppuration takes place. After a short time their excretory ducts become obliterated, with the result that the secretions formed in the closed glandular pouch can no longer escape. With the retention the glands enlarge, and their walls become thickened. Palpation as directed above (*vide* p. 100) allows one to

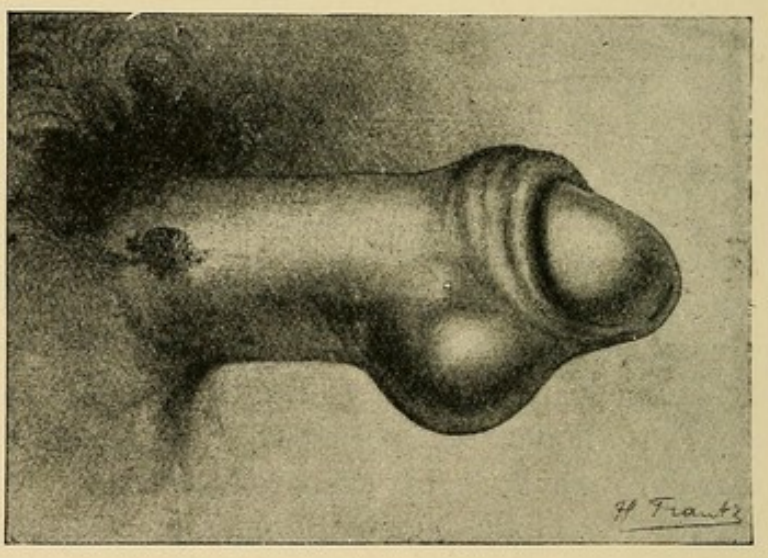

FIG. 126.—GONORRHEAL PERI-URETHRITIS OF GLANDULAR ORIGIN (Legueu.)

feel the inflamed glands as small characteristic nodules. When the inflammation does not extend beyond the gland wall, a simple littritis is present, and as a rule, a number of these glands are affected simultaneously in the penile portion.

If, on the other hand, the inflammation spreads to the periglandular cellular tissue, the volume of the inflamed gland may reach a considerable size; it may become as large as a cherry-stone, or even as a cherry or a hazelnut. One then speaks of "folliculitis." This condition is usually sufficiently obvious to attract the attention of the patient, who notices with horror a hard, round, or oval, movable swelling immediately under the skin which covers the under-surface of his penis. In the usual course of events these lesions, which are seldom painful, tend to open spontaneously on the skin. Fistulæ are thus formed which may last indefinitely, and even urinary fistulæ may develop, from which a few drops of urine dribble every

time the patient makes water ; or a peri-urethral cellulitis may supervene which gives rise to an abscess, and requires immediate incision.

It is highly desirable to prevent the formation of these sinuses and fistulæ under all circumstances, and therefore the treatment of littritis and folliculitis should be largely prophylactic. The patients should be warned against the dangers of clumsy injections and irrigations, and should be informed of their liability of producing these complications.

When the littritis is established, proper urethro-vesical irrigations should be instituted, and they should be combined later on with methodical gradual dilatation (*vide* Chapter XII.). As far as the penile urethra is concerned, this treatment should be persevered with until a high degree of dilatation has been reached.[1]

In the case of folliculitis this treatment may be given a trial. But as soon as the urethra has been sufficiently widened to admit an endoscopic tube of some size, an attempt should be made to incise the inflamed follicle through the urethroscopic tube with a knife. A typical case of this kind has been described on p. 171. In the last instance, when all these methods have failed, *surgical excision* of the follicle should be resorted to.

Cowperitis.

Although cowperitis is not a frequent complication of gonorrhea, it should always be looked for, because in most cases it escapes observation. Moreover, if the gonococci are localized in Cowper's glands, the disease is apt to last indefinitely, unless it be diagnosed and treated.

In most cases it is difficult to find a definite cause for the infection of these glands. It would, however, appear as if here, again, clumsy injections with a syringe or bad urethro-vesical irrigations were responsible.

The anatomy of Cowper's glands and their ducts, which has been so well studied by Hogge of Liège, explains the peculiar features of this localization of the gonococcus. Cowper's gland opens by means of a relatively very long and sinuous duct, which soon becomes occluded after the gonococcus has invaded it. The inflammation gradually reaches the glandular acini, and thus a closed cavity, filled with purulent material, is formed.

Cowperitis, which has been well studied by Lebreton,[3] usually supervenes during the third or fourth week of the attack of gonorrhea, and is

[1] When this fails, it becomes necessary to resort to endoscopic measures—electrolysis, cauterization, etc.; *vide* Chapter XII. (A. F.).

[2] Hogge, *Anatomie du Périnée*, VII. Sess. de l'Ass. Franç. d'Urologie, Paris, 1903, p. 480.

[3] Lebreton, *Contribution à l'Etude des Glandes Bulbo-Urétrales de et leurs Maladies* (Paris, Thesis, 1904).

more often unilateral than bilateral. Its beginning is perfectly painless, and escapes the notice of the patient. The specialist who is consulted for an obstinate and rebellious discharge, should always consider the possibility of an inflammation of Cowper's glands, and should examine them according to the indications laid down on p. 102.

When a small swelling is present on one side of the urethral bulb, the diagnosis of cowperitis is easy. But if the swelling is of a more diffuse character, the differential diagnosis between this condition and a urinary abscess is much more difficult. In fact, it is not rare to find a urinary abscess following upon a cowperitis, and it may very well be localized in its early stage to one side of the urethra. Later on the abscess reaches the middle line, and assumes characteristic features of its own. An abscess of the anal margin has also to be considered for purposes of differential diagnosis. The abscess last mentioned lies farther back, and extends farther to either side of the anus.

Clinically one meets with several varieties :

1. **Cowperitis with Permeable Duct.**—When the duct of Cowper's gland remains patent—and this is usually the case—the contents of the gland can be emptied by squeezing the organ between index and thumb. They thus find their way through the duct into the urethra, and thence to the outside. These cases are the favourable ones, and yield rapidly to a well-conducted massage treatment.

It is best to combine the massage with urethro-vesical irrigations with potassium permanganate until the urine collected in the first glass has become clear. The whole passage should then be dilated with curved steel sounds. In this way the bulb is widened out, and with it the ducts of Cowper's glands. Massage gives under these conditions its best results, as shown in the following two instances:

CASE 1.—GONORRHEAL COWPERITIS OF LONG STANDING TREATED BY MASSAGE OF THE GLAND AND DILATATION OF THE URETHRA ; CURE.

A man of thirty-four was sent to me in January, 1910, by Dr. Emery. He suffered from a copious discharge which contained gonococci, and had not yielded to three months' irrigations with potassium permanganate.

On examination, I found that the persistence of the discharge was due to a large, doughy, inflamed, and painful gland of Cowper, which yielded plenty of pus on massage. I at once resorted to massage of the gland, and to dilatation with curved sounds until No. 57 G was passed, although with some difficulty.

In June the urine collected in the first glass was still turbid and contained thick masses of filaments, and the massage removed a great quantity of heavy filaments from the gland. Considering the long duration of the illness, I feared that a tuberculous infection of the gland might be developing, and had the secretions which were massaged from the gland examined bacteriologically.

The immediate examination of the specimen and inoculations into guinea-pigs gave a completely negative result. I therefore continued the massage treatment ener-

getically, with the result that the patient when seen again, on September 19, 1910, had no trace of a discharge, that his urine was clear, and that the massage of the gland yielded no more filaments.

CASE 2.—GONORRHEAL COWPERITIS TREATED BY MASSAGE OF THE GLAND AND DILATATION OF THE URETHRA ; CURE.

A youth of twenty-nine was sent to me in February, 1909. He had a great deal of discharge, which contained a considerable number of gonococci. His right Cowper's gland was much enlarged and very painful.

Under glandular massage and irrigations with permanganate considerable improvement took place, but as soon as the irrigations were discontinued the discharge reappeared.

Professor Legueu was therefore consulted on March 27, 1909, as to the advisability of excising the gland. He was against the operation, and thus the same treatment was continued, and with the best results. It was necessary, in order to obtain a definite cure, to dilate up to No. 60 G with curved sounds, and then with Kollmann's curved dilator up to No. 37. Through this treatment Cowper's gland became again insensitive, and a definite cure was obtained. When I saw the patient again a year later, he had no trace of any disease; his urine was perfectly normal. He had married, and no untoward result had followed, neither for him nor for his wife.

2. **Cowperitis with Obstruction of the Duct.**—In cases of this kind it is impossible to empty the contents of the inflamed gland into the urethra by massage, however well it may be done. They are therefore very obstinate and difficult to cure.

Several varieties are met with : either the cowperitis takes an acute and rapid course or it assumes a more torpid form.

In the first instance the patient soon notices a heavy feeling and pain about his perineum. In a short time a swelling of the size of a cherry appears, which rapidly suppurates and opens spontaneously on the skin. The treatment of these cases is simple: an immediate incision is required in order to evacuate the pus. The prognosis is, however, not favourable. A fistulous tract often remains, which may develop into a urinary fistula—a condition which is always troublesome and difficult to cure.

In the torpid form no discharge is visible as long as the urethra is irrigated and the gland massaged. But as soon as this treatment is discontinued, the discharge reappears with an exasperating tenacity.

In these cases, in which glandular massage, combined or not with dilatation of the urethra by means of curved metal sounds, is of no avail, Cowper's gland should be attacked with the knife. One should not be content with incising it, but should resort to extirpation, as in the case about to be described :

A youth of twenty-two and a half was sent to me in November, 1906, by Dr. Cheurlot. He was suffering from a copious discharge which contained gonococci. The local examination showed the presence of a small swelling to the left side of the bulb, which was of the size of a cherry and was very tender.

Dilatation and massage were resorted to, and after each visit the patient showed considerable improvement. However, as soon as this treatment was left off, the discharge reappeared.

These perpetual recurrences decided me to advise the complete removal of the diseased Cowper's gland. Professor Segond performed the operation, which was followed by a complete cure.

This extirpation treatment appears to be the best therapy for this condition, and is frequently indicated, as one has to protect the patients against a tuberculous infection of Cowper's gland, which not infrequently supervenes when the gonorrheal infection is subsiding.

Primary tuberculosis of Cowper's gland is well known to occur since the researches of Englisch,[1] Tapret,[2] Couillard and Després,[3] Hartmann and Lecène,[4] and supervenes in the following manner: The gonococcus invades Cowper's gland, damages it, and lessens its resistance. The tubercle bacillus then grafts itself on the weakened gland, and overpowers it.

The treatment should be removal of the gland. For the operation the patient is put into the lithotomy position, and a curved incision is made from one tuberosity of the ischium to the other, the convexity being directed forwards—*i.e.*, the same incision as for perineal prostatectomy. When the most anterior fibres of the anal sphincter have been divided, the rectum is separated and drawn backwards. By means of retractors one can then bring the membranous urethra into view, and one follows it downwards along its sides to the angle formed by the bulb and the urethra, in which Cowper's gland lies. In order to have a free access to it, the superficial transversus perinei muscle may be divided. If perineal fistulæ have supervened owing to a protracted cowperitis, they should be curetted or destroyed by means of the thermo-cautery. It is essential to remove the gland as completely as possible, and also any diverticula which may be present; otherwise the wound will not heal, and everlasting fistulæ are apt to follow.

Prostatitis.

The prostate is liable to two different forms of inflammation if it is infected during an attack of gonorrhea. Its inflammation may be either *acute* or *chronic*.

[1] Englisch, "Über Tuberkulöse Urethritis and Peri-Urethritis : Zur Extirpation der Cowperschen Drüsen," reference in *Centralb. f. Chir.*, 1891, p. 819, and *Centralb. f. Harnkr.*, 1894, p. 371.

[2] Tapret, "Étude sur la Tuberculose Urinaire," *Arch. Gén. de Méd.*, Paris, 1878, vol. i., p. 513, and vol. ii., pp. 57 and 405.

[3] Couillard, *Contribution à l'Étude des Affections de la Glande de Cowper* (Paris, Thesis, 1876), p. 31.

[4] H. Hartmann and Lecène, "La Tuberculose de la Glande de Cowper," in *Travaux de Chirurgie Anatomique*, Paris (Steinheil), 1903, p. 118.

Acute Prostatitis.—According to Montagnin (1885) and Eraud (1886), 70 per cent. of all cases of gonorrhea suffer from prostatitis. The chief cause of this complication is to be found in clumsy urethral injections, which are always harmful. Other causes are sexual excess, masturbation, fatigue, excessive exercise, and long journeys by carriage or by rail.

If the inflammation is confined to the crypts of the gland, and if the prostatic parenchyma remains healthy, one has to deal with *glandular prostatitis*, which is a mild form. On other occasions the excretory ducts of the infected glandules are obliterated, and the latter become distended. This condition, which is frequently accompanied by a marked periglandular inflammation, is called *phlegmonous interstitial* or *parenchymatous prostatitis*, and usually leads to the formation of an acute prostatic abscess. An abscess of this kind usually bursts into the urethra, but it may also open into the rectum or some other neighbouring structure.[1] It is not infrequently accompanied by a periprostatitis *by diffusion*, as the inflammation spreads into the prerectal cellular tissue. Large collections of pus pointing towards the perineum and the pelvis are then likely to be found. The infection of the periprostatic cellular tissue can also be brought on by a direct spreading along the contiguous tissues or through the blood-stream or through the lymphatics.

Glandular prostatitis is asymptomatic—hence the necessity of looking out for it in every case of gonorrhea, and of massaging the prostate.

In *phlegmonous prostatitis* general symptoms are present, such as fever, which may rise to 39°, 40°, and even 41° C.; tenesmus and dysuria, which are often highly troublesome. Retention of urine, owing to the swelling of the prostate, is not rare. In these cases palpation *per rectum* allows one to make the diagnosis by showing the prostate to be enlarged and painful. The passing of a catheter is always very unpleasant in these cases, and not without danger. One should reserve this measure for very urgent cases in which the retention is complete.

The treatment differs according to the type of lesion present. The glandular form is treated by means of permanganate irrigations combined with prostatic massage.

The treatment of phlegmonous prostatitis depends on the stage of the illness. In the beginning, before pus has collected, an antiphlogistic treatment is indicated, such as rest in bed, soothing drinks, suppositories containing morphia and belladonna, hot rectal irrigations, etc. Once the pus has collected, it should be given an outlet.

[1] In statistics collected by Segond (1880), the prostatic abscesses opened sixty-four times into the urethra; forty-three times into the rectum; fifteen times in the perineum; eight times into the ischio-rectal fossa; three times into the groin; twice through the obturator foramen; once at the umbilicus; once through the great sacro-sciatic notch; once at the false ribs; once into the peritoneum; once into the cavity of Retzius (A. F.).

The question how one should deal with acute prostatic abscesses has been discussed in 1907 at the meeting of the French Urological Association, and Dr. Oraison's report shows that there are three methods of unequal value for coping with this affection :

1. The opening of the abscess from within the urethra by massaging the gland and repeated lavage is only feasible for very small abscesses which lie immediately under the surface of the urethral mucosa.

2. The opening of the abscess *per rectum* gives excellent results in most cases. Oraison has a preference for this method, because it is very simple, safe, and rapid. One uses for it a ball-pointed knife.

3. The opening of the abscess by the perineal route is more complicated, and is more apt to be followed by untoward results, such as the formation of a fistula or injury to the ejaculatory ducts. But, as has been well pointed out by Professor Albarran, it has the great advantage of being the cleanest method, and of allowing one to deal thoroughly with all the various collections of pus which may be present, and of thus insuring a complete cure.

This last method is evidently the most suitable one for large prostatic abscesses which require to be opened up as freely as possible once they are diagnosed.

Chronic Prostatitis.—Chronic prostatitis, of which Le Für has given an excellent account, is one of the commonest complications of gonorrhea. Its onset is usually insidious, and therefore examination and massage of the prostate should not be omitted in any case of gonorrhea (*vide* p. 104).

The presence of a chronic inflammation of the prostate is always to be expected when the discharge is scanty, and when the third and fourth glasses contain filaments. The diagnosis is clinched by rectal palpation and massage of the gland, as described above (*vide* p. 105).

The treatment of chronic prostatitis comprises two main phases:

1. In the beginning, when all four glasses are turbid, when the gland is still very tender on rectal palpation, and yields a considerable amount of purulent débris on massage, the only direct treatment admissible is massage of the gland (*vide* Chapter XII.), combined with hot permanganate irrigations. At the same time, an antiphlogistic treatment should be instituted, consisting of hot rectal injections, hot fomentations on the perineum, plenty of fluid by the mouth, urotropin internally, etc.

Very often good results are obtained from one of the following suppositories:

1.	Mercury ointment	0·05 gramme.
	Cocoa butter	q.s. for a suppository.
2.	Potassium iodide	0·50 gramme.
	Cocoa butter	q.s. for a suppository.
3.	Ichthyol	0·10 gramme.
	Extract of belladonna	0·015 ,,
	Cocoa butter	q.s. for a suppository.

2. When the urine has become clear, the massage and the irrigations should be combined with dilatation by means of curved steel sounds. This latter treatment, however, requires to be carried out with great caution, as it is apt to set up an orchitis if done carelessly. Gentle and methodical dilatations usually lead to a very rapid improvement. Once No. 60 G has been passed, it is advisable to continue the dilatation by means of Frank's irrigating dilator or a similar instrument.

Lastly, in order to make certain that the patient is cured, and that no trace of inflammation is left in the prostatic glands and in the urethra, urethroscopy of the posterior urethra should be resorted to, and appropriate local interventions should be carried out if necessary.

It is indispensable to submit the patients who are suffering from chronic prostatitis, to the control of the urethroscope. The massage of the gland *per rectum* improves the posterior part of the gland, but it has no effect on the portion which is situated in front of the urethra, and it is also inadequate when the orifices of the prostatic glandules are obstructed. Where it fails in combination with dilatation, endo-urethral interventions have to be resorted to in order to obtain a cure.

The urethroscope allows one to diagnose the openings through which the pus oozes, and it enables one to enlarge and to lay open the fistulæ present by means of the cautery, and to insure a proper drainage.

The portions of the prostate which most often require interventions of this nature, are situated on the lower wall behind the verumontanum, in the region of the prostatic fossette, and in the lateral grooves to either side of the verumontanum, which are a favourite site for the openings of fistulæ.

By urethroscoping the posterior urethra and massaging the prostate *per rectum* simultaneously, the openings through which the pus escapes, can be ascertained by sight. One then brings the point of the electric cautery up to them, and enlarges them as much as possible.

When several openings have been treated in this way, it happens that one big hole is formed, leading to a vast cavity, which is now easily accessible and can be disinfected by swabbing it with mounted swabs which are saturated with some antiseptic solution.

A most interesting instance was a man of forty-seven, who had had gonorrhea twenty-two years previously, when he was twenty-five. His urine was turbid, and contained a great amount of heavy purulent flakes, and by massage a good deal of pus could be squeezed out of the prostate.

With the urethroscope one could see that the prostatic fossette was converted into a regular sponge, which was drenched with pus. Of special importance was the fact that pus oozed out of an orifice situated in the groove on the right side of the verumontanum, when the finger in the rectum

pressed on the left lobe of the prostate. I thus had to conclude that the parenchyma of the prostate was riddled with fistulous tracts. A series of punctures with the cautery was made in a transverse direction, and thus a regular trench was formed behind the verumontanum. The exposed cavity was gradually enlarged and cleansed with antiseptics. Once it was properly laid open, the pus became gradually less thick, the secretions were more fluid, and the urine became clearer every day.

The therapeutic result was brilliant, and shows what can be done by endo-urethral interventions in cases of prostatic inflammation which seemed to be incurable.[1]

Gonorrheal Inflammation of the Testicle.

The term "gonorrheal orchitis," so frequently used, is a bad one, for in most cases the epididymis alone is involved. It is therefore better to speak of epididymitis.

This extremely frequent complication is met with in about 25 per cent. of all cases. It comes on during the third, fourth, or fifth week, and is directly due to the gonococcus, although the presence of this organism has been seldom demonstrated.

Walter Collan[2] failed to find any gonococci in the pus withdrawn by puncture from an epididymitis which complicated a gonorrhea of two and a half months' standing, when he examined it under the microscope. But he obtained a positive result with his cultures on ascites-agar which showed several typical colonies.

Similar observations had been published previously by Routier and by Grosz.

The first symptom of epididymitis is usually a heavy feeling about the scrotum, and on palpation the tail of the epididymis is found to be somewhat enlarged. The pain which comes on subsequently, is often so acute as to make the patient moan and shriek. As a rule, it lasts three to five days. It then diminishes in intensity, and disappears fairly rapidly. The testicle is always swollen; the skin over it is red, hot, and tense. Behind the testicle which has retained its peculiar sensation, a hard mass is to be felt which is very tender on pressure. A certain degree of hydrocele is very commonly present. The general health is always affected, and there is fever, rising to 100° or 102° F., which lasts about four to five days, and then gradually disappears. The duration of the illness is from two to three weeks on the

[1] *Vide* also in this connection the interesting case published by Dr. Desvignes of Limoges ("De la Necessité de Uréthroscopie dans le Diagnostic de l'Urétrite Postérieure Chronique," in *La Clinique*, 1911).

[2] Walter Collan, *Wien. Klin. Woch.*, 1897, No. 48, p. 1061.

average. As a rule, the inflammation subsides without leaving any trace; occasionally, however, a nodule remains in the tail of the epididymis, or the other testicle may become infected. The prognosis is good, and a cure is usually observed after two to three weeks. The dark point is the functional trouble which may follow. In cases of bilateral epididymitis the spermatozoa may disappear completely, and thus render the patient unfit to beget children.

Medical Treatment of Gonorrheal Epididymitis.—Complete rest in bed and the raising of the scrotum to the level of the abdomen are essential. A board fitted with a suitable notch is one of the best appliances for the purpose. It is also well to make use of soothing local measures, such as hot fomentations. The application of an ice-bag to the parts is one of the best means for the relief of the pain, but care should be taken to surround it by flannel or by wool before putting it on the parts.

Hot applications are also of value, and it is a good plan to use them in alternation with the ice-bag. This combination is most effective in reducing the pain. For the continuous application of heat to the scrotum I have devised a small sachet which is made of a fabric which conducts electricity well. This apparatus is connected through a resistance with the main, and gives an even heat to the scrotum.

The pain diminishes markedly and rapidly under this treatment, but the duration of the illness is not shortened, nor is the fever influenced in any way.

Bettmann[1] treats gonorrheal epididymitis by means of salicylates. He pours 6 or 8 c.c. of a mixture, composed of 1 part of methyl salicylate and 2 parts of olive-oil, on a compress made of ordinary wool, and applies it to the scrotum. The latter and its dressings are then covered with india-rubber paper and put into a well-padded suspensory bandage. Firm pressure is made on the scrotum in this way.

Picot[2] advises the use of sodium salicylate in the dose of 4 grammes per day, taken in four cachets of 1 gramme each. This treatment is persevered with for eight to ten days, during which the patient is without pain.

Sodium salicylate seems thus to be an excellent remedy for gonorrheal epididymitis.

Du Castel[3] used methyl chloride, which he sprayed daily upon the diseased part of the scrotum, or which he applied by means of a piece of wool impregnated with it. Ethyl chloride may be used instead.

[1] Bettmann, *Münch. Med. Woch.*, 1899, No. 38. p. 1233.
[2] Picot, Paris, Thesis, 1899.
[3] Du Castel, *Soc. de Thérap.*, January 12, 1898.

Professor Petrini Galatz[1] recommends the use of the following ointments in epididymitis:

Vaseline	30 grammes.
Ichthyol	4 ,,
Guaiacol	2 ,,

Or—

Lead iodide	2 grammes.
Cold cream	30 ,,

The indurated nodules of epididymitis have been treated by means of so-called "melting ointments," which probably owe their name to the fact that they melt when they come into contact with the skin (Fournier). They have no effect on the inflammation.

Surgical Treatment of Acute Gonorrheal Epididymitis.—Of late, the surgical treatment of acute gonorrheal epididymitis, which was once upon a time recommended by Pirogoff and Vidal de Cassis, has again been advocated.

Baermann[2] advises the *puncture of the epididymis* in acute epididymitis of gonorrheal origin; the local pain and the feeling of tension disappear rapidly and permanently. The fever is soon checked, and subsides completely. This intervention is often of the greatest value if done properly. So far puncture of the epididymis has not given rise to any accidents; its chief disadvantage is that it is painful.

Dr. Bazet[3] of San Francisco makes a practice of treating acute epididymitis by means of *epididymotomy*. He incises the cavity of the epididymis by an incision which is about an inch long, and runs parallel with the axis of the organ. If any pus is present, he punctures the various nodules, and stitches the walls of the epididymis to the skin. In a week the wound is healed, and the patient is allowed to get up some time between the fourth and seventh day.

The treatment of epididymitis by means of *aspiratory puncture*[4] is a modification of the simple puncture by means of the knife. Dr. Ernst[5] uses a sterilized syringe with a very sharp needle. He thrusts the needle through the skin of the scrotum into the substance of the epididymis as far as $\frac{1}{2}$ to $\frac{2}{3}$ inch, and then withdraws it, gently aspirating at the same time. This little operation is carried out without any anesthetic.

As a rule, very little fluid is withdrawn. The effect of the aspiration becomes manifest by an almost immediate relief of pain, and within twenty-four hours the swelling of the epididymis has gone down considerably.

[1] Petrini Galatz, *Presa Medicala Romana*, June 1, 1902, pp. 161, 166.
[2] *Presse Médicale*, 1903, p. 730.
[3] Bazet, American Urological Association, January 16, 1906.
[4] *Jour. de Méd. et de Chir. Prat.*, May 10, 1910, p. 349, No. 22,850.
[5] Ernst, *Berl. Klin. Woch.*, March 15, 1909.

The aspiratory puncture eases the sufferings of the patients so promptly, and shortens the course of the infection to such an extent, that it may be recommended as the most suitable treatment for hospital practice.

William Belfield[1] has conceived a prophylactic treatment which is intended to safeguard against epididymitis and the resulting obstruction of the vas deferens. He exposes this structure, under local anesthesia, through an incision about ½ inch in length, and opens it along its axis. He then introduces into its lumen the blunt needle of a hypodermic syringe, and injects some medicated fluid, which runs through the vas into the seminal vesicle. At each end of the incision a piece of fishing-gut is passed into the duct about ¼ inch, and brought again to the skin, where it is tied loosely. This knot serves as guide for the needle when the daily irrigations are given, and preserves the lumen of the duct during cicatrization.

Belfield claims to have treated six cases in this fashion with the greatest success.

Dr. Hagner[2] describes his own operative procedure as follows:[3] An incision 2½ to 4 inches long is made through the various layers of the scrotum and through the tunica vaginalis at the junction of testicle and epididymis. The organ is brought to the surface, and a series of punctures are made in the epididymis. If pus escapes from one of these, the hole is immediately enlarged, a small drainage-tube is inserted, and the purulent cavity is washed with a 1 : 1,000 solution of perchloride of mercury, followed by normal saline. The wound in the scrotum is then sewn up except at its lower angle, where a gauze drain is inserted.

The good results obtained by this method have led Dr. Hagner to formulate the following conclusions:

1. The surgical treatment of acute gonorrheal epididymitis is rational and without danger.

2. The inflammation subsides much more rapidly under this treatment than under any other therapy.

3. The immediate effect of the intervention is excellent as far as pain is concerned.

4. The chances of obliteration of the epididymis and of subsequent atrophy of the testicle are lessened.

Dr. Paul Asch,[4] of Strassburg, advocates *injections of electrargol* into the lesions of the epididymis, thus following Hamonic's example.[5]

[1] William Belfield of Chicago, Urological Society, October 25, 1906.

[2] Hagner, "The Operative Treatment of Gonorrheal Epididymitis," *Medical Record*, October 13, 1906, p. 565.

[3] *Vide* Kendirdjy, *La Clinique*, February 15, 1907.

[4] Paul Asch, *Zeits. f. Urol.*, vol. v., 1911, p. 87.

[5] Hamonic, *Ass. Franç. d'Urol.*, 1908, p. 232.

Asch's technique is simple: The skin is disinfected with tincture of iodine, and 1 to 2 c.c. of electrargol are injected into the inflamed epididymis by means of a syringe fitted with a very fine needle. If necessary, this treatment should be repeated once or twice at intervals of twenty-four hours. More than three injections are seldom required.

The results obtained with this treatment are the following: In very early cases in which the neighbouring parts were not infiltrated, one injection was usually sufficient (fifteen times out of eighteen) to abort the attack, and a *restitutio ad integrum* took place within one to three days. No indurations are left behind, and the testicle retains its function. This fact was proved by five cases in which the other epididymis had been obliterated by a previous illness.

In three out of the eighteen cases a second injection was necessary before a complete cure could be obtained. When the soft parts are infiltrated, two or three—seldom more—injections are required. The cure takes place in three to eight days. Sometimes, however, fully two to three weeks elapse before the resorption is complete, and it should be assisted in these cases by fomentations and hot sitz-baths. In all instances the resolution was ultimately complete, and, as far as one could tell, the functional character of the testis was normal.

The only drawback to this method is a temporary increase of tension and of pain, especially when infiltration is present. But in a few hours this discomfort is followed by a feeling of relief.

Collargol is less satisfactory than electrargol; it appears to be less homogeneous, less pure, and less endowed with catalytic properties.

The *electrargol* treatment is held by Asch to be the treatment of choice for acute epididymitis. The sooner the injection is given, the more rapid is the cure. In quite early cases the electrargol treatment is an abortive measure, but even when the surrounding tissues are infiltrated and edematous, a complete anatomical and physiological cure may be expected from this treatment.

One should not forget that the effect, the epididymitis, is not the only condition which requires treatment in these cases. Its cause—the inflammation of the posterior urethra—also demands attention. During the acute stage it is therefore right to prescribe plenty of fluid, and to start irrigations with a solution of potassium permanganate, 1 : 4,000, as soon as the fever has subsided. In this way excellent results are obtained, and the period of treatment is much shortened.

Moreover, it is necessary in all cases of epididymitis to examine the condition of the seminal vesicles. In most cases these organs are inflamed, and, once the epididymo-orchitis is subsiding, it is advisable to combine the irrigations with massage of the vesicles. In this way the resolution

is more rapid, and the nodules which so frequently follow upon an acute epididymitis disappear much more quickly.

Sterility Supervening upon Double Epididymo-Orchitis.—When both testicles have been involved in the gonorrheal inflammation, indurated nodules may persist in the tail of the epididymis for a long time—often many months, or even years—after the inflammation has subsided and passed off. They consist of fibrous tissue formed within and around the canal of the epididymis, and may constrict the cavity of this organ to such an extent that the testicle is shut off from the seminal vesicle. The epididymis is thus obstructed, and it is easy to understand that the spermatozoa can no longer pass, and are wanting in the sperma ejaculated. Experience, however, shows that this obliteration does not always take place, not even in cases of double epididymitis. When one meets with instances of this kind, one should, therefore, not be too rash in proclaimimg their complete sterility, not even if a microscopic examination of the ejaculated material seems to corroborate this view. One single microscopic examination of this kind is quite inadequate.

It is only natural that attempts should have been made to overcome the obliteration of the sperm channel by means of a plastic operation, and for this purpose one has advocated to exclude the constricting fibrous node in the epididymis by anastomosing the body of Highmore with the vas deferens.

Unfortunately, the practical results obtained do not appear to come up to the expectations founded on this theoretically hopeful and sound measure, as one of my cases shows :—

Double Orchitis; Absence of Spermatozoa; Unilateral Anastomosis of the Vas Deferens to the Body of Highmore; Operative Success, but Complete and Permanent Absence of Spermatozoa.

A man of thirty-four acquired an attack of gonorrhea towards the end of 1904, which was complicated by prostatitis and double orchitis. In 1906 all discharge had disappeared, but there were two very hard nodules left in each epididymis. On two occasions examination of the sperma showed total absence of spermatozoa, and I therefore sent him to Professor Pierre Delbet, at the Laennec Hospital, who anastomosed the right vas to the right body of Highmore. The operation was completely successful, and the patient left hospital at an early date.

When I saw the patient again, three years later, the testicle which had been operated on was quite smooth and regular, and of normal shape and size. The left testicle, on the other hand, which had not been operated on, still presented a big induration at the epididymis. Examination of the sperma showed no trace of any spermatozoa.

One thus had to conclude that, despite a successful operation, the spermatozoa did not reappear in the sperma within three years.

However, it would hardly be fair to condemn the operation on the

strength of this single unsuccessful case. It is quite possible that a large material would yield a certain number of successes.

One should, however, not forget that in cases of double orchitis the prostate and the seminal vesicles are chronically inflamed as well as the epididymis. It is therefore very difficult to tell exactly to what extent each of these various organs is responsible for the sterility. A chronic inflammation of the vas and of the prostate may very well alter their secretions sufficiently to render them an unsuitable medium for the spermatozoa.

Gonorrheal Vesiculitis (Spermato-Cystitis).

Spermato-cystitis is a common complication of gonorrhea. It may be unilateral or bilateral, and is always a tedious and serious complaint which cannot be cured easily.

The diagnosis of spermato-cystitis is relatively seldom made, considering the commonness of this affection. The reason of this is to be found in the vagueness of the symptoms. It is therefore always necessary to explore the seminal vesicles in cases of gonorrhea.

Its causation is somewhat obscure. There is, however, no doubt that intercourse during an acute attack of gonorrhea is a chief etiological factor.

As a rule, vesiculitis is accompanied by a trifling discharge. Very often there is nothing but a little moisture about the meatus, or a drop in the morning, and in some cases there is no discharge at all. There may be some vague pains about the perineum or the lower abdomen or the loins. They are usually more marked during defecation, and radiate along the urethra, the glans, the testicles, and sometimes also to the kidneys. They may assume the character of "colic" (vesicular colic), and be mistaken for an attack of appendicitis or of renal or ureteric colic. Reliquet[1] studied them long ago, and found them to be cramp-like, and to start in the deep part of the urethra, from where they radiate along the passage to the glans, and also backwards to the anus. This vesicular colic he considered to be due to a mechanical obstruction in one or both ejaculatory ducts, and to be absolutely comparable with renal colic.

The changes in the generative functions are of great importance. Painful erections and painful pollutions are sometimes complained of, or the ejaculation is premature. "The diseased seminal vesicle expels the semen in the same way as an inflamed bladder gets rid of its urine" (Guiard). Others' again, become impotent. The pathological changes in the seminal vesicles and in their excretory ducts may bring about sterility.

Occasionally the sperma is blood-stained. This condition, which is

[1] Reliquet, *Coliques Spermatiques*, Paris, 1880.

called "hemospermia," is only characteristic for a lesion of the seminal vesicles if sperma and blood are *thoroughly mixed*. One should bear this in mind, as a urethral ulcer may cause a little bleeding when ejaculation takes place. In spermato-cystitic hemospermia the semen is usually yellowish and "rusty." When this symptom is definite, it becomes just as important as the rusty sputum in pneumonia. When the blood is very abundant, and has been for some time in the vesicles, the colour is darker, and may be as black as ink.

The examination of the urine, which should always be passed into four glasses, enables one often to make a provisional diagnosis of vesiculitis. If the urethral discharge ceases after a series of urethro-vesical irrigations, and if, despite the very small amount of oozing still present, the urine continues to be uniformly turbid in the four glasses, a vesiculitis is probable, and a local examination is indicated.

Frequency of micturition is also not uncommon. Some patients have to make water every fifteen or thirty minutes. Occasionally there is also vesical pain when the bladder is full or during the act of micturition.

Phosphaturia is generally present, but it is not due to a disturbance of the functions of the kidneys. It owes its presence solely to the condition of the seminal vesicles, as is easily shown. When the patient makes water into four glasses, there is a considerable difference between the urine in the first glass and the remainder. The first glass is turbid, whilst the others are clear. This phosphaturia is thus simply due to the fact that a few drops of the vesicular secretion find their way into the posterior urethra, and carry phosphates with them, which the initial flow of urine washes away into the first glass.

Acute gonorrheal vesiculitis is often accompanied by marked general symptoms. High fever is by no means rare, especially if a digital exploration has been carried out during the acute or hyperacute stage. One then usually notes general malaise, pallor, fatigue, and loss of appetite.

The diagnosis can only be made by examining the vesicles *per rectum*, and for this purpose the patient should be placed in the position described on p. 106. The horizontal position is insufficient.

The finger is deeply introduced into the rectum. One seeks and palpates the lobes of the prostate, and then feels above them the two seminal vesicles. In health they are insensitive, and almost imperceptible to the touch; but when they are inflamed, the digital palpation is horribly painful, and may cause the patient to faint. The vesicles are felt as elongated, more or less large masses, which run upwards and outwards above the horns of the prostate. One cannot insist too strongly upon the necessity of palpating very gently, especially when the inflammation is acute, on account of the violent attacks of fever which may supervene.

One has proposed to resort to puncture of the vesicles for the diagnosis of spermato-cystitis. This exploration can be carried out through the rectum or through the perineum.

Exploratory puncture per rectum is easy. One passes the needle into the terminal gut after having introduced a speculum, or simply under the guidance of the finger. The danger of perforating the bladder is not as great as one might think, providing one holds the needle in the direction of the gut wall, and not at a right angle to it. A fistula between the punctured vesicle and the rectum is, however, apt to supervene, and therefore this operation cannot be recommended.

The *perineal route* is preferable. One makes an incision at a point which is 3 centimetres in front of the anus and 3 centimetres to one side of the median raphé, traverses the fat of the ischio-rectal fossa, and passes along the side of the prostate. By putting a finger into the rectum, one can guide the direction of the needle more easily. In this way the needle enters the seminal vesicle immediately. This method is practically free from risk, and it allows one, if one has withdrawn pus from the vesicle, to utilize the exploratory needle as a director, and to perform a more complete operation.

The prognosis should be a guarded one. In many cases the course of a spermato-cystitis is benign, but this is not always so.

An abscess of the seminal vesicle may perforate and discharge its contents into one of the neighbouring body cavities. Unfortunately, it bursts not infrequently into the peritoneal sac, and sets up a fatal peritonitis.[1] Kocher has published several cases of this kind.[2]

Opening into the rectum is less common. Vadja has published an example.

As a rule, these abscesses burst into the urethra or into the bladder. This took place in one of Wildbolz's cases.

The relative thinness of their walls and the richness of their vascular supply explain readily why a spermato-cystitis is so dangerous. In men who are suffering from a generalized gonococcal infection, the starting-point may be taken to be in the seminal vesicles. In this respect it would be interesting to examine systematically a series of cases of gonorrheal rheumatism, for instance, and to ascertain if an inflammation of their seminal vesicles was the starting-point of the general infection. I am convinced that this is so, as in practically every case which has come under my notice or my care a gonorrheal spermato-cystitis preceded the systemic complications (rheumatism, myelitis, etc.). One should therefore always consider the possi-

[1] Wildbolz, *Ann. des Mal. des Org. Génito-Urin.*, 1903, p. 1521.

[2] Kocher, "Die Krankheiten der Männl. Geschlechtsorgane," *Deutsch. Chirurg.*, 1887.

bility of a general infection supervening when a seminal vesicle is the seat of a gonorrheal inflammation.

Amongst the other complications observed in the course of a protracted gonorrheal vesiculitis, attacks of pain along the ureters should be mentioned. Picker was one of the first to point out their occurrence in the course of spermato-cystitis. They are often very severe, and simulate renal colic, so much so that a wrong diagnosis is very apt to be made, unless one is acquainted with the history of the case. The origin of these pains is to be found in the compression of a portion of the ureter, either directly through the inflamed vesicle, or—and this is more often the case—through the perivesiculitis which is commonly present in this condition. The lumen of the ureter may become partly obliterated, and the resulting obstruction to the flow of urine may give rise to the pain of renal tension which is observed in renal colic.

Spermato-cystitis is very generally accompanied by an inflammation of the vas deferens. This deferentitis often leads to an irritation of the peritoneum.[1] Pain in the lower abdomen, which finally becomes generalized all over the peritoneal cavity, retching, nausea, vomiting, increase in the pulse-rate, and rapid respiration, are then noted, so much so that the diagnosis of appendicitis is easily made.[2] On examination, the vas deferens is found to be enlarged; it often resembles a thick hard cylinder, which projects through the superficial inguinal ring.

Lastly, vesiculitis and epididymitis frequently go together, and it is well to inform patients, who are suffering from an inflammation of their vesicles, of this fact.

[1] The gravity of an acute inflammation of the deep sexual organs is mainly dependent on their relation to the peritoneum.

The upper part of the seminal vesicles is in relation with the peritoneum, and the vas deferens runs under its cover during a considerable part of its course. Hence peritoneal irritation, and even inflammation, are frequently observed when these structures are acutely inflamed. In severe acute epididymitis, for instance, the vas is always implicated, and through it the peritoneum. For this reason all the alarming symptoms which are observed in that illness are peritoneal, and not testicular (pain most marked in the inguinal region and lower abdomen, muscular defence, rapid pulse, constipation, etc.). It is, thus, not the privilege of the fair sex to suffer from pelvic peritonitis. The rôle played by the vas and the seminal vesicles is absolutely comparable to that of the Fallopian tubes. The male is only in so far better off as his genital gland is situated at a considerable distance from the peritoneum. In cryptorchids who are unfortunate enough to develop a gonorrheal epididymitis in their intra-abdominal testicle, the analogy with the female is absolutely complete.

As a rule, this pelvic peritonitis in the male terminates by resolution, but cases like those of Kocher and Wildbolz mentioned above bring home its dangers and its importance (A. F.).

[2] Le Für, "Déférentite et Appendicite," *Bull. de Soc. de l'Internat*, January, 1911, No. 1, p. 22.

In all cases the course of a spermato-cystitis is a protracted one ; its minimum duration is two months, and it often lasts longer.

The treatment naturally varies whether the inflammation is acute or chronic.

In acute gonorrheal spermato-cystitis local interventions should be avoided. Not only are they certain to give rise to atrocious pain, but they are also apt to bring about a systemic infection. Massage of acutely inflamed vesicles is to be condemned. The best treatment appears to be rest in bed, the intake of large quantities of fluid, urethro-vesical irrigations with weak permanganate, and hot rectal irrigations, which are especially valuable.

The chronic cases are treated by means of massage of the seminal vesicle. This therapy is carried out after the bladder has been filled with fluid from an irrigator. If done efficiently, it frees the affected organ from its purulent débris, which is subsequently washed away as the patient passes the permanganate within his bladder.

In certain instances the vesicles are situated at a very high level, and are beyond the reach of the finger. Electric massage, carried out with Feleki's instrument, or a similar apparatus, can then be resorted to with advantage.[1] This massage treatment should be continued until the urine has become clear. When this has been achieved, dilatation should be resorted to, using Frank's irrigating dilator towards the finish of the treatment. Lastly, urethroscopic examinations should be made, in order to verify the condition of the verumontanum and of the ejaculatory ducts.

A vesiculitis can only be considered to be cured when no indurations are left, when all pain in the region of the vesicles has disappeared, and when no longer any purulent débris comes away on massage.

Operative Treatment of Spermato-Cystitis.—Unfortunately, there are cases in which the above measures fail. It is then necessary to consider the advisability of a surgical intervention.[2] These operations have so far been done chiefly by American surgeons, who have proposed the following operations:

1. Vesiculotomy (Fuller).
2. Vesiculectomy (Brandsford Lewis).
3. Vasotomy (Belfield).

The *method last mentioned* owes its existence to Belfield of Chicago, who studied in 1905 the effects of injections into the seminal vesicles on the cadaver. He injected coloured fluids or an emulsion of iodoform and

[1] Feleki has also devised a special apparatus for heating the seminal vesicles, which consists of two portions through which a circulation of hot water is maintained. The results of this treatment have not yet been published.

[2] *Vide* p. 222 (A. F.).

glycerine into the vas deferens, and studied their penetration. He found it possible to fill the whole genital apparatus in this way. His technique consists in exposing the vas through a small incision under local anesthesia, separating it, and making a small incision into it. Through this opening the cannula of a syringe containing protargol, argyrol, or 5 per cent. collargol, is introduced, and the drug is injected into the seminal vesicles.

Belfield uses these collargol injections, not only for therapeutic purposes, but also for rendering the seminal vesicles visible under the X rays.[1]

Vesiculotomy has been chiefly advocated by Fuller, whose technique is the following: The patient, whose rectum has been cleansed by purges and enemata, is placed in the genu-pectoral position. A curved incision, the convexity of which is directed forwards, is traced in front of the rectum. One then makes one's way through the ischio-rectal fossa, and separates the prostate and the seminal vesicles from the rectum, the left index being placed in the latter in order to protect it against being injured. In this way the operation is not very difficult, and the seminal vesicles are reached without any trouble. One now brings a grooved director into them, and incises them with a knife which has been introduced along the groove of the director. The cutting should be made with the stout part of the blade, and not with the point. After the pus has been evacuated, one frees the opened vesicles from any granulations present with the finger.

According to Fuller, this operation is almost bloodless, and hardly requires any ligatures. It is a somewhat blind procedure, and not very scientific; but it appears to be practically sound in the same way as suprapubic prostatectomy.

Vesiculectomy can be done by three routes: through an inguinal incision, through the perineum, and through the ischio-rectal route.

A. **The Inguinal Route.**—The vas deferens serves as guide, and in this way the operation becomes a retroperitoneal one. An incision is made from the antero-superior spine of the ilium to the scrotum, and the inguinal canal is opened in its whole length. The vas is drawn forwards, whilst the peritoneum is pushed back. By following the vas downwards, one gradually reaches the vesicles, which one isolates with the fingers and removes.

B. **The Perineal Route.**—An incision similar to the crescent-shaped one for perineal prostatectomy is made. One passes between the muscles which attach the rectum to the membranous urethra, and thus reaches the separable zone along which one frees the rectum from the prostate and bladder. Unless the latter organ be distended, the seminal vesicles lie at a considerable depth, and are very difficult to reach. In any case, the perineal route does not appear to be very recommendable.

[1] William Belfield of Chicago, Urological Society, October 25, 1906.

C. **The Ischio-Rectal Route.**—According to Voelcker, this method is the most satisfactory one for removing the seminal vesicles. In his interesting book[1] he advises the following technique: The patient lies on his abdomen, with his head hanging down and his coccyx considerably raised, whilst the legs are allowed to drop down. In order to prevent an infection of the wound, the rectum is closed by a temporary ligature of its mucous membrane after it has been emptied. An incision which is parallel with the middle line, is made along the side of the anus as far as the last piece of the sacrum. The lower fibres of the gluteus maximus are then separated, and the ischio-rectal fossa comes into view. In the deep part of the wound the fibres of the levator ani become visible. They are separated and incised. The bare rectum then comes into view, and is pushed aside. The prostate and the seminal vesicles are then free within the cavity exposed, and can be excised or extirpated.

The Catheterization of the Ejaculatory Ducts.

Considering the wonderful ease with which, thanks to the perfection of our modern instruments, the ureters can be catheterized, it would appear somewhat strange that a similar intervention should not have been attempted on the ejaculatory ducts. However, the literature is practically silent on this question.

Klotz[2] thought of this operation in 1905, and invented a small syringe, which was fitted with a fine cannula. He intended to introduce the latter into the ejaculatory ducts, and to inject solutions into the seminal vesicles in this way. His procedure was, however, unsuccessful, as his injection gave rise to epididymitis.

Klotz's attempt is certainly interesting, and the moment seems near when one will be able to wash and cleanse the seminal vesicles in the same way as one irrigates the renal pelvis in pyelonephritis.

Already now one may say that this catheterization is possible, and that it has its definite indications.

Luys was the first to catheterize an ejaculatory duct successfully, and this intervention proved most beneficial to the patient.[3]

A man of forty was brought to him in August, 1912, by Mr. Habibollah, assistant in the Paris hospitals. He had had three attacks of gonorrhea, which had given rise to complications (orchites and prostatitis).

He had a profuse discharge when Luys saw him, which contained gonococci. All four glasses were uniformly turbid. The examination showed the prostate to be

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[1] Voelcker, *Chirurgie der Samenblasen*, Heidelberg, 1912.
[2] Klotz, *New York Medical Journal*, January 26, 1905.
[3] Luys, *La Clinique*, No. 7, February 14, 1913.

definitely inflamed. There were hard indurated nodules in the epididymes, and the seminal vesicles, especially the left one, were painful.

The treatment consisted, to begin with, in irrigations with permanganate and massage of the prostate and the seminal vesicles. The urethra was then dilated with curved metal sounds up to No. 58 G, and subsequently with Frank's instrument.

In the first days of January, 1913, the left seminal vesicle was still tender, despite this treatment, and it was noteworthy that the massage of this organ gave rise to intense pain, and failed to evacuate the contents. Moreover, this treatment was followed by a fresh attack of epididymitis on the left side, although no instrument was used inside the urethra. The inflammation of the left testis was mild, and yielded rapidly to rest in bed for three or four days. The whole course of events proved clearly that massage was unable to empty the diseased vesicle, and that its ejaculatory duct was obstructed. This led Luys to attempt to re-establish its permeability.

After all the inflammation inside the urethra had disappeared, Luys urethroscoped the patient with a tube No. 26 (January 17, 1913). It was easy to see the verumontanum, which, thanks to the previous treatment, was free from inflammation, and did not bleed.

On its lateral aspects the orifices of the ejaculatory ducts were visible. Attempts were made to catheterize the orifice on the left side of the verumontanum with a urethral sound No. 5, but every time the instrument reached the opening it slipped off the curved and shiny surface of the verumontanum, and failed to enter the orifice. Luys therefore took a small blunt probe, which passed into the opening of the ejaculatory duct with the greatest ease. As its end was conical, there was a slight resistance, and then the probe entered the ejaculatory duct for a distance of 1·5 centimetres.

Immediately after the catheterization the bladder was filled with a solution of oxycyanide of mercury, and the vesicle was massaged. To his great surprise, Luys found that the massage was no longer so painful, and that enormous masses of purulent débris dropped into the glass held in front of the meatus. Never before had massage been so successful, and yielded so much material, in this patient.

No ill effects followed. The induration in the left epididymis diminished, the urine became perfectly clear, and ceased to contain any filaments. Ten days later the patient was seen again, and was found again to be free from any signs or symptoms.

It thus seems that the catheterization of the ejaculatory ducts can and should be recommended, when these channels are stenosed and prevent the emptying of the seminal vesicles.

Indications for the Catheterization of the Ejaculatory Ducts.

1. The first indication seems to be the one which served as guide in the case just described—*i.e.*, **Vesicular Retention.** When proper massage fails to evacuate a seminal vesicle, the corresponding ejaculatory duct is obviously obstructed, and it is legitimate to try to establish its permeability in the same way as one dilates a urethral stricture when there is retention of urine.

2. **In Painful Ejaculations.**—When a patient feels a sharp pain during coitus, the question of atresia of one or of both ejaculatory ducts has to be considered.

3. **In Blood-stained Ejaculations.**—Blood-stained ejaculations may be due to a chronic affection of the seminal vesicles or to a change in the

ejaculatory ducts. In both instances the catheterization of the ejaculatory ducts appears to be indicated.

4. **In Chronic Spermato-Cystitis.**—As everybody knows, inflammation of the seminal vesicles is very common in gonorrhea. It is one of its longest, most serious, and most rebellious complications. Despite its frequency, it is comparatively seldom diagnosed, owing to the vagueness of its functional symptoms, and passes unnoticed for a long time. For this reason it should always be sought for systematically. One should bear in mind the importance of a urethroscopic examination of the verumontanum, and its intimate pathological relation to the seminal vesicles. The urethroscopic picture of the verumontanum often allows one to diagnose a vesiculitis. In the same way as the cystoscopic aspect of the ureteric

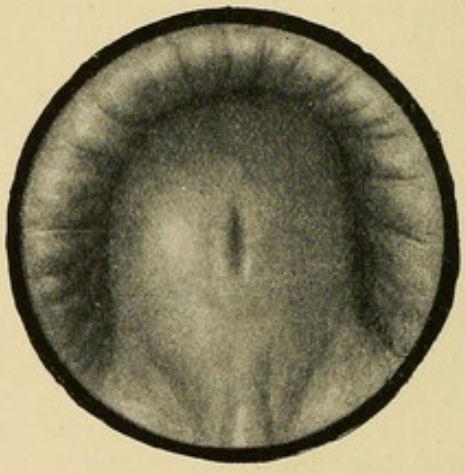


Fig. 127.—Normal Verumontanum with a Visible Single Median Utriculus.

orifices permits one in many instances to conclude that a pyonephrosis is present, the prostatic utriculus may be termed the "mirror of the seminal vesicles."

The catheterization of the ejaculatory ducts in chronic spermato-cystitis allows one to obtain a good evacuation of the pathological secretions contained in the affected vesicle, or to inject antiseptic fluids into it.

Technique.—One selects a tube 14 centimetres long, of a suitable diameter, cleans the urethral mucous membrane by means of an irrigation, and passes the tube according to the rules as far as the prostatic fossette. One then reaches the anterior aspect of the verumontanum, which may show a single median utriculus (Fig. 127). In other cases there is no utriculus in the middle line. On the lateral aspects of the verumontanum two symmetrical openings, which are the orifices of the ejaculatory ducts, are visible to either side of the crest. The verumontanum has then the shape of a diver's helmet (Fig. 128).

In cases of this type the catheterization is much easier. It is best to use a straight metal probe, which is passed along the tube, the lamp of which must be lying on the upper wall. In this way one reaches the orifice of the ejaculatory duct, and the blunt end of the probe can enter in the same way as a ureteric catheter. By means of a few gentle vertical and horizontal movements one can widen the opening a bit, and then one passes the instrument 1 to 2 centimetres into the lumen. One stops when one feels a slight resistance. As a rule, this intervention is perfectly painless ; there is no bleeding, or it is trifling.

When a single median utriculus is present, one proceeds in a similar manner. One directs the probe into the utriculus, and then one brings

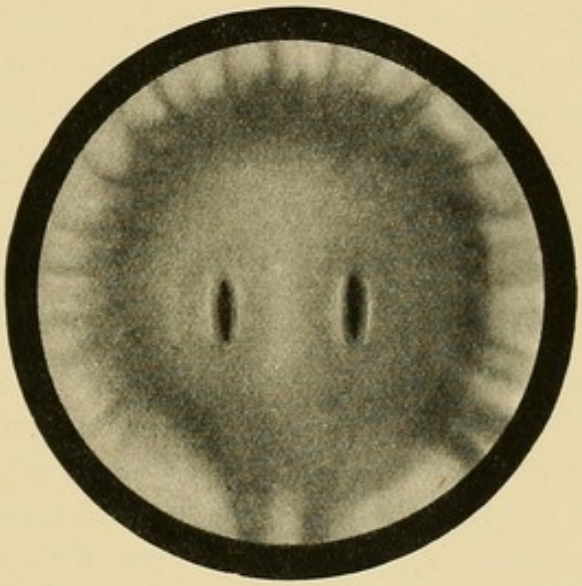


FIG. 128.—VERUMONTANUM WITHOUT A MEDIAN UTRICULUS.

The two ejaculatory ducts open on its lateral aspects, giving it the appearance of a diver's helmet.

the handle to one side (to the left for the left duct, and to the right for the right one). After a few very gentle essays, the probe enters the ejaculatory duct.

This intervention should be reserved for special cases. It is absolutely contra-indicated when the posterior urethra is in a state of acute inflammation. One has always to wait until all acute changes have subsided. As a rule, it is also necessary to urethroscope the patient on several occasions previously, and to prepare the verumontanum. Caustics should be applied to render its surface smooth, and to prevent it from bleeding. Only then will the orifices of the ejaculatory ducts be clearly visible. It would appear as if the catheterization of the ejaculatory ducts would never give rise to any trouble under these conditions. On the contrary, it seems to be one of the most beautiful achievements of modern urethroscopy.

Gonorrheal Cystitis.

Gonorrheal cystitis usually supervenes upon an inflammation of the posterior urethra. It comes on most frequently about the third or fourth week of the infection, and is nearly always the result of a direct contamination, the gonococci being carried into the bladder by means of an instrument or of forcible injections, or through some untimely local intervention on the urinary passages.

In a few cases violent exercise, venereal excess, riding on horseback or in a carriage whilst the gonorrhea is still in the acute stage, may lead to implication of the bladder.

The organism usually at fault is the gonococcus. In certain cases, however, only the bacteria of a secondary infection are found.

It has seldom been possible to study the morbid anatomy of gonorrheal cystitis. But cystoscopic examinations undertaken in cases of gonorrheal cystitis have given us sufficient information to enable us to form an idea of the lesions present. In most cases the vesical mucous membrane is in a state of generalized diffuse inflammation, which is sometimes accompanied by a more or less marked edema. In places raised follicles, represented by accuminated dark red spots, are visible on the mucosa. The lesions are usually most pronounced near the internal sphincter, at the level of the trigone. Histological researches have shown that the vesical epithelium soon undergoes desquamation in gonorrheal inflammation, and that it is replaced by a proliferation of the subepithelial tissue. The vessels of the latter are widely dilated, and filled with leucocytes, most of which are laden with gonococci (Finger).

Cystitis is characterized by the following symptoms:

1. Frequency of micturition accompanied by vesical tenesmus. The desire to micturate becomes frequent, imperative, and repeats itself every forty-five minutes, or even more often—say every five minutes. It is less accentuated when lying down than on walking or standing. Once micturition is terminated, the desire to repeat the act starts afresh, although the bladder is empty. This condition is called "tenesmus."

2. The pain is most marked at the end of micturition. The expulsion of the last drops is the starting-point of an intense pain.

3. The urine is practically always purulent, and, when the patient makes water into several glasses, the last specimen is the most turbid. There is usually some blood in the urine, especially towards the end. Occasionally the last drops of fluid passed are pure blood.

The course of the disease is variable. If left to itself, resolution may take place in a few days. But a recrudescence is very common, and this is a characteristic feature of the malady.

An acute cystitis lasts usually eight to ten days. In certain cases it becomes chronic, and then it lasts much longer. If it takes a chronic course, it should be attended to with great care, because a tuberculous cystitis is likely to develop ultimately.

The diagnosis is usually easy, and is made by the aid of the three symptoms just described. Sometimes, however, the difficulty of distinguishing between a gonorrheal and a tuberculous cystitis is very great, especially if the latter grafts itself on the former.

In such doubtful cases the urine should be centrifuged, and the deposit should be inoculated into guinea-pigs in order to clinch the diagnosis.

The medical treatment is very important. In the first place, the patient should be confined to his bed and take plenty of fluid. Infusions of cherry stalks, or, better, of folia uvæ ursi are recommendable.

One of the best prescriptions is the following: The patient takes three times per day an infusion of folia uvæ ursi, which is prepared in the same way as tea, and sweetened by means of the following syrup:

Syrup of tolu	300 grammes.
Benzoate of sodium	15 ,,

One teaspoon per cup of infusion.

Baths and sitz-baths are to be recommended. The amount of food taken should be reduced, and replaced by a milk diet, if possible. Hot applications to the lower abdomen relieve the pain. The balsam preparations taken internally often render good service. Sandalwood-oil especially works wonders in certain cases. If one has to deal with a hemorrhagic gonorrheal cystitis, accompanied by great suffering, it is best to confine the patient to his bed and to let him take ten to twelve sandalwood-oil capsules per day. The blood disappears, and the pain ceases in twenty-four hours.

Apart from the balsam preparations, urotropin or helmitol, in doses of 1·5 to 2 grammes per day, should be given, or one may prescribe turpentine. If the cystitis is accompanied by phosphaturia, uraseptine is preferable to urotropin, because it acidifies the urine, and thus allows its urotropin radical, which requires an acid medium, to act efficiently.

Local treatment should be deferred until all acute inflammatory phenomena have subsided, and until there is no longer any blood in the urine. The treatment which would be the most appropriate, varies with the individual cases. If there is an abundant discharge containing gonococci, urethro-vesical irrigations with weak permanganate are preferable, and they should be combined with massage of the prostate, because this organ is usually implicated when cystitis is present. In many instances the prostatitis is the direct cause of the cystitis.

When, on the other hand, all urethral discharge has subsided, the treatment of choice consists in instillations of 1 or 2 per cent. silver nitrate every other day.

If the nitrate is not well borne, and causes excessive pain, it can be replaced with advantage by an organic silver salt (protargol, argyrol, etc.).

Pyelitis and Pyelonephritis of Gonorrheal Origin.

It is by no means rare to find the gonorrheal infection spreading to the kidney.[1] Several observations have been recorded by Borkhardt (1886), Mendelsohn, Ashara (1898), Brandsford Lewis,[2] and Hagner, in which the gononcoccus was found in a state of purity in the pelvis of the kidney or in abscesses within the renal tissue. In most cases, however, the infection is a mixed one, containing chiefly staphylococci, streptococci, and coli bacilli. In these cases the gonococcus confines itself to provoking an inflammation, and to preparing thus the soil for a secondary infection.

Hagner[3] has reported on twenty-seven personal cases, of which sixteen showed a mixed infection, whilst nine were purely gonococcal.

Sellei[4] observed five cases in which the gonococcus was associated with *Bacillus coli*.

The channels through which the gonococcus reaches the kidney are the same as those by which other infectious organisms reach that organ—namely:

1. **Through the Ureter.**—Murchison has described cases in which a gonorrheal cystitis was followed by an inflammation of the whole ureter. In most cases the ascending infection supervenes upon retention, whether the latter be caused by a stricture of the urethra or by an inflammation of the prostate. The ureteric orifices are enlarged, and gape in these cases. The urine can thus flow backwards from the infected bladder, and the gonococci are able to find their way to the kidney.

2. **Through the Blood-Stream.**—The gonococci which circulate in the blood-stream are carried to the kidneys, and may settle there in the same way as they attack the articulations and the cardiac valves. This route is the only feasible one when there is no concomitant gonorrheal cystitis.

3. **Through the Lymphatics.**—The gonococci set free from a prostatic abscess can travel along the ureter into the perirenal tissue, and invade subsequently the kidney itself.

The abuse of balsam preparations is a predisposing factor for the infec-

[1] *Vide* on this question Wossidlo, *loc. cit.*, p. 304.

[2] Brandsford Lewis, *Journal of Cutaneous and Genito-Urinary Diseases*, September, 1900, p. 167.

[3] Hagner, "Gonococcus Infection of the Kidney," *Medical Record*, 1910, p. 568.

[4] Sellei and Unterberg, *Berl. Klin. Woch.*, 1907, pp. 1113-1115.

tion of the kidney by the gonococcus. Taken in large doses, they irritate the renal epithelium, and thus prepare the organ for an invasion by Neisser's organism.

Gonorrheal pyelonephritis is usually ushered in by a chill, and by fever up to 39° or 40° C.; but its onset may be insidious, and be indicated by a little shivering only. As soon as pyelonephritic abscesses are formed, the pulse becomes small and rapid, and violent febrile attacks of a hectic character set in. If pus is present, and if the lumen of the ureter is sufficiently obliterated to bring about the retention of the pus in the renal pelvis, very high fever is common.

Very rapidly one of the kidneys becomes painful. This pain may be either spontaneous or only noticed on pressure. It may be unilateral or bilateral. It may radiate along the ureter into the bladder, and even into the penis, or it may be referred to the loins.

Gastric troubles and violent headaches usually accompany this condition. The tongue is coated, the appetite is lost, and diarrhea and constipation alternate.

The urine is found on examination to be uniformly turbid at the time when it is passed. However, if only one kidney is affected, and if its ureter becomes partly occluded, clear and turbid specimens may be obtained in alternation. The urine has to be tested repeatedly, therefore, in these cases.

If the pyelitis is bilateral, anuric crises may supervene.

The deposit obtained by centrifuging the urine is composed of pus, blood, various bacteria, casts, and renal cells. Chemical analysis reveals the presence of albuminuria. Palpation of the kidneys does not give any information as a rule, but it may show the pain to be limited to one kidney, or, if carried out bimanually, it may prove one of the organs to be enlarged.

The diagnosis is usually very difficult, and in many instances it has only been made post mortem. The appearance of shivering, fever, and pain in the loins, during an attack of gonorrhea, should make one suspect a pyelonephritis. The histological and chemical examination of the urine is the chief guide to diagnosis; the presence of casts and of a considerable quantity of albumin often decide the nature of the case. Cystoscopy and catheterization of the ureter allow one to complete the diagnosis.

The treatment of gonorrheal pyelonephritis is similar to that of other types of pyelonephritis. Rest in bed, very low diet (water, milk), and purgation are indicated. No alcohol should be allowed; 1·5 grammes of urotropin internally per day should be given.

Kelly and Casper recommend irrigations of the renal pelvis with boric lotion, or with a 0·1 per cent. solution of silver nitrate through a ureteric catheter. Argyrol may also be used.

More serious cases require a nephrotomy, or even a nephrectomy.

Retention of Urine.

Retention of urine occurs during gonorrhea under different conditions.

In the acute stage the urethral mucous membrane may be so swollen and edematous that the urine finds its normal channel closed. This accident is often met with in little boys.

When the prostate and the seminal vesicles are the seat of acute gonorrheal inflammation, retention is also common, and, like these troubles, it is usually the result of bad or untimely local treatment.

In other instances it follows upon an acute inflammation of Cowper's glands, or it may result from an old stricture, which suddenly swells up under the influence of a fresh gonococcal infection.

Lastly, the nervous complications of gonorrhea may be accompanied by retention, as in the case of gonorrheal myelitis described on p. 248.

The treatment should be at first medical. The intake of plenty of fluid, prolonged hot baths, and hot enemata are of service.

The more important local treatment should be preceded by a rectal exploration of the prostate and of the seminal vesicles, in order to ascertain if an inflammation of these organs is at the bottom of the mischief. Should this be the case, the patient is placed in the genu-pectoral position, and energetic rectal massage is carried out. In certain cases a prostatic abscess can be opened in this way, and its evacuation may be followed by spontaneous micturition. Treatment of this kind should, however, be avoided (or, at any rate, one should be very cautious) if the seminal vesicles are in a state of acute inflammation, for serious generalized complications might follow otherwise.

Lastly, when the palliative measures have failed, one has to make up one's mind to pass a catheter. A soft rubber catheter, No. 15 or 16, is best for this purpose. Its introduction should always be preceded by a thorough cleansing of the anterior urethra with boric lotion. The passing of the catheter gives the patient immediate relief, and may be repeated, as long as the bladder requires it, until normal micturition is re-established. Under no circumstances whatsoever is it permissible to leave the catheter in the urethra and to tie it in.

GENERAL SYSTEMIC COMPLICATIONS OF GONORRHEA.

Gonorrheal Rheumatism.

Gonorrheal rheumatism is a distinct morbid entity, which is quite different from ordinary rheumatism. Its clinical manifestations are frequently so typical that they alone would be sufficient to recognize it as a definite autonomous disease.

The pathology of gonorrheal rheumatism has been under discussion for a considerable time. Some, like Hervieux, saw in the association of gonorrhea and rheumatism nothing but a mere coincidence; but Fournier and Féréol soon realized that the rheumatism originating during an attack of gonorrhea was related to the infection of the urethra, and caused by it.

Peter believed gonorrhea to be merely a favourable occasion, like cold, moisture, and fatigue, for the outbreak of rheumatism in "rheumatic subjects." Fournier, on the contrary, held that gonorrhea was not only a predisposing cause, but *the efficient and necessary cause.*

Sex and age have very little bearing upon the incidence of gonorrheal rheumatism. It would seem, however, as if men were more often affected than women. Other occasional causes which have often been pointed out, are cold, violent exercise (riding, excessive walking, etc.), and a peculiar predisposition.

As to the relative frequency of gonorrheal rheumatism, about 2 per cent. of all cases of gonorrhea develop this complication.

At the present stage of our knowledge, the pathogeny of gonorrheal rheumatism can be resumed in one sentence: Migration of the gonococcus to the joints, where it settles down and multiplies. Even when the joints yield on aspiration a fluid which contains no gonococci, their absence cannot be considered to be proved, as there is every chance that they may be found on another occasion.

A great number of microscopic examinations have established beyond doubt that gonorrheal rheumatism is definitely the result of the specific action of the gonococcus.

The organism can be found in the pus contained in the joints, but it is necessary to examine the articular fluid in the course of the first days which follow upon the involvement of the joint, if one wishes to find the gonococcus. It disappears soon, and examinations carried out at a later date yield a negative result. In cases in which the pus is sterile, the exudate which is obtainable after opening and scraping the synovial membrane often contains the coccus. Lastly, cultures may be made to confirm the presence of the gonococcus.

Gonorrheal rheumatism may complicate any gonorrheal infection, whether it be a urethritis, or a gonorrheal ophthalmia, or other manifestation. Weiss and Klingelhoeffer[1] observed a male nurse, aged thirty-five, who received some pus from a urethritis into his eye, and severe, intense, purulent conjunctivitis supervened within two days, which was treated by means of installations of silver nitrate and permanganate irrigations. After five weeks the eye was almost well, when the patient suddenly complained of sharp pains in his right knee, the skin of which was reddened. After eight

[1] Weiss and Klingelhoeffer, *Klin. Monatsb. f. Augenh.*, March, 1897, p. 7.

days this trouble subsided, but fifteen days later the right ankle was affected. However, this joint also recovered within eight days. The patient had never suffered from an inflammation of his urethra.

Cases of this kind are, however, very rare. As a rule, gonorrheal rheumatism supervenes upon a gonococcal urethritis, and in particular upon an inflammation of the posterior urethra.

There is one organ which appears to be especially prone to act as starting-point for gonorrheal rheumatism—the *seminal vesicle.* Its thin walls and its rich vascular supply render its inflammation very dangerous, and liable to reach the blood-stream. The vesicle thus is the organ from which the gonococci are set free and bring about a pyemia.

In practically every case which I have seen and followed up, I found that an inflammation of the seminal vesicle preceded the outbreak of the gonorrheal rheumatism.

One of the most striking examples I saw in a man of thirty-seven who had come to Paris from the country. He acquired gonorrhea in February, 1911, was badly treated, and developed after a time gonorrheal rheumatism, the feet, the knees, the shoulders, and the fingers, being involved. The latter were more affected than the other joints, and presented a characteristic fusiform shape (Fournier's *radish fingers*) when I saw them in September, 1911.

My examination showed me that his left seminal vesicle was still—*i.e.*, seven months after the beginning of the attack—inflamed, doughy, and horribly tender on rectal palpation. The vesicle was treated, and almost immediately all the symptoms showed a marked improvement.

This opinion has also been supported by Fuller of New York, who resorts to vesiculotomy as soon as gonorrheal rheumatism supervenes.[1]

Whilst in man the seminal vesicles are the usual starting-point of gonorrheal rheumatism, systemic gonococcal infections giving rise to articular lesions are usually observed in women after they have developed a gonorrheal salpingitis.

The articular lesions of gonorrhea are common, and usually make their appearance between the sixth and fifteenth day. Any joint may be involved, but some are attacked more often than others. The most commonly affected articulations are, in an order of decreasing frequency: the knee, the ankle, the wrist, the finger-joints and toe-joints, the elbow, the shoulder, the hip, and lastly the temporo-maxillary joint.

Four main forms occur:

1. **Arthralgia,** characterized by articular pain only. A joint thus affected shows nothing abnormal when examined, and is in no way impaired in its mobility.

[1] Fuller, *La Clinique*, April 16, 1909, p. 254; *vide* also pp. 209 and 222.

The pain is most marked in the morning, when the joint is slightly stiff; but this stiffness readily diminishes as the patient gets about, and often disappears entirely during the day.

Several joints may be affected in this fashion at the same time, or the pain may be very vague and shift to different articulations.

The character of the pain varies. Sometimes it is sharp and shifts. On other occasions it is stationary and less intense, flaring up, however, with every recrudescence of the affection.

2. **Hydarthrosis.**—This condition is most often met with in the knee, and is usually unilateral, although it may be bilateral. The synovial sac and its prolongation under the quadriceps extensor are distended, the joint is swollen, and the patella is raised and separated from the long bones.

This hydarthrosis takes a very long time to disappear. It often lasts two or three months, and resists even the most energetic medical treatment. Its main feature is its stationary character, whilst the hydarthrosis of rheumatism is essentially a shifting one.

3. **Acute Arthritis.**—This is the most common form, and is characterized by violent pains affecting simultaneously several joints (two or three as a rule, seldom five or six). It is accompanied by fever, which is usually moderate (up to 102·2°). The infected joints are extremely painful, considerably swollen, and perfectly useless.

The onset is abrupt. A joint suddenly becomes painful, and begins to swell rapidly. The tumefaction follows almost immediately upon the pain, the skin becomes red, and the local temperature is raised.

Acute gonorrheal arthritis seldom ends by resolution. Its usual termination is ankylosis. Sometimes suppuration supervenes, a complication of the utmost gravity under the conditions.

4. **Polyarthritis Deformans.**—This type of lesion is chiefly found in connection with the small joints, with those of the toes and fingers. The articulations between the first and second phalanges are often affected, and thus a curious deformity which is typical (Fournier's radish finger) is brought about. In other cases the metacarpo-phalangeal joints or the big toe-joints are implicated. In all lesions of this kind atrophy of the corresponding muscles is common.

The diagnosis of gonorrheal rheumatism is often difficult. The fact that a patient has had gonorrhea previously should arouse one's suspicions. The chief signs which point to a gonococcal origin of an attack of rheumatism are—the small number of the joints involved, the fixed character of the articular lesion, and the sudden inflammatory exacerbations in the affected joints, which subside quickly.

The prognosis is always serious, firstly because resolution is slow and difficult, and secondly owing to the remarkable tendency to ankylosis.

This feature is typical of gonorrheal articular lesions, and becomes more pronounced with every fresh attack.

The treatment should be directed against the source of infection, and for this purpose it is necessary to disinfect the urethra as rapidly as possible by means of irrigations with permanganate combined with massage of the prostate and of the seminal vesicles, and also of Cowper's glands if necessary.

Internal medication, sodium salicylate, salophen, aspirin, etc., given by the mouth, is not very effective in most cases.

The local treatment of the diseased joints is far more important. The diseased articulations should be immobilized by means of splints or plaster of Paris, and counter-irritants, blisters, Scott's dressing,[1] or a 5 per cent. guaiacol ointment, should be applied. Electric treatment in the form of continuous currents or in the shape of ionization with salicylate is often beneficial, chiefly for the relief of pain.[2]

When the acute phenomena have subsided, the normal mobility of the parts should be restored by means of gentle movements, electricity, massage, turpentine baths, and hot baths (45° or 50° C.).[2] If a marked hydarthrosis is present, compression by means of an elastic bandage or puncture is often useful. Bier's treatment in these cases often gives good results. Lastly, there are severe cases which require operative measures, such as arthrotomy or resection.

As gonorrheal rheumatism is caused by the action of the gonorrheal toxin on the system after it has been absorbed at the level of the posterior urethra, one has endeavoured to find the commonest and most important places through which the absorption into the system takes place. The seminal vesicles are apparently most often at fault, and the inflammation of one or of both of them is most liable to be followed by systemic complications.

For this reason Fuller of New York treats gonorrheal rheumatism by vesiculotomy. Amongst his 101 cases there was not a single death due to the operation. In twenty-three instances the intervention was done for gonorrheal arthritis, and in each case a marked improvement followed. Seventeen cases were cured completely in this way.[3]

Unfortunately, vesiculotomy is neither a common nor an easy operation, and thus it does not seem likely that it will ever find general favour.

Lastly we may mention that serum-therapy and antigonococcal vaccination have been resorted to. These therapies are based on the

[1] Substituted for Ung. Neapolit. (A. F.).

[2] Hot air, steam, and diathermy, are also of great service. In certain very acute and septic cases immediate arthrotomy and frequent irrigation of the joint cavity is indicated (A. F.).

[3] Fuller, *La Clinique*, April 16, 1909, p. 254.

knowledge that gonorrheal rheumatism is the result of a general pyemia due to the gonococcus, and seems to be indicated in certain cases (*vide* Chapter XI.).

Muscular Rheumatism.

During an attack of gonorrhea, pain in the muscles of the loin, of the neck, of the hollow of the back, of the forearm, and in the pectoralis major, etc., is occasionally complained of. Up to now medical men have paid but little attention to these pains; they are, however, not uncommon, and seem to be directly connected with the gonococcal infection.

Gonorrheal Synovitis.

Inflammation of the tendon sheaths has been observed chiefly in connection with the peronei muscles of the leg, the extensors of the toes and of the fingers, the muscles of the thumb, the radiales, the flexors of the fingers, the semitendinosus and the semimembranosus.

This gonorrheal synovitis is chiefly found in the feet, the ankle, the knees, and the wrists—that is to say, in the regions of those joints which are most often affected by gonorrheal rheumatism. These lesions are characterized by a swelling and a reddening of the integuments along the course of a tendon sheath. The spontaneous or provoked pain is very marked, and the voluntary movements are difficult or impossible.

Bacteriological researches have demonstrated the presence of gonococci in cases of suppurative tenosynovitis.

Griffon[1] has published the history of a patient in whom the bursa of the tensor fasciæ femoris was inflamed. Puncture yielded a distinctly purulent fluid in which the direct examination and the cultures on blood-agar showed the presence of gonococci. When a second puncture was made twenty-four hours later, no more diplococci were found in the pus, but the culture gave a positive result. Lastly, the material obtained from a third puncture a few days later, showed no gonococci under the microscope or in cultures.

This observation is interesting in so far as it proves how easily the gonococcal nature of these affections can be overlooked, unless the bacteriological examination be made immediately.

Gonorrheal Bursitis.

Inflammation of the bursæ is less frequent. The bursæ most commonly involved are the retro- and subcalcanean bursæ.

The pain in the heel (*talalgia*), which is so frequently observed during

[1] Griffon, *Revue de Médecine*, January 10, 1901, p. 84.

an attack of gonorrhea, is in some cases due to their inflammation. But, as Fournier and Jacquet have pointed out, gonorrheal talalgia is more often the result of an osteitis or of an osteo-fibrous calcanean rheumatism.

Gonorrheal Periostitis.

This complication of gonorrhea has been chiefly studied by Fournier. As a rule, the patients complain of a sharp pain in a bone, which is definitely limited to a small area of the size of a shilling or less.

It is not uncommon to find at this level a slight doughy swelling, and sometimes an inflammatory reddening of the integuments. After a few days' duration these phenomena subside and disappear. The parts most commonly involved are the tibia, the epitrochlea, the lower end of the ulna, the upper end of the fibula, etc., or, in a few words, the bony projections of the skeleton.

In certain cases these periostites do not terminate by resolution, but form true tumours which become periostoses. They are flattened, fixed, hard, small, resistant swellings firmly adherent to the bone. At first they give rise to a certain amount of pain, but they soon become less and less sensitive.

Abscesses containing Gonococci.

Systemic gonococcal infection is occasionally followed by the formation of abscesses which contain gonococci in their pus. Cases of this kind have been described by Sahli, Lang and Paltauf, Horwitz, etc.

Cassel has seen an infant who developed purulent ophthalmia shortly after birth, and subsequently gonorrheal rheumatism and an abscess on his back. This abscess was incised, and the bacteriological examination of the pus revealed the presence of the gonococcus in a state of purity.[1]

Dr. Campbell[2] has published the case of a youth of eighteen who sustained a compound fracture whilst he was suffering from an attack of gonorrhea which he had acquired six weeks previously. Considerable suppuration set in at the site of the fracture, and the pus yielded cultures which contained gonococci. Dr. Campbell holds that in this case the fracture was infected by cocci which reached it through the blood-stream.

Kerassotis[3] has seen a metastatic gonorrheal abscess in a man of twenty-five who was suffering from a gonorrheal urethritis, and subsequently developed an abscess in the mastoid region. The pus collected after it had been incised contained gonococci. Both the urethritis and the abscess

[1] Cassel, *Presse Médicale*, August 8, 1903, p. 569.
[2] *New York Medical Journal*, February 28, 1908.
[3] Kerassotis, *Ann. Génito-Urin.*, 1904, p. 516.

were cured at the same time. It was thus clear that one was dealing with a metastatic gonococcal abscess which owed its origin to the urethritis.

M. Meyer[1] has shown at the Berlin Medical Society a patient who suffered from a profuse vaginal discharge containing gonococci, and developed a superficial whitlow on her right middle finger a few days after she had scratched it whilst she was cleaning saucepans. A big, slightly raised bleb, containing a yellowish fluid, made its appearance on the outer surface of the finger, which was incised. The pus withdrawn from it contained gonococci, as the microscope and cultures showed.

Effects of Gonorrhea upon the Skin.

Gonorrheal skin lesions are chiefly found in men, and are usually noticed about the fourth or fifth week of the infection.

The following forms have been described:

1. *Erythemata*, which imitate measles or scarlet fever.

M. Hodara quotes the case of a soldier who developed on the third day of his urethral discharge an eruption, and therefore sought admission to the hospital.

There it was found that his chest, face, arms, and legs were covered with an eruption composed of rounded and polymorphous erythematous patches. He had fever (102·9° F.), and within forty-eight hours the erythema had become general and assumed a bullous character. The various bullæ were filled with a purulent liquid, which in some instances was blood-stained. His face, which was remarkably red, became edematous, and conjunctivitis supervened. Gradually the various patches underwent desquamation, and the bullæ were superseded by scabs. The fever remained at 102° F. for eleven days, and the patient was very depressed and feeble.

The nature of the complaint remained obscure for a week, until the author made cultures from the blood, which revealed the presence of the gonococcus. This organism was then also found in the urethra.[2]

2. *Purpura*, which is found chiefly on the lower limbs, and seldom spreads beyond the knees. This gonorrheal purpura is also met with on mucous surfaces, on the arch of the palate, on the soft palate, and in the larynx.

General malaise and other systemic disturbances usually accompany this purpura and suggest typhoid fever. The duration of this eruption is very variable, from twenty-four hours to three, four, or ten days, according to the case.

The diagnosis is often difficult. A patient whom I saw together with

[1] Meyer, *Presse Médicale*, August 8, 1903, p. 562.
[2] *Gaz. Méd. d'Orient*, No. 4, 1912, p. 142.

Dr. Alexandre had a rebellious attack of gonorrhea, which was complicated by well-marked gonorrheal littritis. Whilst under treatment he suddenly developed a marked eruption, which another medical man who was called in, diagnosed as a syphilitic roseola (!), although he had never had any trace of syphilis.

It need hardly be mentioned that in these cases drug rashes, such as copaiba eruptions, have to be excluded before one can pronounce the skin lesions to be due to the gonococcus. But it would seem as if even in these instances the organism were often at fault, and not the drug.

3. *Gonorrheal Keratoses.*—The gonorrheal keratoses consist of more or less pronounced horny crusts, as described by Vidal, Jeanselme, Jacquet, and Chauffard. They have been carefully studied recently by Le Damany.[1]

Vidal was the first, in 1893, to draw attention to a dermopathy which he, and since then Jeanselme, Jacquet and Robert, and Chauffard have described under the name of "corne cutanée." It is characterized by trophic changes in the skin, which appear to be in relation with gonorrhea.

They make their appearance three to five weeks after the beginning of the infection, and are almost exclusively found in cases which present serious complications. Their aspect is that of a corn, or of a conical protrusion or of a large hard irregular patch, composed of hypodermic horny masses. As a rule, these hyperkeratinized areas are remarkably symmetrical. They are chiefly found on the limbs, especially on the palmar surfaces of the hands and on the plantar aspect of the feet. They may, however, occur anywhere, even on the face, on the scalp, and on the genitals.

According to Professor Chauffard, this skin disease is due to an exalted and cachexia-producing virulence of the gonococcal infection, which leads to trophic disturbances. The lesions remain stationary for a very long time, and often recur if the patient is unfortunate enough to get a fresh attack of gonorrhea.[2]

Cardiac Complications of Gonorrhea.

The cardiac complications of gonorrhea are by no means exceptional, as more than 100 cases are to be found in the literature. They are more common in men than in women, and are usually observed during the acute stage of the discharge.

1. **Gonococcal Endocarditis.**—Its onset is sometimes sudden and characterized by fever or by syncope, but in most cases its beginnings are insidious, and careful auscultation has to be resorted to in order to find

[1] Le Damany, *Presse Médicale*, June 19, 1897, p. 282.

[2] Local treatment of these lesions is practically useless. They often improve after the urogenital lesions have been cured. It is satisfactory to note that vaccine-therapy appears to have a favourable effect on them (*vide Lancet*, May 17, 1913, p. 1382 (A. F.).

any characteristic murmur. When established, the disease can be diagnosed by the presence of abnormal heart sounds (murmur and duplicated sound). The valve most often affected is the mitral, but the aortic valves are also frequently damaged. Functional troubles and general symptoms may be wanting. The acute stage is comparatively short, but it often leaves incurable permanent lesions.

Widal and Faure-Beaulieu[1] have brought before the Medical Society of the Paris Hospitals a case of gonorrheal endocarditis in which the gonococcus was isolated from the blood during life, and found on the affected heart valve after death.

This double finding—in the blood during life, and on the valve post mortem—leaves no doubt as to the authentic character of the case, and proves conclusively that there is such a disease as gonococcal septicemia.

A. Rendu and J. Hallé[2] have published the case of a woman of thirty who, having contracted gonorrhea, developed a metritis, and later on a periarthritis at the elbow. Her general condition rapidly became worse. A hectic fever indicative of the generalization of the infection supervened, and the patient died within a short time. The autopsy showed that the patient had been suffering from a gonorrheal metritis, the uterine mucus contained gonococci, and the serous fluid obtained from the cellulitis at the elbow yielded a pure culture of Neisser's organism. On the other hand, it was impossible to find any gonococci in the blood or in the pleural and peritoneal exudates. However, the bacteriological and histological findings were again positive when the aortic valves were examined. The chief cardiac lesion found at the autopsy was an infective endocarditis. The aortic valve was enormously thickened, and covered at its free border by cauliflower-like vegetations.

This case alone would suffice to prove the existence of an infective endocarditis caused exclusively by the gonococcus.

Carageorgiades[3] has collected a dozen cases of gonococcal endocarditis. The autonomy of this disease is proved by the fact that the gonococcus can be found on the cardiac valves. Only those cases should, however, be diagnosed as gonococcal in which the presence of the gonococcus can be demonstrated.

Prockoska[4] has published the case of a young man of twenty-four who, during an attack of gonorrhea, was taken ill with fever, swelling of his joints, and ulcerative endocarditis affecting his aortic valves. The ex-

[1] Widal and Faure-Beaulieu, *Soc. Méd. des Hôp.*, June 30, 1905.

[2] A. Rendu and J. Hallé, *Soc. Méd. des Hôp.*, November 12, 1897.

[3] Carageorgiades, *De l'Endocardite Gonococcique* (Thesis, Paris, 1896).

[4] Prockoska, "Über die Gonorrhoische Allgemein-Infection," *Virchow's Arch.*, 1901, vol. clxiv., p. 492.

amination of the blood during life failed to show any gonococci. The patient, however, succumbed in a fortnight, and at the autopsy an ulcerative endocarditis was found. Pieces of the aortic valves and blood taken from the heart were inoculated in tubes, and yielded cultures of gonococci.

Frendl[1] treated a lieutenant of twenty who, during the third week of his gonorrhea, was suddenly taken ill with dyspnea and precordial pain. He died forty-eight hours after his admission to the military hospital, his temperature rising to 40° C.

At the autopsy his pericardium was found to be filled with a seropurulent fluid; the aortic valves were perforated, and showed a typical ulcerative endocarditis. Microscopic examination and cultures on agar-serum demonstrated the presence of gonococci in a state of purity.

Wassermann[2] has also published a conclusive case.

A young man of twenty-seven who had acquired his fourth attack of gonorrhea suffered from prostatitis and retention, which necessitated the passing of a catheter. This intervention was followed by a serious general illness, and led to a fatal termination. The autopsy showed an abscess in the left lobe of the prostate, a nephritis in its early stage, and cystitis with ecchymoses on the mucosa. The left ventricle of the heart was hypertrophied, and the aortic valves were studded with warty growths which contained gonococci, as the microscopical examination showed. Cultures confirmed this histological diagnosis by yielding pure cultures of Neisser's organism.

Sidney, Thayer, and Lazear,[3] quote two cases of gonorrheal endocarditis:

The first one relates to a woman of thirty-four who had rheumatic pains for three months. Cultivation of the blood showed gonococci. The post-mortem examination revealed a vegetating endocarditis affecting the mitral valve. The valvular thrombi, as well as the vagina and the uterus, contained gonococci.

The second observation relates to a young man of nineteen who had had gonorrhea for six months. Auscultation revealed an aortic systolic murmur and a prolonged first sound at the apex. A blood-culture yielded typical gonococci. At the autopsy the pericardium was found to contain 300 grammes of liquid in which gonococci were present. On the middle segment of the mitral valve a thrombus was present which also contained gonococci.

Endocarditis is by far the commonest *cardiac* complication of gonorrhea, and is usually preceded by articular lesions.

Histologically, its lesions are those of a simple or of an ulcerative endo-

[1] Frendl, *Wien. Klin. Woch.*, 1903.

[2] Wassermann, *Münch. Med. Woch.*, 1901, p. 298.

[3] Sidney, Thayer, and Lazear, *Journal of Experimental Medicine*, 1899, vol. vi., No. 1, p. 81.

carditis with destruction and perforation of the valves. The right heart is often involved

In the thirty-one cases collected by Sidney, Thayer, and Lazear, the lesions were distributed as follows:

Left heart	Aortic	12	67·7 per cent.
	Mitral	6	
	Both	3	
Right heart	Pulmonary	7	25·8 ,,
	Tricuspid	1	
Both hearts		2	6·4 ,,

Gonorrheal endocarditis affects chiefly adults, and in particular men. Its onset may occur at any time—*i.e.*, soon after the gonorrhea has been acquired or even after years.

2. **Gonococcal Pericarditis.**—This disease is far less common, and takes occasionally a very mild course. In most cases, however, it is characterized by definite symptoms: palpitations, precordial pain, and dyspnea. The physical signs are those of a dry pericarditis (pericardial rub) or of a pericarditis with effusion (more or less increased cardiac dulness, heart sounds faint, pulse small and irregular). The affection is usually benign, and terminates, as a rule, by resolution.

3. **Gonococcal Myocarditis.**—This variety of myocarditis is never found alone. It is always associated with endocarditis, and is a sequela of the latter or of pericarditis. The findings of morbid anatomy have established beyond doubt that the gonococcus migrates into the endocardium and into the myocardium.

One finds in the latter areas of leucocytic infiltration, embolic abscesses, and necrotic patches, which contain gonococci.

Pericarditis usually disappears without leaving a trace. Endocarditis also terminates in most cases by recovery, but it frequently leaves common valvular lesions. It may give rise to embolism, as is shown by two cases recorded in the literature.

The treatment of the cardiac complications of gonorrhea is purely symptomatic. The patient's strength must be maintained by means of stimulants. Counter-irritants applied to the precordial region are often of value, and, according to the requirements of the case, the usual heart tonics and regulators of the circulation should be prescribed.

Complications of Gonorrhea affecting the Digestive System.

The gonococcus can invade all parts of the alimentary canal, but true gonorrheal complications appear to occur only at its two extremities—namely, at the mouth and at the ano-rectal region. The esophagus, the

stomach, and the intestine do not seem to be inconvenienced by the gonococcus.

An interesting observation of Tazembre[1] appears to bear out this statement.

A husband who had been betrayed, wished to punish his wife and her lover by infecting them with gonorrhea, and contracted the disease especially for that purpose. But instead of contaminating his wife in the usual way, he conceived the extraordinary idea of compelling her to drink every day for a week or so a certain quantity of milk which he had mixed with as much pus as he could obtain from his urethra. After a certain time both the wife and her sweetheart contracted the disease, but they never displayed any symptoms pointing to an inflammation of the mucous lining of the alimentary canal. It thus seems probable that the absorption of gonorrheal virus with the food has no detrimental effect upon the digestive tract.

Prostitutes are commonly addicted to vicious habits (cunnilingus), and yet they do not display any digestive disturbances in consequence.

Gonorrhea Buccalis.—This complication is much less frequent than gonorrheal proctitis. Its existence is, however, beyond doubt.

Horand related in 1885 a demonstrative case: A medical student practised, during the absence of his sweetheart, a coitus buccalis with a prostitute, and developed three days later a typical attack of gonorrhea, which lasted two weeks. Gonococci had been found in the discharge. After he had been cured, he induced his mistress to lend herself to the same vice, and no ill-effect resulted. It was thus clear that the gonorrhea was really due to an infection, and not merely the product of mechanical irritation or a recrudescence of an old gonorrhea.

Cuttler in 1889 published the case of a woman who developed a pseudo-membranous stomatitis after a coitus. The false membranes contained gonococci, and the individual with whom she had had relations suffered from typical gonorrhea.

Petit in 1889, Honnora in 1889, Colombini in 1901, and Jurgens in 1904, have each described cases of gonorrheal stomatitis which were characterized by a swelling of the tongue, by greyish, more or less rounded spots on the buccal mucous membrane, and by a fetid breath.

Buccal gonorrhea is comparatively frequent in the new-born, especially when they have already become the prey of ophthalmia. This inflammation of the mouth is apt to become very serious, as a pyemia may supervene. Ahlfeld has seen infants in whom the palate was covered with a thick coating, and studded with yellowish masses which contained a great number of gonococci.

[1] Tazembre, *Archiv. de Méd.*, 2nd series, vol. ii.

Kimball of New York described in 1903 a case of gonococcal pyemia which had its starting-point in the mouth. There was no sign of any ophthalmia, or rhinitis, or vulvitis. The gonococcus was present in the blood and in the pus.

Chantemesse[1] has published the case of a foreigner who developed ten days after a coitus "ab ore" a urethral discharge which contained a great number of gonococci.

Von Geissler[2] quotes a similar case. His patient developed a gonococcal urethritis with positive microscopic findings four days after a coitus "ab ore." He had never had gonorrhea previously.

In cases of this kind the gonococci are often deposited in the mouth, which receives them for the moment without showing any reaction, and the infective material can be taken over by a second individual who is addicted to the same vice.

I have met with a very typical instance. A young man who was about to get married, and who on that account had broken off his relations with his mistress, who had lived with him for six years, went to a brothel a few days before the wedding was to take place. He practised a coitus "ab ore" in order "to safeguard himself against any possible infection," as he told me. Four days later he had a profuse discharge in which I found, to his great surprise, a considerable number of typical gonococci. He had never had any inflammation of his urethra previously.

Occasionally, however, the reaction set up by the gonococcus in the buccal cavity is intense. Thus, Malherbe[3] of Nantes met with a case of gonorrhea buccalis in which an intense stomatitis developed, which was accompanied by violent pain and the impossibility of swallowing. The pus contained gonococci, and the buccal mucous membrane was smooth, as if it were varnished. The lips were covered with a large number of small, irregular, superficial ulcerations, and the gums were edematous and loose around the margin of the teeth. At these places there was a good deal of pus. The hard and the soft palates were red, but not inflamed. Buccal irrigations with a 1 : 4,000 solution of potassium permanganate, and painting the ulcerations with a 2 per cent. solution of chromic acid in water, gave great relief, and effected a cure in five days.

Jurgens[4] has published a case of gonorrheal stomatitis in an adult in which the bacteriological examination established its true nature. The lesions were most marked at the free border of the gums, which were covered by a greenish-grey deposit and were horribly fetid. The buccal mucous

[1] *Soc. Méd. des Hôp.*, July 10, 1891.
[2] Von Geissler, *Wien. Klin. Rundschau*, No. 21, 1908.
[3] *Gaz. Méd. de Nantes*, October 14, 1911.
[4] Jurgens, *Berl. Klin. Woch.*, No. 24, June 14, 1904.

membrane was swollen, inflamed, and so painful that the patient experienced great difficulty in opening and closing his mouth. Salivation was so free that the pillow was saturated overnight. Improvement was only obtained after applications of a 0·15 per mille solution of corrosive sublimate had been resorted to. After repeated bacteriological researches, a diplococcus was ultimately found which showed the typical intracellular arrangement of the gonococcus. Cultivation on Wertheim's medium was also positive.

Ano-Rectal Gonorrhea.

The history of ano-rectal gonorrhea has been described by Mermet.[1]

Bumm in 1884 was the first to demonstrate the presence of gonococci in a purulent discharge from the rectum.

Horand in 1888 observed eight cases of gonorrheal proctitis in which the disease had been caused by direct spreading.

Frisch in 1891 made post-mortem examinations of individuals who had been suffering from rectal gonorrhea for six months, and found gonococci not only in the pus, but also in sections of the rectum.

Tuttle in 1892 published three cases of gonorrheal rectitis in which the pus contained gonococci.

Hartmann in 1895 quoted a case of gonorrheal ulceration of the anus with positive bacteriological findings.

Griffon[2] has reported the case of a youth of nineteen in whom gonococci were found by direct examination.

Dr. Jullien,[3] who is an authority on this subject, holds that ano-rectal gonorrhea occurs in 5 per cent. of all cases. It is much more common in women than in men.

Its causation is either indirect or direct.

1. **Indirect Causes.**—Ano-rectal gonorrhea is most commonly the result of the presence of a gonococcal focus in the neighbourhood of the terminal gut. In women, especially when they lie on their back, the gonorrheal discharge runs along the perineum, as it flows from the vulva, and thus reaches the anus. This organ collects the infectious material, owing to its funnel shape—a very favourable condition for contamination.

Indirect contagion is also met with under other circumstances. For instance, women have been known to infect themselves by taking an enema through a cannula which had been used previously for a vaginal douche by some other woman who was suffering from gonorrhea.

[1] Mermet, *Gazette des Hôpitaux*, May 2, 1896, No. 52, p. 531.

[2] Griffon, "Rectite à Gonocoques," *Presse Médicale*, February 13, 1897.

[3] Jullien, "Les Blennorragies Aberrantes," *Rev. Int. de Méd. et de Chir.*, April, 1905.

Rollet has reported the story of a man who was afflicted with chronic constipation, and was in the habit of introducing his index into his rectum in order to elicit defecation. This patient acquired gonorrhea, and subsequently inoculated his rectum with his finger.

2. **Direct Causes.**—Very often ano-rectal gonorrhea is the result of direct contamination through a coitus *contra naturam* (sodomy). Jullien quotes the following case: "Two friends, Orestes and Pylades, wished to honour the same lady. Orestes, who knew himself to be impure, was reluctant to soil the sanctum which Pylades should enter later on. He therefore worshipped Venus Callypyge, as he did not wish to divulge his secret or to betray his friend. Pylades, who suspected Orestes, thought it wise to be cautious. He therefore discarded the normal ritual and followed his friend's example. He was severely punished for his sin, and long after Orestes had forgotten his error, he continued to shed bitter tears."

Dr. Verchère has had many occasions during his visits to Saint-Lazare to convince himself of the great spread of sodomy. There are but few prostitutes, if any, who resist against these revolting practices. They unanimously state that hardly a day passes without some client asking for this "favour." Some day or other they all yield, enticed by the prospect of a larger present, and the majority of them finally allow their rectum and anus to be traumatized daily.[1]

Dr. Picker[2] has paid much attention to the gonococcal infections of the rectum which supervene upon abscesses of Cowper's glands, of the prostate, and of the seminal vesicles. He notes that in rectal infections of this kind the symptoms are often painful, consisting of a burning pain in the anus at the end of micturition or during defecation.

As a rule, ano-rectal gonorrhea is characterized by a complete absence of subjective symptoms. The patients make no complaint, they have no pain, and only become aware of their malady if they look for it carefully.

Brunswic[3] has called attention to this point. It is a great mistake to expect the anal and peri-anal tissues to be bathed in pus, and to be violently inflamed and excoriated. One sees no pus, and, in order to find it, it is necessary to explore the rectum with the finger. The discharge in no way resembles that of ordinary gonorrhea, which is creamy and yellow. It is brownish, and the gonococcus is seldom found in it amongst the huge number of other micro-organisms present.

[1] Verchère, *De la Blennorragie chez la Femme*, Paris (Rueff), 1894.

[2] Picker, *Centralb. f. d. Krankh. der Sexual Organe*, vol. xvi., November 21, 1905.

[3] Brunswic-le-Bihan, "La Blennorragie Rectale," *Bull. Acad. de Méd.*, 1907, p. 501.

In the florid state three important signs characterize ano-rectal gonorrhea, as Jullien has pointed out—namely:

1. The *drop*, which does not reach the anal orifice. In women it should be sought for by introducing the finger into the vagina, and pressing from above downwards on the recto-vaginal septum. Pus containing gonococci may thus be obtained.

2. The *fissure*, which is to be found at the posterior end of the anus. It is a narrow, superficial fissure which is usually hidden in a fold of mucous membrane. It seldom gives rise to bleeding, and takes a slow and indefinite course.

3. The *condyloma*, which is single, prominent, and elongated. It is thin, shiny, very soft, and almost painless. It is the revealing sign *par excellence* of ano-rectal gonorrhea.

Amongst the *frequent sequelæ*, collections of pus around the ano-rectal passage and strictures deserve a special mention. The latter are only too readily, and without any justification, labelled "syphilitic."

Brunswic-le-Bihan[1] recognizes three important complications:

1. **Acute Perirectitis,** which is really an ischio-rectal abscess and has the features of such. In the pus only *B. coli* and other members of the flora of the lower bowel are found. The rôle of the gonococcus is restricted to damaging the rectal epithelium. In this way a passage is made for the other organisms, but the gonococcus itself does not penetrate into the ischio-rectal fossa [or, if it does, it succumbs very rapidly (A. F.)].

2. **Chronic Perirectitis** is characterized by the formation of a firm, hard, sometimes almost cartilaginous sheath around the rectal walls, which grips them like a vice. It forms a more or less complete ring of variable width around the terminal gut, and produces a more or less noticeable bulging into the lumen of the rectum. This condition gives rise to a series of functional troubles, and is most tenacious and rebellious. One notes a heavy feeling about the rectum, or a sensation as if the gut contained a foreign body, tenesmus, defecation troubles, difficulty in and pain on emptying the rectum, and all the symptoms of rectal coarctation.

3. **Gonorrheal Strictures of the Rectum.**—This condition is, according to Brunswic, much more common than one should think, and occurs more often after gonorrhea than after syphilis.

Brunswic has, for instance, seen a young man of nineteen who suffered from a rectal stricture after having had several attacks of gonorrheal rectitis. He subsequently acquired syphilis (indurated labial chancre with typical submaxillary adenitis, roseola, and mucous plaques), which illness took a normal course. There can be no doubt that in this case the rectal stricture was gonorrheal, and not syphilitic.

[1] Brunswic-le-Bihan, *loc. cit.*

The course of ano-rectal gonorrhea is very similar to that of a gonorrheal urethritis—*i.e.*, in both instances the ultimate result is the formation of a stricture. The gonorrheal inflammation produces a thickening of the coats of the rectum, which form, as they retract, a ring or a cylinder constricting the lumen of the terminal gut.

The prognosis should be a guarded one in cases of rectal stricture. As Hamonic has pointed out, they soon affect the general health. A rebellious dyspepsia supervenes, and there is a gradually increasing difficulty in defecation. Finally, the motions lose their normal character completely. The patient suffers from a persistent diarrhea, which weakens and exhausts him.

Proliferative Rectitis.[1]—Ano-rectal gonorrhea assumes sometimes a proliferating character. Papillomatous growths form, which may either be sessile or pedunculated, and are described as "condylomata."

Treatment.

Gonorrheal proctitis should be treated in its early stage with irrigations consisting of boiled water or a weak solution of permanganate. If the anal sphincter is implicated, gauze ribbon, medicated with borax or iodoform, should be introduced into the anus. When the rectum is seriously affected, the best treatment is local therapy carried out under the control of the rectoscope.

Description of Luys's Rectoscope.—This instrument consists of a metal tube, fitted with a pilot, which is 18 centimetres long, and has an internal diameter of 2 centimetres. This is the usual size, but longer tubes, 30 centimetres long, have been made at my request, which allow one to examine the whole descending colon. The lower wall of the tube is fitted in its entire length with a small special tube, which opens about 0·5 centimetre within the distal end of the rectoscopic tube. The other extremity of the small pipe is branched and fitted with two taps. One of the latter communicates by means of rubber tubing with a closed vessel in which a vacuum is made by means of a filter pump; the other tap is connected with bellows which blow air into the rectum. The light is supplied by a minute cold lamp mounted on a long holder which is fixed to the handle of the rectoscope. This portion is attached to the tube after the pilot has been withdrawn.

On the handle is a movable mounted lens which has a focal length corresponding to the length of the tube. It also carries an electric switch, and receives the two connecting wires from the battery or main. Lastly, a small metal ring encircling a window is supplied, which allows one to

[1] Luys, "La Rectoscopy," *Revue de Gynécol. et de Chir. Abdom.*, June 6, 1910.

obturate hermetically the outer end of the rectoscopic tube when one desires to inflate the rectum.

One sterilizes the rectoscopic tube and its pilot by boiling, whilst the lamps and their holders are disinfected by formalin vapours.

Advantages.—The chief advantage of my rectoscope is the ease and the rapidity with which it enables one to cleanse the rectal mucous membrane. With other instruments a tedious and revolting preliminary operation is necessary if the rectal ampulla contains masses of feces. This scraping

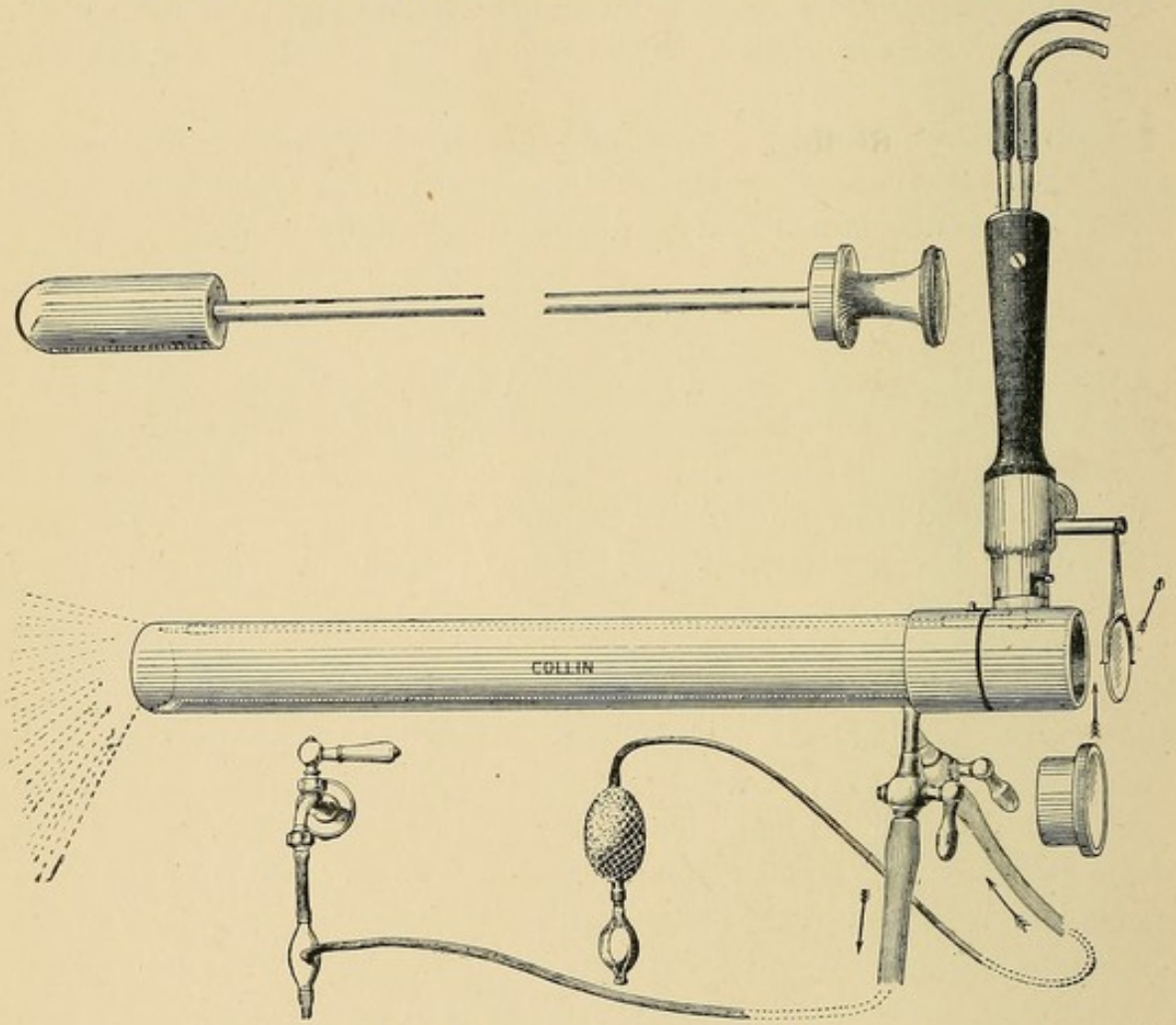


Fig. 129.—Luys's Rectoscope.

and wiping away of the excreta takes up a considerable amount of time, and is most disagreeable. It can be avoided by using my instrument. One has only to let some hot water run into the rectum through a cannula which one passes into the rectoscopic tube. In this way the rectal cavity can be properly cleaned, and any excess of fluid, and with it any impurities, are aspirated at once by the filter pump. The rectum is thus thoroughly cleansed mechanically.

Despite the reclining position in which the patient is placed, there are cases in which it is impossible to distend the rectum sufficiently. It then

becomes necessary to inflate the organ with air. The second tap fitted on the instrument is opened, and air enters the rectum from the bellows. Its pressure is maintained by closing the outer end of the rectoscopic tube with the little framed window.

Technique of Rectoscopy—*Preparation of the Patient.*—It is advisable to purge the patient on the night before the examination takes place. This is, however, not absolutely necessary. A few hours before the investigation an enema should be given, or else the patient should empty his bowels in the natural way before being examined. The bladder should be emptied by ordinary micturition.

Fig. 130.—Rectoscope in Use: Position of Patient and Surgeon.

In a previous visit one should have ascertained by digital examination if the rectoscope can be introduced to any distance, and if any tight stricture or a tumour is present.

Local Anesthesia.—It is well in the case of sensitive patients to anesthetize the rectum with a local anesthetic before passing the tube. This is readily done by introducing a small mounted swab into the anus which has been soaked in a 10 per cent. solution of stovain.

Position of the Patient.—The pelvis should be raised. The table shown in Fig. 130 is very convenient for rectoscopy. Firm supports should hold the shoulders and prevent the patient from slipping away from the surgeon.

The pelvis should just touch the edge of the table. The legs should be well separated and supported by stirrups or holders.

If the patient is thin, a highly inclined position is unnecessary. As soon as he is put on the slope, the abdominal contents fall back on to the diaphragm. Air enters spontaneously into the rectum and dilates it. In stout people the conditions are very different. The intra-abdominal plethora prevents the rectal cavity from expanding, and insufflation is required.

The sloping position recommended is infinitely better than the knee-elbow position advocated by some authorities. The latter is unpleasant and very tiring for the patient, and there is something revolting about it. Lastly, a good inclined plane permits one to graduate the entry of air more readily than the genu-pectoral position.

The Introduction of the Tube.—The sterilized tube and pilot are lubricated with glycerine, and brought into contact with the anus. The passing of the instrument should be effected with great gentleness and patience. It is well for the patient to bear down in order to relax his sphincter. When no obstacle is present, such as a stricture or a tumour, one reaches the rectal ampulla without any difficulty. After half or two-thirds of the tube has passed, the pilot is withdrawn.

Lavage.—The lower tap is connected with the filter pump by means of rubber tubing, and one inserts between the rectoscopic tube and the pump a vessel which allows one to see any impurities which may come away in the washings. One then makes sure that everything is in good working order, and this is indicated by a characteristic whistling sound in the rectoscopic tube. At this stage the other (insufflation) tap should be completely closed. One now runs some water into the rectum through a nozzle which one introduces into the rectoscope. The washings, which are immediately aspirated, remove all impurities, and are continued until they come out quite clear.

Illumination.—The lamp is now introduced into the tube of the rectoscope and the handle is firmly secured. The light is switched on, and the rectum is magnificently illuminated. Should one find that some fecal matter has been left in the gut, the irrigation is repeated until the mucosa is perfectly clean.

By proceeding in this fashion one obtains a more complete and more rapid cleansing than by swabbing with tampons—a tedious and unpleasant process. This cleaning by irrigation is of special value when the mucous membrane bleeds readily. Continuous irrigation carried out by an assistant is very useful in such cases. The rectum is examined *under water*. This method gives good results, and is preferable to all others.

Insufflation.—If the rectal cavity is not distended sufficiently after

the patient has been placed in the sloping position, it is advisable to insufflate the organ with air. For this purpose the aspiration tap is closed, and the other one, which is connected with the bellows, is opened. The outer end of the endoscopic tube having been shut by applying the mounted window, an assistant works the bellows until the rectum is sufficiently distended and can be examined easily.

The aspiration tap must be closed during insufflation, otherwise the mucous membrane would be aspirated, and pain and hemorrhage would follow.

The aspirator should never be working when the outer end of the rectoscopic tube is closed by means of the framed window.

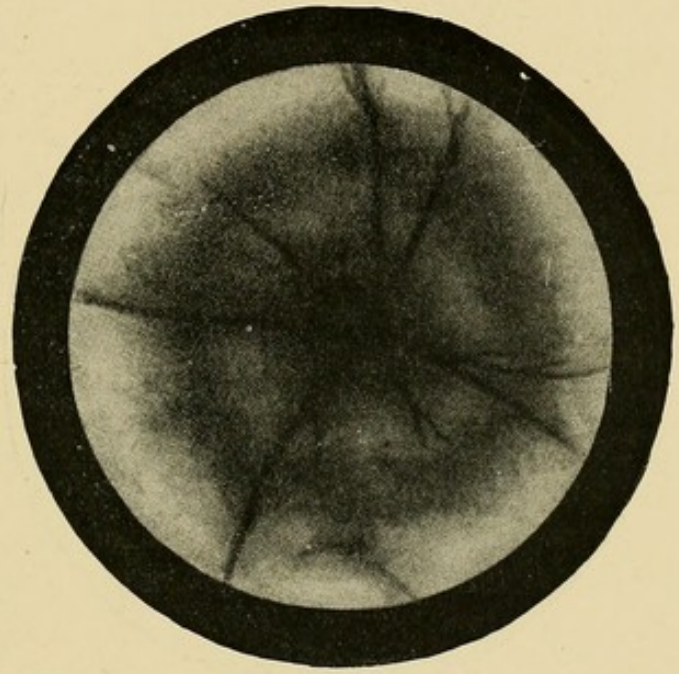


Fig. 131.—Gonorrheal Stricture of the Rectum

Value of Rectoscopy in Cases of Stricture of the Rectum.—The strictures of the rectum are usually situated low down, about 2 to 3 centimetres from the anus. Hence a digital examination should precede rectoscopy whenever one suspects the presence of a stricture of the lower gut. One can thus make out its position, and introduce the tube as far as the stricture. After the lavage has been terminated, the whole lower circumference and the lumen of the stricture are readily examined. This procedure gives valuable information.

It is well known that the proper treatment of rectal stricture is gradual and methodical dilatation. As a rule, this treatment is carried out in the dark by means of elastic bougies or metal dilators. In experienced hands such interventions are free from danger, but one should remember that they

have been followed by accidents, and that they are not free from danger. Perforation of the rectum, followed by peritonitis and death, has occurred on many occasions.

Fig. 132, which is drawn from Nature, shows a case in which the lumen of the stricture is excentric and helicoidal, instead of being in the centre. Cases of this kind bring home the danger of working without the guidance of the rectoscope, and the ease with which ordinary dilatation treatment may lead to perforation of the gut wall.

Methodical dilatation under the control of the rectoscope is thus the best and safest means of treating strictures of the rectum.

In fact, it is extremely easy to introduce through the firmly-held rectoscopic tube an elastic bougie with lead interior, and this instrument will

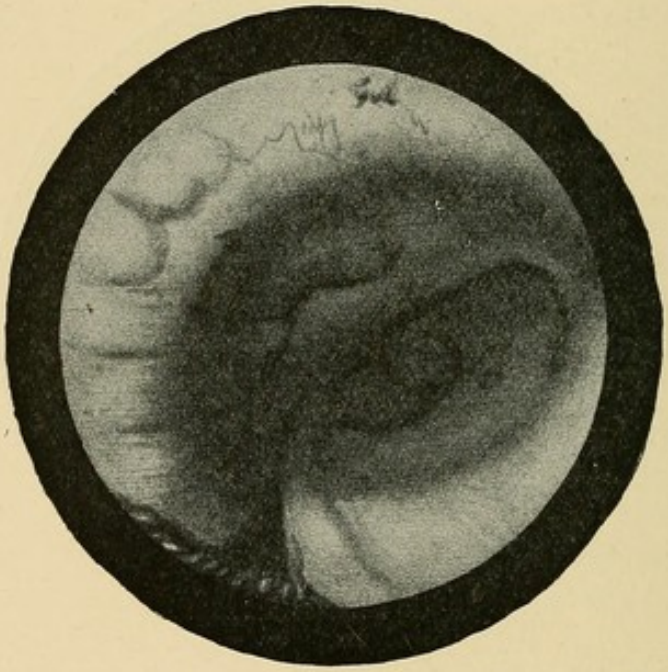


Fig. 132.—Excentric Stricture of the Rectum due to Gonorrhea.
Gradual dilatation under the control of the rectoscope avoids all danger.

enter the stricture by its own weight with a little manipulation. In this fashion the narrowing can be dilated properly and without any risk. "False passages" and disasters are impossible with this technique.

There are some other advantages connected with this method. Once a sufficient degree of dilatation has been obtained in the course of a few visits, the rectoscopic tube and its pilot are often available as dilators. Once they have passed the upper margin of the stricture, the rectal wall beyond can be examined. The exact length of the narrowing can thus be made out, and one can ascertain if any lesions are present above the stricture. Local treatment can be applied with advantage to any portion of the mucosa

which may have undergone ulceration or some other change on account of the presence of the stricture.

Tincture of iodine and a weak solution of silver nitrate are of great service in these cases, and when necessary direct applications with the cautery can be made—in the case of papillomata, for instance.

AFFECTIONS OF THE RESPIRATORY ORGANS OF GONOCOCCAL ORIGIN.

Nasal Gonorrhea.

This complication is very rare, exceptional even, although the pituitary mucous membrane is exposed to gonococcal infection, as it is so close to the eye. Andrew Duncan met with a case in which a young man developed nasal gonorrhea after having wiped his nose on a towel which was soiled with pus from his urethra. A special type of coryza supervened, which the author considered to be gonorrheal.

Several other observations plead in favour of the existence of nasal gonorrhea, but the experimental researches which some observers have undertaken have not confirmed these clinical findings.

Diday tried on eight or ten occasions to produce a nasal gonorrhea by rubbing the septum with a finger which had been soiled with gonorrheal pus.

Bonnière also failed in his attempt to produce a gonococcal infection of the nose by painting the pituitary mucous membrane with a brush which had been dipped into pus derived from a case of gonorrheal ophthalmia.

However, the coryza of the new-born deserves attention, and it would seem, if we may believe Jullien, that a number of cases of coryza supervening on the second or third day after birth are of gonococcal origin, and that they are contracted by the infants at birth from the gonorrheal infection present in the generative organs of their mothers.

Gonorrheal Pleurisy.

Gonorrheal pleurisy has escaped notice for a long time, and the mere coincidence of gonorrhea and of pleurisy is not sufficient to establish a causal relation between them. The few observations which were published before 1894 deserve, therefore, no credit, as the diagnosis was never certain and never based upon a proper bacteriological examination.

However, Guiard[1] relates two cases, one belonging to Chiaso and Fournier (1894), and another one due to Mazza, in which little girls of ten and eleven respectively had been raped, and were subsequently affected with pleurisy. The fluid aspirated from the chest contained in each case gonococci.

[1] Guiard, *Les Complications de la Blennorragie*, Paris, 1898, p. 391.

Félix Bertrand[1] has published the case of a woman who on the seventh day of her gonorrheal vaginitis developed a pleurisy with effusion. Examination of the fluid revealed the presence of gonococcus, according to the author.

In all cases noted and described the amount of exudate is moderate. The pleurisy is usually unilateral, and shifts in a remarkable manner. The effusion comes on in a few hours, and tends to disappear with equal rapidity.

Géraud of Nice[2] has published an interesting case of gonorrheal pleurisy in a young man of nineteen who had a profuse urethral discharge. The bacteriological examination of the pus withdrawn by aspiratory puncture from the chest gave a pure culture of the gonococcus. Thoracentesis was deemed necessary, and led to a complete cure. This is the first case of purulent gonococcal pleurisy which has been cured by a surgical intervention.

OCULAR COMPLICATIONS OF GONORRHEA.

By Dr. Péchin.[3]

Infection of the eye by the gonococcus is brought about in three ways:

1. By direct spreading from a focus in the neighbourhood. The infection of the eye is then a local complication. These cases may be disregarded here.
2. By exogenous infection.
3. By endogenous infection, metastasis, gonococcemia.

1. Exogenous Infection—Exogenous Gonococcal Conjunctivitis.

1. **Gonococcal Conjunctivitis in the New-Born.**—This affection is very common in infants whose mothers are suffering from gonorrheal vaginitis. The contamination usually takes place at birth, whilst the head of the infant passes through the vagina. Some of the secretion of the latter organ is carried along on the eyelids, and subsequently the infectious material finds its way through the palpebral fissure into the eye.

The inflammation of the conjunctiva supervenes on the second or third day after birth. An incubation period of four or five days is very rare, and an interval of six or seven days is quite exceptional. A conjunctivitis which makes its appearance after four or five days should not be brought

[1] Bertrand, *Arch. Gén. de Méd.*, October, 1895, p. 404; and *Thèse sur la Pleurésie Blennorragique*, Paris, 1896.

[2] *Bull. et Mém. de la Soc. de Méd. et de Climatol. de Nice*, 1912, No. 3.

[3] Dr. Péchin, who is a well-known authority on this subject, has very kindly consented to write this paragraph on gonorrheal affections of the eye, and we wish to make this an opportunity for tendering him our best thanks.

into connection with the birth. The contamination has occurred later either through soiled linen (mother and baby using the same towel), or insufficient antiseptic precautions when mother and baby are washed, or through another infant (maternity hospitals, children's homes, etc.). When the conjunctivitis is congenital, the infection has taken place *ante partum, in utero;* the membranes ruptured prematurely, and the gonorrheal secretions of the mother's vagina found their way into the amniotic sac.

The infection of the conjunctiva is characterized by a more or less free amount of discharge and a variable degree of swelling of the eyelids. Intense suppuration is very common, but there are benign forms with slight symptoms in which the infection is attenuated. Occasionally one meets with fulminating attacks, but they are not common. The symptoms are usually severe, and the disease takes a rapid and destructive course. Perforation, and even panophthalmia, supervene and defy all therapy.

The duration of conjunctivitis varies roughly from three weeks to two months, if no complications arise.

The most frequent complication of gonococcal conjunctivitis is an infection of the cornea which may lead to ulceration, perforation, retrochoroidal hemorrhage, lesions of the iris, secondary glaucoma, leucoma, staphyloma, panophthalmia, and anterior polar cataract.

Vulvo-vaginitis contracted in the same way as this type of conjunctivitis may in its turn lead to conjunctivitis.

Gonococcal conjunctivitis is the most serious form of conjunctivitis met with in infants. The chances of a complete cure without any corneal lesions depends on the promptness of the treatment.

For further details on the symptoms and on the treatment the reader should consult the textbooks on diseases of the eye.

The best prophylactic measure against ophthalmia neonatorum consists in putting a few drops of a silver nitrate solution into the conjunctival sac immediately after birth. One tends more and more, however, to replace the nitrate by organic silver salts, such as argyrol or sophol, which has been so warmly advocated by Von Herff.

2. **Gonococcal Conjunctivitis in Children and in Adults.**—Broadly speaking, gonococcal conjunctivitis takes a similar course in children and in adults to that met with in infants.

The prognosis is more serious, as complications involving the cornea are more common.

Most cases of vulvitis in little girls are due to gonorrhea, and vulvovaginitis is a frequent cause of gonorrheal conjunctivitis. Hence this condition should be sought for and should be treated. This fact should also be borne in mind from a prophylactic point of view.

2. Endogenous Infection.

Whilst the exogenous variety of conjunctivitis is well known, the endogenous gonococcal infections of the eye have been but little studied. They deserve to be called *metastatic*, but this term is usually reserved for those endogenous infections which implicate all the coats of the eyeball.

Endogenous metastatic infection due to gonorrhea may involve the conjunctiva, the uveal tract, the sensory apparatus of the eye, and Tenon's capsule, and it may lead to thrombosis of the central vein of the retina, and to dacryo-adenitis.

That these metastases should occur is not surprising, considering the vast number of other systemic complications of generalized gonorrhea.

1. **Conjunctivitis through Endogenous Infection—Spontaneous Metastatic Gonococcal Conjunctivitis—Sero-Vascular Conjunctivitis.**[1]—This gonococcal conjunctivitis, which is really an inflammation of the conjunctival epibulbar connective tissue (mucosa, submucosa, and episclerotic), is only found in patients who are suffering from gonorrhea. It thus differs from the form of conjunctivitis described above, which may occur in any healthy person, and is the result of a direct local contamination. Apart from this etiological difference, the clinical behaviour of the two kinds of conjunctivitis is very dissimilar. The exogenous type is serious; there is intense inflammation and a profuse discharge, so much so that it may be considered to be the paradigm of purulent conjunctivitis. The phenomena of reaction are marked (pain, photophobia, blepharospasm, etc.), and there is the great danger of the cornea being implicated. The metastatic form is mild in its symptoms, and the prognosis is a good one.

The eye is more or less red and hyperemic. The bulbar conjunctiva is slightly raised by a serous chemosis, but there is no discharge. The eye is not closed, there is no photophobia, and there is no pain. This condition lasts about ten to twenty days, and then disappears without leaving a trace. The vision remains perfect, and the cornea is never affected to any extent. At the most, a few phlyctenules may be found.

This conjunctivitis owes its origin to a generalized gonococcal infection, in the same way as gonorrheal rheumatism, for instance. It very often ushers in this latter complication, or it may accompany it, or it may follow immediately upon it.

It has the same shifting character as certain gonorrheal articular affections. It passes from one eye to the other, disappears, and recurs.

As a rule, the bacteriological findings have been negative in these cases. The gonococci have only been traced exceptionally in the conjunctiva, and then they were associated, just as in the case of joint lesions, with staphylo-

[1] Vide *Nouvelle Pratique Médico-Chirurgicale Illustrée*, vol. i., p. 1022.

cocci. One can therefore say that the gonococcal infection prepared the way for the staphylococci, which subsequently set up the conjunctivitis. The gonococcal toxin may also be incriminated, when no gonococci are found. But this is hypothetical.

The prognosis is favourable providing the inflammation remains limited to the conjunctiva.

2. **Gonococcal Infection of the Uveal Tract—Iritis—Choroiditis.**—Endogenous gonococcal infection is liable to affect the uveal tract, either secondarily or by developing a true gonococcal metastasis.

The iris may be implicated alone (plastic iritis, or purulent iritis with hypopyon, or hemorrhagic iritis), or so-called "serous iritis" may be present, in which case the whole uveal tract is involved.

Metastatic choroiditis has been often observed in cases of systemic infections. Primary lesions in the various regions may ultimately lead to this complication after the infection has become general.

It is generally not well known that gonococcemia gives rise to a metastatic choroiditis, and we wish to draw attention to this ocular complication of gonorrhea, especially as it occasionally supervenes at a very remote period. We have seen it to come on two, three, and even twenty-five years after the original infection. The metastatic choroiditis assumed a different course in these various cases, but it was always caused by a gonococcal infection of the genito-urinary organs which had not been cured, and which had remained latent for years. As the usual signs of chronic gonorrhea are absent, a methodical exploration of the genito-urinary organs is the only available means of tracing the true origin of this ocular affection.

The reader should consult one of the ordinary textbooks for a general description of metastatic choroiditis. The clinical aspect and the evolution of the malady vary with the nature of the infection and according to the part of the eye which is most affected.

The gonococci reach the eye through the blood-stream. In the case of the retina, they are conveyed by the arteria centralis retinæ; the uvea is reached through the long ciliary vessels. They travel to the iris through the anterior ciliary arteries, and to the choroid through the short posterior ciliary vessels.

A case which I saw together with Dr. Luys presented the following features:

A young man contracted an attack of gonorrhea in June, 1908, which took a serious course, and was followed within a month by a severe gonococcal irido-choroiditis, which led to the loss of the left eye. Despite this disaster, the patient did not think it fit to seek treatment. Four years later he consulted Dr. Péchin, who suspected that a general infection might have been the cause of the loss of the left eye. He persuaded the patient to have his urine examined. This was done, and M. Leclerc was able to

demonstrate the presence of Neisser's organism in the deposit. The patient was thus still suffering from gonorrhea, and it was highly imperative that he should be cured in order to safeguard him against further sequelæ of this prolonged infection, such as a metastatic infection of the remaining healthy eye. Dr. Péchin therefore sent him to Luys in November, 1912.

At this time the patient had no discharge, his urine was practically clear, and contained but a few filaments. The examination of the urethra with an exploratory bougie No. 24 showed no stricture, but the verumontanum was abnormally sensitive, and bled considerably as the olive passed over it. After a few dilatations with curved metal sounds the urethra was endoscoped. The prostatic fossette was quite healthy, and there were no lesions in the penile urethra. However, the bolster over the verumontanum was swollen and badly folded. The verumontanum itself was enlarged, bled as soon as it was touched, and resembled a raspberry. It was in a state of chronic inflammation.

This naturally rendered an examination of the seminal vesicles imperative, as they were most likely to be the starting-point of this inflammation. On massage, the prostate was found to be absolutely healthy, but the seminal vesicles were very painful and yielded well-marked casts. The presence of a chronic inflammation of the seminal vesicles was thus ascertained.

Regular massage of the vesicles and dilatation of the prostatic urethra by means of Frank's instrument were resorted to, and later on topics were applied to the verumontanum under the control of the urethroscope.

This treatment had the happiest effect. The seminal vesicles became less and less painful when massaged, and yielded less and less débris. The verumontanum ceased to bleed, although it was difformed.

Towards the end of January, 1913, the urine was again centrifuged, and sent to M. Leclerc for a bacteriological examination. Neither the gonococcus nor any other pathogenic cocci were found.

In order to make quite sure that the gonococci had completely disappeared, the seminal vesicles were carefully massaged, and the secretion was collected in a glass. M. Leclerc again made the examination, and found a number of spermatozoa, but, despite all efforts, he was unable to discover any gonococci.

There is thus little doubt that the patient in question harboured Neisser's organism for four years or so, and that the focus which sheltered them, was in the seminal vesicles.

3. **Optic Neuritis.**—Metatastic optic neuritis belongs to the same type as the gonococcal polyneurites and the cerebro-spinal lesions. In the same way as the gonorrheal infection reaches the chord through the arteries or veins, the optic nerve is affected through the blood-stream. This optic neuritis is an infective neuritis, and the chord, or even the brain, may be involved.

Other gonococcal lesions of the eye which deserve to be mentioned are—

Tenonitis (inflammation of Tenon's capsule).
Thrombophlebitis of the central vein of the retina.
Dacryo-adenitis.

Treatment.—The local therapy of the ophthalmic lesions of gonorrhea need not be mentioned here, as it is described in the textbooks which deal with the diseases of the eye.

When the infection is exogenous, local treatment is of the utmost value; but in endogenous cases it is often powerless.

Hence it is imperative to treat the primary focus from the beginning. To cure the lesions present in the genito-urinary organs is the best prophylactic measure against ocular complications. If carried out properly and at once, there is every chance of localizing the infection and of preventing complications. When endogenous ocular lesions have supervened, it still remains essential. By treating and curing the primary focus in the sexual organs, one does away with an unsuspected source of generalized infection, especially in the cases which develop complications at a late date.

NERVOUS COMPLICATIONS OF GONORRHEA.

It is perfectly feasible that the nervous system should be implicated when a gonorrheal infection becomes general and affects the whole body.

Cases of meningitis, neuritis, and myelitis, have been recorded.

Gonococcal Meningitis.

An instance of gonococcal meningitis has been published by D. Bieck.[1] A man of forty-eight who had been suffering from a chronic discharge for a year, developed a fresh discharge. After six days he became delirious and maniacal, and coma and death followed shortly afterwards. At the autopsy exudative patches were found on the cerebral pia mater, especially in the regions of the right frontal and parietal lobes. The microscopic examination of these exudates revealed the presence of the gonococcus.

Neuralgiæ of Gonorrheal Origin.

Of all forms of neuralgia met with in gonorrhea, *gonorrheal sciatica* is the most important. Professor Fournier has studied it carefully and demonstrated its gonococcal nature. Its onset occurs usually during the second or third month of the gonococcal invasion. It is sudden, lasts three to four days as a rule, and is very seldom present for more than fifteen to twenty days. It is most amenable to treatment, and often vanishes as soon as one manages to subdue the discharge.

Crural neuralgiæ and peripheral polyneuritis are also met with as complications of gonorrhea.

Gonorrheal Myelitis.

Hayem and Parmentier in 1888 were the first to draw attention to the meningo-medullary complications of gonorrhea. In the following year Dufour (1889) gave a complete résumé of the subject in his thesis.

[1] Bieck, *Wratschebnaja Gazeta*, 1907, No. 46.

In 1894 Barié also published a thesis on this subject.

The meningo-medullary complications of gonorrhea are rare. They usually supervene about the third or fourth week of the disease.

More or less severe pain in the lumbar region, accompanied by girdle pains, is noted. But the most characteristic symptom is a *paraplegia*, which usually comes on gradually, but occasionally it is complete at its onset.

Sphincter troubles are also met with: retention of urine and constipation; or the reverse, incontinence of urine and feces.

Clonic and choreic movements and localized contractions have also been observed.

The knee-jerks are usually exaggerated, but they may be diminished or absent. Ankle-clonus is also sometimes present.

Muscular atrophy has been noted repeatedly, and when present to a marked degree it is of serous import. A median eschar over the sacrum is also a very bad sign.

All these disturbances appear to be, in a certain number of the cases published, really due to the action of the gonococcus or of its toxin upon the meninges and the chord.

Marcel Labbé[1] has published the case of a man of thirty-five who had never had syphilis, and who developed joint lesions in his legs after gonorrhea. He became the prey of great muscular weakness, and was unable to stand; his lower limbs doubled up under him, and he experienced fulminating pains in his thighs and legs. For a few days he found it difficult to pass water, but he never suffered from incontinence of urine or feces. The muscular atrophy was well marked about the leg and the thigh; the reflexes of patella and of the tendo Achillis were exaggerated and produced some epileptiform tremor.

In November, 1910, I observed signs of medullary irritation in a patient of Dr. Drugman of Monte Carlo. The youth in point was suffering from a gonorrheal vesiculitis, and was being regularly treated with urethro-vesical irrigations for his gonorrheal discharge, when he suddenly developed acute retention. There was no mechanical obstruction, and rectal palpation failed to show anything abnormal in the prostate and in Cowper's glands.

The left seminal vesicle was slightly affected. It was not much swollen, but there were a few adherent nodules in it. The urethra was perfectly free, there was no trace of any stricture, and the urine was quite clear.

During eight to ten consecutive days he suffered from complete retention, which gave rise to intense pain, and had to be relieved by the passing of a soft rubber catheter.

As no local trouble was found which could be made responsible for the

[1] *Journal des Praticiens*, July 26, 1901.

retention, a nervous cause had to be considered, especially as the patient displayed signs of spinal irritation. His pupils were widely dilated, his patellar reflexes were much exaggerated, and ankle-clonus was also present.

Under rest in bed, regular passing of a catheter combined with urethro-vesical irrigation and massage of the seminal vesicle, the trouble cleared up, and the patient was completely cured.

The paraplegiæ are generally spastic, and accompanied by slight sphincter troubles and considerable muscular atrophy. They usually coincide with a mild attack of rheumatism, and are slight and curable, as a rule.

It seems probable that the gonococcal toxins alter the cells of the spinal cord, and produce foci of myelitis, traces of which have been found post mortem in a few instances.

The prognosis of gonorrheal paraplegia is favourable. Recovery takes place, as a rule, within a few months or a year. Sulphur baths, massage, and electric treatment of the muscles are of great value.

The therapy of meningo-myelitis should consist firstly in the removal of the main focus of the gonorrheal infection—*i.e.*, treatment of the urethra and its appendages—and secondly in appropriate symptomatic treatment of the various manifestations of the myelitis.

CEREBRAL COMPLICATIONS OF GONORRHEA.

The cerebral complications of gonorrhea are more obscure than those of the spinal cord.

Gonorrheal delirium has been described by Bourdon (1868), Bonnet (1877), insanity on a gonorrheal basis by Vidar (1875) in his thesis, and apoplexy by the same author. But the evidence produced is not absolutely conclusive.[1]

[1] See on this matter the curious book by Professor Silvio Venturi, *Corrélations Psycho-Sexuelles*, Lyon (Storck), 1899, especially p. 305 (A. F.).

CHAPTER X

GONORRHEA IN WOMEN AND CHILDREN

GONORRHEA IN WOMEN.

GONORRHEA in the female is a serious illness owing to its exasperating tenacity, and also owing to the formidable complications which frequently supervene. Amongst the latter metritis and salpingitis are by no means uncommon, and usually require in the end serious operations which mutilate the patient and render her sterile.

In women gonorrhea takes an essentially chronic course, and it is common to find the gonococcus remaining active in them for a considerable number of years. Moreover, to make matters worse, *most women are not aware that they are suffering from gonorrhea, and have not the faintest suspicion that they are contagious.* This statement is especially true in the case of young wives who have been infected by their husbands shortly after their marriage. This "gonorrhea of the innocent," as Verchère calls it, is by no means rare, as many a man suffering from gleet contracts a union without taking the trouble of seeing that he is cured, be it that the marriage is of financial advantage to him or that he is merely careless or ignorant.

Once infected, the women pay little attention to their illness as a rule, with the result that the lesions become more and more pronounced and very difficult to cure.

"All women are exposed to gonorrhea; it has no respect for social position and virtue," says Verchère, one of the greatest authorities on gonorrhea in women.[1]

Fournier's statistics show that this disease is far more common amongst kept women, actresses (138 out of 387), and working girls[2] (126 out of 387), than amongst the regular prostitutes (12 out of 287). This discrepancy is no doubt due to the exquisite knowledge of venereal diseases which many prostitutes can boast of. "They understand how to examine the man who is about to obtain their favours" (Verchère); they douche properly after each coitus, and resort to a series of other precautions which safeguard them.

[1] Verchère, *La Blennorragie chez la Femme*, Paris (Rueff), 1894.

[2] Factory girls, servant girls, etc.

The structure of the female generative organs, with its numerous folds about the vulva, the urethra, the vagina, and the uterus, offers admirable hiding-places for the gonococci, in which they thrive and are able to resist even the most carefully planned and best-conducted therapeutic efforts.

It is unquestionable that the overwhelming majority of women are infected through sexual intercourse.

But there are also other causes, as has already been pointed out in Chapter III. (p. 21). Inert objects, for instance, which are soiled with matter containing gonococci (towels, thermometers, nozzles, sponges, etc.) may bring about the contamination, and the cases are by no means rare in which ladies have been infected through their own toilet articles after they had been used during their absence by their diseased maids.

An instance in point which came under my personal observation is the following:

A married man, who had had relations with a young woman of twenty-four for a considerable time, noticed one day a discharge which seemed to him inexplicable. My "mistress has nothing; it must be herpes," he said when he consulted me. I was unable to find any gonococci in his discharge, and diagnosed an aseptic urethritis. Asked if I thought that his mistress had any disease about her genitals, I replied in the affirmative. He therefore sent me his young lady, although he did not believe me, and I examined her. She was suffering from a typical cervicitis. The cervix was swollen, hyperemic, and gave issue to a considerable amount of discharge, consisting of pus and blood. After a long cross-examination, she finally admitted that her discharge had come on after the use of an old and dirty instrument for a certain purpose.

The infection of the young woman and of her lover was thus explained.

The acute stage of gonorrhea is nearly always very short in women, and often escapes notice. Its intensity is most variable. There may be some slight itching about the vulva and the labia minora, or a burning sensation in the urethra during micturition.

On inspection the mucous membrane of the vulva is found to be congested, red, shiny, and sometimes edematous and covered with ulcerations. A whitish discharge which soils and stiffens the linen is present. The urinary meatus is red, puffy, and a bead of pus containing gonococci escapes from it either spontaneously or on making pressure on the urethra. The inflammation of the vagina is often intense, and renders all examinations impossible. Vaginismus is common and prevents sexual intercourse. There is so much pain that the vulvar orifice and the levator ani contract. The cervix is usually enlarged, congested, and ulcerated. A more or less free, and sometimes blood-stained, discharge is seen to escape from its os.

Bartholin's glands are frequently involved. Sometimes the pus is pent up in them, and an acute suppurative bartholinitis supervenes. In other instances the matter can be squeezed out of the gland by making pressure on the latter.

Gonorrhea takes a very slow course in women. The symptoms mentioned are often extremely mild, especially if the patient is very clean in her habits. The disease may then escape notice for some time, and only be recognized after serious and rebellious lesions have developed.

The gonococcus is capable of remaining dormant for many months, but once the conditions become favourable, it resumes its activity. This fact explains, for instance, the infections at long intervals which follow upon a marked orgasm and luxurious feeding, or occur just before or after menstruation.

Amongst the most common local complications, chronic urethritis, urethral stricture, chronic metritis, and salpingitis, deserve a special mention. It need hardly be stated that women who are suffering from gonorrhea are exposed to the same systemic complications as men: gonorrheal rheumatism, synovitis, pyelitis, cardiac lesions, etc.

Lastly, there is one complication which is more common in woman than in man: stricture of the rectum (*vide* p. 232).

We will now review the different local lesions which gonorrhea produces in women.

Gonorrheal Urethritis in Women.

The female urethra seldom escapes infection when a woman contracts gonorrhea. During intercourse the male organ is in intimate contact with the vestibule and the urinary meatus of the female, and thus direct contamination occurs readily, if the man has a virulent attack of gonorrhea.

In the beginning the urethral mucous membrane is of a bright red colour. A certain degree of ectropion is common. By pressing on the lower wall of the urethra, a considerable amount of greenish-yellow pus can be squeezed out of the meatus. Pressure on the urethra is most uncomfortable, and natural micturition is decidedly painful. Symptoms of cystitis often supervene at an early date, and show themselves by an increased frequency of micturition.

This acute stage is of short duration, and often passes off without having been noticed by the patient, who is not aware of any trouble, and does not complain of pain or any other symptom. In cases of this kind the urethritis can only be diagnosed by making a direct examination. One introduces a finger into the vagina, and presses from behind forwards the lower wall of the urethra against the posterior surface of the pubis. One obtains in this way at the meatus either a bead of pus or two or three small white specks, which represent the contents of inflamed urethral glands.

The technique of the examination of the female urethra has already been described (*vide* p. 113). It is important that the woman should not have made water recently, as one micturition is very often sufficient to

wash away all the gonococci which are on the surface. Hence a woman whosuffers from an inflammation of her urethra may, be perfectly harmless for a short time after she has made water, whilst she is virulent if intercourse takes place several hours after the last micturition. This fact also explains the possibility of a woman having connection with several men, and contaminating only one of them. In this respect the size of the male organ is also of importance. A small penis may not exert sufficient pressure to squeeze the morbid secretions out of the urethral glands, whilst a large organ is most likely to do so, and will probably be infected.

The intensity of the orgasm is also of importance. The resulting hyperemia is apt to drive any latent gonococci which may be hidden in some glandular crypt to the surface, and thus to favour contamination.

Nicolas Massa's rule ("Oportet non morari in coitu") is absolutely correct. An intercourse is ever so much more dangerous the longer, slower, and more "refined" it is. Menstruation is also not without influence. Some women are only infectious during their periods, owing to the menstrual hyperemia of their sexual organs.

The Course of Gonorrheal Urethritis in Women.—Gonorrheal urethritis may follow one of the two following courses: Either a *fibrous urethritis* ultimately develops, which is usually regarded, as in the case of man, as a process of natural cure—it leads to the formation of stricture; or a *proliferating urethritis* occurs which is characterized by the formation of little polypi. These vegetations may line a part or the whole of the urethra, and are often accompanied by slight hemorrhages from the passage.

In Fig. 133, which is drawn from Nature, an example of this condition is shown.

In other instances the infection extends to the numerous glands which surround the female urinary meatus, and a peri-urethritis results.

The exasperating tenacity of urethritis in women is due to the great number of glands which are situated not only within the urethral mucosa, but also in the mucous surfaces which surround the meatus. The latter glands are of special importance.

The structure of the mucous membrane is exactly the same in man and woman. The female urethra also has its glandular culs-de-sac and diverticula which correspond to the glands of Littre and the lacunæ of Morgagni in the male. Moreover, a great number of follicular glands arranged in two lateral groups are present in the neighbourhood of the meatus. Hamonic has given a good description of them.[1]

Para-urethral folliculitis, a frequent mate of gonorrheal urethritis, is characterized by small, red, shiny, slightly raised spots surrounding the

[1] Hamonic, "La Blennorragie Génito-Urinaire chez la Femme," *Revue Clinique d'Andrologie et de Gynécologie*, April 13, 1910, p. 97.

meatus. When pressure is made on them, they give issue to a little drop of pus from their excretory duct. Occasionally the outer surface of these glands is absolutely normal, and yet they are diseased. They should therefore be sought for systematically in all cases in which one wishes to form an accurate idea of the contagiosity of a woman.

These folliculites, and the fistulæ which are frequently found in connection with them, are diagnosed by pressing on them or by exploring them

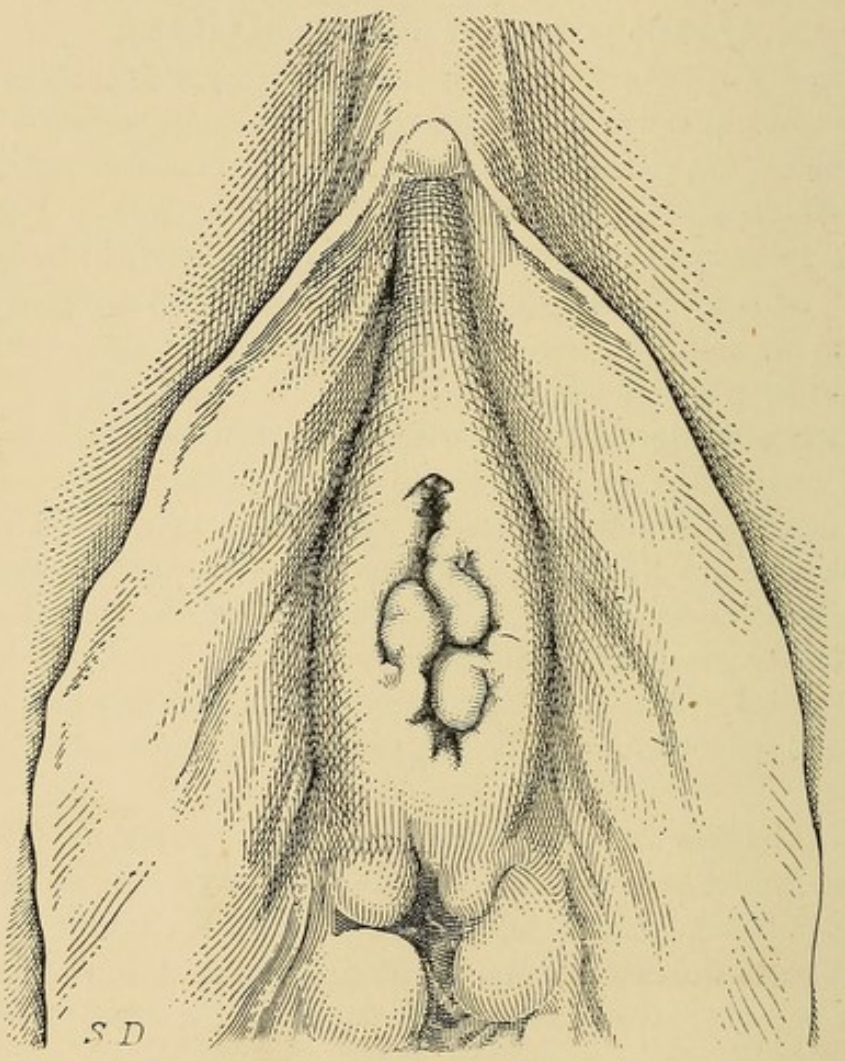


Fig. 133.—Urethral Polypi in Woman. (From Nature.)

with a small stylet. One often finds to one's surprise that a minute orifice which has barely the size of a pin's head, and only gives rise to an infinitesimal amount of purulent discharge, leads to a tract in which the stylet passes several centimetres.

Gonorrheal para-urethral folliculitis has a tendency to last indefinitely, as the infection becomes localized in the glandular crypts, from which it can only be dislodged with the greatest difficulty. Moreover, the small fistulæ which are the sequelæ of these follicular abscesses of the para-

urethral glands never heal spontaneously. They are apt to remain stationary for a very long time.

Para-urethral folliculitis is sometimes accompanied by small abscesses in the vestibule, which burrow their way more or less deeply into the tissues and cause great mischief. I have had occasion to observe two cases of such para-urethral abscesses which had been overlooked by other medical men and specialists, and could only be cured after a well-directed local therapy had been instituted.

Treatment of Gonorrheal Urethritis in Women.—Gonorrhea in the female should be treated in the same way as in man.

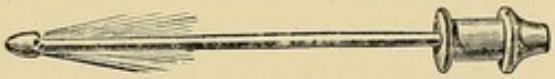


FIG. 134.—JANET'S SOUND FOR RETROGRADE IRRIGATION.

A similar general treatment is indicated, and the same hygienic precautions should be taken (*vide* Chapter XI.).

As soon as possible local treatment should be instituted, and this therapy should mainly consist of irrigations with potassium permanganate.

Technique of Urethro-Vesical Irrigations in Women.—One should always use a weak solution of permanganate; 1 : 8,000 to 1 : 4,000 is quite sufficient.

Before beginning the lavage, the patient should pass water into several glasses. One is thus able to see if the first glass alone is turbid, or if the turbidity is uniform.

Once the bladder is completely empty the patient is put into the speculum position, and if the urethra is very tender, it is anesthetized by injecting a few cubic centimetres of a 1 per cent. solution of stovain with a syringe. One then begins the irrigation.

FIG. 135.—ULTZMANN'S SOUND FOR IRRIGATING THE FEMALE URETHRA.

A special nozzle is required for the urethro-vesical irrigations in women. The best models are those of Janet and of Ultzmann. The irrigator should be about 3 to 5 feet above the level of the bed or couch. One introduces the nozzle gently into the urethra, and washes the passage with the permanganate. One then gradually passes it farther along the urethra until it reaches the bladder. By moving it to and fro the whole urethral mucous membrane can be cleansed properly. After a time one pushes the extremity of the instrument into the bladder and fills it with permanganate. When the desire to micturate supervenes, the nozzle is withdrawn, and the patient

is asked to pass the permanganate solution into several glasses. This technique allows one to clean the urethral mucous membrane very thoroughly, as the washings are made in two directions—from before backwards, and from behind forwards.

In many cases it is possible to teach the patient to carry out this treatment herself. Seated on a bidet, with her thighs well flexed and her body leaning against the back of a chair, she can manage to find her meatus by means of a mirror fixed at a suitable angle. After having separated her labia minora with the left hand, she can make her meatus gape and carry out the irrigation of her urethra and bladder.

When this irrigation treatment has been used for a few days, the discharge ceases and the urine becomes clear. This, however, does not imply that a cure has been effected. Far from it, and this is the most common reason for the tenacity of gonorrheal infection in women.

As the urethral mucous membrane is not very sensitive in women, they do not worry much about their illness, and as soon as they realize that their urine has become clear again, they hasten to cut short their treatment, with the result that in most cases the discharge reappears after a few days. When this occurs, one can be practically certain that a definite focus is present which was not affected by the irrigations. One should locate it by means of the urethroscope, as there is no other means of finding it. The female urethra is very short, and in many cases the urine dribbles constantly. It is therefore best to use Luys's direct vision cystoscope instead of the urethroscope. Its introduction is permissible as soon as the urine has become clear and the urethra has been dilated sufficiently (*vide* Chapter VIII., p. 182).

By means of this instrument the areas which contain the gonococci, and which prolong the malady indefinitely, can be made out. Sometimes one finds a little lacuna which the permanganate irrigations failed to reach; on other occasions little polypi or polypoid vegetations are present which shelter the gonococcus.

It is always advisable to make a urethroscopic examination as soon as possible. How necessary it is may be seen from the following case:

A young woman came to consult me in April, 1908, almost immediately after she had been infected. She had a definite urethritis, and the discharge from the urethra contained typical gonococci. There was no morbid secretion from the cervix, and scrapings of its mucous membrane were free from gonococci. Urethro-vesical lavage with permanganate was restored to, and after a few days it rendered the meatus dry and the urine clear; but as soon as this treatment was discontinued the discharge reappeared, and was of considerable amount.

Two anatomical conditions were especially unfavourable in this case—firstly the meatus was very narrow, and secondly a marked degree of cystocele was present, owing to which the meatus lay on a higher level than the urethra. The irrigations were

started again, and were combined with gradual and slow dilatation of meatus and urethra. After a few days the patient could be urethroscoped, and now a small focus was discovered on the lower surface of the urethra, which was opened by means of the galvano-cautery, and then destroyed by burning it. The irrigations were now discontinued, but the discharge reappeared once more. I therefore examined the patient with my direct vision cystoscope. The urethra was found to be quite healthy, but I discovered a big polypus with fleshy excrescences close to the neck of the bladder. As this papillomatous condition was obviously the cause of the recurrence of the discharge, I destroyed it with the cautery, and this time a complete cure was effected, the beer and the silver nitrate tests being both negative.

I saw the patient again after six months. She had remained well. The meatus was dry, and the urine was clear.

To resume, gonorrheal urethritis in women should be treated in the same way as in men. At the beginning, and as soon as possible, urethro-vesical irrigations should be resorted to. Once the meatus is dry and the urine clear, the urethra has to be gradually dilated with short straight sounds, until a sufficient degree of dilatation is reached to permit of the introduction of the urethroscope. The subsequent treatment depends upon the urethroscopic findings. Thus, some cases require to be irrigated and dilated by means of Kollmann's irrigating dilator, whilst others demand direct local applications (cautery, silver nitrate, tincture of iodine, etc.).

This is the truly scientific and methodical treatment of gonorrheal urethritis in women, and it leads to a certain cure.

This being so, we may be brief in our description of the various therapeutic measures which have been recommended for this affection.

Tamponade of the Urethra by Means of Mounted Tampons soaked in Ichthyol.—This treatment of urethritis in women has at one time been fashionable. Small swabs which were firmly mounted on sticks, were soaked in pure ichthyol, and passed into the urethra. One left them there for a few minutes, and then withdrew them. This therapy was undoubtedly followed by a certain improvement in many cases. But the number of relapses was endless, and thus there seems little justification in encouraging this usually inadequate therapy. The use of balsam preparations (sandalwood-oil, cubebs, copaiba, etc.) does also not appear to have given any definite and complete cures.

Écouvillonnage.—Verchère has recommended to brush the urethra with little tampons held by a pair of forceps. These swabs were soaked in a 1 : 30 solution of silver nitrate, or in a 5 per cent. solution of zinc chloride, or in corrosive sublimate of a strength of 1 : 5,000. One rubbed them all over the urethral mucous membrane.

This treatment cauterized the urethra and was rather painful. In some cases it was followed by retention.

Urethral Suppositories (Medicated Bougies).—Urethral suppositories have been recommended by Martineau, who used medicated bougies containing

2 to 6 milligrammes of corrosive sublimate. One of them was to be introduced every morning after the bath, and to be retained as long as possible. They were most irritating, and their action was very limited, as they could not influence any deeply-seated infection in the glandular crypts.

Bierhoff[1] prescribed suppositories consisting of cocoa butter containing 5 per cent. protargol. They were to be used after the urethra had been irrigated with a 1 : 4,000 solution of protargol, and were retained by means of a T-bandage.

The treatment of chronic urethritis in women must be accompanied by that of the commonly present para-urethral folliculitis.

For the cure of the latter, and of the fistulæ which so often result from them, a series of injections of silver nitrate or of zinc chloride into the glandular orifices has been recommended. There is no reason why one should not give this treatment a trial, if one has a very fine and blunt hypodermic needle, or one of the special cannulæ invented by Janet (Fig. 136), at one's disposal. But as a rule this therapy gives no perfectly satisfactory results.

The proper treatment of these para-urethral folliculites is the one which Diday outlined long ago: "The true, the only indication is to provoke

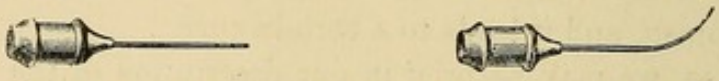


Fig. 136.—Janet's Platino-Iridium Cannulæ for the Para-Urethral Ducts and Skene's Glands.

by cauterization the obliteration of the abnormal cavity, and the only method which is of any use for this purpose is, owing to the narrowness of the passage, the introduction of a metal rod at red heat."

Even to-day this method appears to be the best one, especially as our modern instrumental outfit is greatly improved and provides us with finely-pointed cautery knives. The little operation itself is done by introducing a very sharp cautery blade into the follicle, whilst it is cool, and turning on the current. The fistulous tract is thus almost instantaneously destroyed.

Gonorrheal Vaginitis.

The presence of a gonorrheal vaginitis seldom passes unnoticed. The patient discovers a more or less profuse flow of pus from her vagina, which is often accompanied by pain on moving. Walking becomes troublesome, and if she is able to go about, she walks with her legs apart in order to prevent her painful and excoriated parts from rubbing against each other.

[1] Bierhoff, *New York Medical Journal*, January 11, 1908.

According to Verchère, the portions of the vagina which are most often affected, are the upper part of the posterior wall and the posterior fornix, whilst the anterior fornix is rarely implicated. This localization is supposed to be due to the fact that the uterus is the chief seat of infection. For this reason, the part of the vagina upon which the cervix rests, the posterior fornix, is the most diseased. Moreover, this latter structure is also the part most likely to be affected by direct contamination. It is in this fornix that the penis deposits the contaminating liquid.

Verchère [1] distinguishes several clinical types of vaginitis:

Congestive Vaginitis.—The whole vaginal mucous membrane is bright red, smooth, and glistening. It is covered by an adherent mass of yellowish pus, which accumulates in the vagina, and is sometimes retained in it. Its presence leads to a marked desquamation of the vaginal epithelium, which is characterized by a very adherent caseous and fetid coating covering the mucosa.

Granular Vaginitis.—In this condition the surface of the mucous membrane becomes irregularly roughened, and gives the palpating finger the same sensation as a cat's tongue. The mucosa is studded with more or less extensive granulations.

Diphtheroid Vaginitis (croupous vaginitis) is less common, and is characterized by a thick yellowish-white lardaceous coating, which adheres intimately to the vaginal wall.

The treatment of gonorrheal vaginitis consists mainly in vaginal douches with a 1 : 4,000 solution of permanganate, and should be completed by dressings which are destined to keep the inflamed walls of the passage apart. Tampons made of wool which have been impregnated with iodoform, salol, or glycerine, are useful for this purpose.

Gonorrheal Metritis (Cervicitis).

According to Wertheim and to Bumm, the gonococcus remains for a long time in the uterus after it has disappeared from the urethra and from the vagina. The gonorrheal inflammation is, however, nearly always confined to the cervix. Its spreading to the body is much less common.

The onset of gonorrheal metritis is often acute, and is ushered in by pain in the suprapubic region or in the loins, and by a copious discharge.

On examination with the speculum, the mucosa of the cervix is found to be puffy; its lips are everted and swollen; the circumference of the os is studded with small raised patches and little ulcers. Sometimes these excoriations coalesce, and form one large ulcerated surface. For cases of

[1] Verchère, *La Blennorragie chez la Femme,* Paris (Rueff), 1894.

this kind, the best treatment is a purely antiphlogistic one—rest in bed, ice on the abdomen, plenty of fluid to drink, etc.

The chronic form is much more common. The symptoms of chronic metritis are not characteristic of the illness. The periods are as a rule more painful and troublesome than they were previously. They are irregular, and come on before their time. They last longer than normally, and often start again after they had just ceased. There is more or less marked leucorrhea. The cervix is large and swollen. The body of the uterus may become implicated, but as a rule the cervix alone suffers.

Gonorrheal Endometritis.—An endometritis may develop as a result of cervicitis.

The implication of the body of the uterus in the gonorrheal process is characterized by general malaisé, fever, fatigue, and loss of appetite. At the same time, vague diffuse pains in the lower abdomen are complained of. They gradually radiate to the loins, and spread all over the abdomen.

On bimanual palpation, the body of the uterus is found to be enlarged and painful. The cervix is swollen and turgid, and gives issue to a permanent purulent discharge.

Endometritis nearly always becomes chronic. In some cases the inflammation of the womb reaches the tubes. An acute salpingitis, or suppurative ovaritis, and pelvic peritonitis with all its sequelæ, or pelvic cellulitis, are then liable to supervene.

Gonorrheal metritis is a benign disease in itself. But its complications render the prognosis less favourable, and, apart from those already mentioned, ophthalmia neonatorum has to be considered.

In the beginning, metritis should be treated by means of vaginal douches with permanganate. Vaginal glycerine tampons are not of much use. They bring about a marked decongestion of the cervix, but they have no effect upon the cavity of the uterus.

One of the best methods of treating the latter consists in the application of Bier's passive congestion therapy.

One uses for this purpose an elongated cupping-glass, the open end of which is placed on the cervix. Its closed extremity is connected by means of rubber tubing with a syringe, or preferably with a filter pump, which maintains the vacuum automatically.

The use of this instrument is very simple. The vaginal walls are held apart by means of a speculum. The cup is then brought into contact with the cervix, and suction is made, as long as it is left in position, by means of a syringe or a filter pump. In most cases the application lasts five minutes, and may be repeated every other day.

The aspiration is followed by the evacuation of the pus and slime from the cavity of the cervix, which becomes congested. This hyperemia is

recognizable by an exudation of blood, which is, however, usually slight.[1]

After a few applications the uterus is found to be less congested, and the symptoms are amended.

If used exclusively, this method of treating gonorrheal metritis is but moderately successful, but it gives excellent results if one combines it with immediate local applications to the cavity of the cervix.

It is therefore well to proceed in the following manner: Apply the cup, aspirate, and leave it on for five to ten minutes. Wipe away the secretions thus removed from the cervix, and then swab its whole cavity with a strong solution of permanganate if gonococci are present, or with silver nitrate or zinc chloride if the cocci have disappeared.

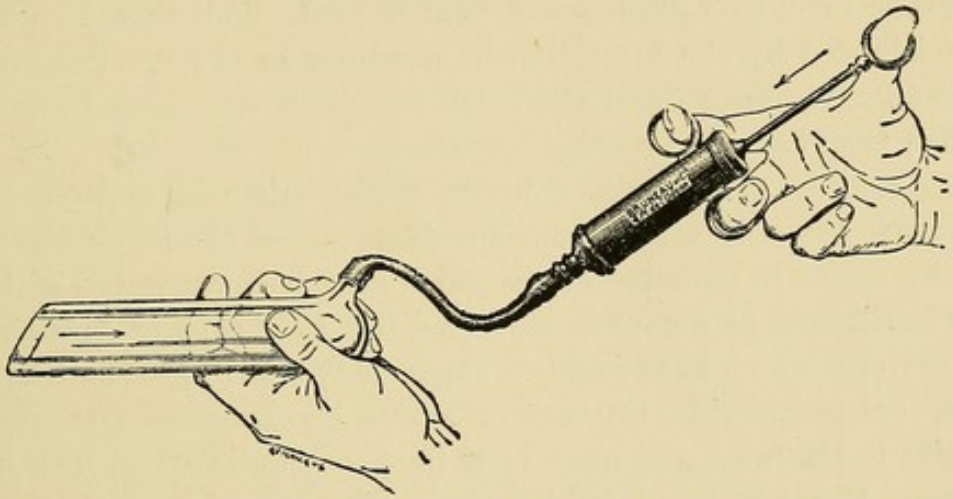


FIG. 137.—UTERINE CUP AND ASPIRATOR FOR BIER'S TREATMENT OF METRITIS. (Dr. F. Jayle.)

In certain cases this treatment can be usefully completed by dilating the cervix with Hegar's bougies.

Apart from the general treatment, consisting in rest in bed, hot douches, etc., gonorrheal endometritis should be treated by local measures. Painting the uterine mucous membrane with solutions of silver nitrate, tincture of iodine, zinc chloride, etc., gives very good results, but it seems as if here also dilatation were indicated. Slow and far-pushed dilatation of the uterus and prolonged uterine drainage, combined with antiseptic treatment of its cavity, are excellent measures against gonorrheal endometritis.

Intra-uterine irrigations with permanganate can be resorted to, but *they cannot be recommended, owing to their danger.* Whatever instruments one may be using, one can never be sure of the pressure of the liquid inside the uterus. The chances of the fluid being under pressure inside the uterine cavity are therefore very great, and if this be the case, it tends to seek an

[1] Jayle and Loewy, "Traitement des Métrites par Application de Ventouses sur le Col," *Presse Médicale*, December 14, 1907, p. 813.

outlet. It may find its way into the tubes, and may even reach the peritoneum, bringing on collapse, and later on peritonitis. Accidents of this kind have been by no means rare, and it is best to avoid these intra-uterine douchings.

Intra-Uterine Cauterizations.—Various methods of cauterizing the uterine cavity for rebellious gonorrheal endometritis have been used.

In the first place, *solid caustics*, such as sticks made of silver nitrate (Courty), have been employed. Their great drawback is that their action is blind. A caustic substance is left in the uterine cavity, which may either act too vigorously or too little.

Dumontpallier and Polaillon advised the introduction of crayons into the uterine cavity, which were composed of Canquoin's paste (1 gramme of zinc chloride for 2 to 3 grammes of flour of rye). This therapy was occasionally followed by the formation of strictures in the cervical canal—so much so that Professor Pozzi alone had to relieve two cases by operation which had been damaged by this treatment.

Liquid caustics, such as zinc chloride, weak nitric acid, and phenol, may also be used, but only after a previous dilatation of the cervix. They are applied by means of mounted swabs which have been saturated with them.

The instillation of a caustic is carried out by means of Braun's intra-uterine syringe, which has roughly a capacity of 3 c.c. Instillations of zinc chloride, iron perchloride, tincture of iodine, glycerine-creosote, etc., have been given in this way, and some have been very satisfied with their effect —Professor Pierre Delbet,[1] for instance. They are, however, often very painful. Dr. Siredy has given intra-uterine injections consisting of a saturated solution of picric acid by means of Braun's syringe.

A number of other methods have been advocated, such as the cauterization of the diseased uterine mucosa with superheated air (atmocausis). This therapy has proved disastrous on various occasions. Jayle was the first to recommend thermo-insufflation or insufflation of hot air into the uterine cavity.

The Electric Treatment of Metritis.—Electricity has been resorted to in the treatment of metritis, in France especially by Apostoli, in the form of intra-uterine electrolysis.

An electrode is placed inside the womb—this intra-uterine electrode is a massive, semi-rigid, semi-malleable stem which is rounded off at one end, and is usually made of some non-corrosive metal, such as platinum—and a second one is applied to the abdomen. It consists of a pad made of gauze or lint which has been saturated with warm saline solution.

If a trophic action on the uterine mucosa is required—for instance, in

[1] Pierre Delbet, *Ann. de Gynéc. et d'Obstétr.*, January, 1899; and in Duplay and Reclus's *Traité de Chirurgie*, vol. viii., p. 133.

cases of old torpid metritis—the negative pole is connected with the intra-uterine electrode, and a current of 30 to 60 milliampères is allowed to pass for four to five minutes. If ionization of the mucous membrane is desired, the positive pole is connected with the intra-uterine electrode, and the negative one with the pad on the abdomen.

Various metals have been used for the intra-uterine electrode. Popyalowsky uses a sound made of zinc. Dr. Donnat of Pau is a great advocate of ionization treatment for gonorrheal metritis. He uses a silver sound, which is passed into the uterine cavity and connected with the positive pole, the negative one being connected with the abdomen. The current should vary between 10 and 25 milliampères, and should be discontinued after five to ten minutes. At this moment the silver electrode is firmly adherent to the mucous membrane of the uterus, but it can be freed by reversing the current.

Curetting.—When the metritis is far advanced, and does not yield to the measures outlined, curettage should be resorted to. In acute gonorrheal metritis it is absolutely contra-indicated, for it would expose to an aggravation of the affection (Pozzi).[1] It is indicated only when all other measures have failed.

Lastly, when the lesions in the cervix are too inveterate, resection of the cervical mucous membrane (Schröder's operation) is advisable.

Gonorrheal Salpingo-Ovaritis.

Gonorrheal salpingitis is usually insidious in its onset. In most cases the woman is perfectly unaware of her illness, and only realizes the nature of her complaint after she has consulted her doctor.

In gonorrheal salpingo-ovaritis, bimanual palpation shows the ovary to be enlarged and displaced. As a rule it has moved towards the uterus, or dropped into Douglas's pouch. The tube is felt as a thick well-defined cord running outwards from the uterus towards the brim of the pelvis.

The functional troubles are chiefly menstrual—amenorrhea, dysmenorrhea, or great pain during the menstruation.

In cases of salpingo-ovaritis, it is essential to treat the metritis, in the same way as it is necessary in the case of man to treat the posterior urethra when an epididymitis is present.

In suppurative salpingitis with rapid pulse and high fever, a surgical intervention by the abdominal route is indicated after the acute inflammatory phenomena have subsided.

[1] Pozzi and Jayle, *Traité de Gynécologie*, Paris (Masson), 1901, 4th edit.

Gonococcal Peritonitis.

Gonococcal peritonitis is the outcome of the spreading of the inflammation of the tubes to the peritoneum.

This complication is, fortunately, not so common in its acute form. Its onset is often fulminating. The patient suddenly feels violent pains in her abdomen, which are accompanied by the characteristic symptoms of acute peritonitis—tympanites, vomiting, high fever, high pulse-rate, pinched, anxious face, prostration, and paralysis of the bowels.

The chronic form is much more frequent, and gives rise to characteristic findings on vaginal examination and bimanual palpation. Behind the uterus one feels a hard, resistant, very painful, doughy mass. Cases of this kind should also be explored *per rectum*, as very often valuable diagnostic information can be gained in this way.

Gonococcal peritonitis is characterized by its irregular course, in which exacerbations of variable intensity and remissions alternate, and its duration is almost unlimited. Hence quite a number of women suffering from this affection manage to pass a great part of their existence on a sofa.

It is permissible to begin the treatment, as in the case of salpingitis, by treating the uterus. Complete rest in bed and copious and frequently repeated hot (or even very hot) douches are indicated for the acute attacks. The application of ice-bags to the abdomen is often very useful in these cases, but as soon as possible, and when the general condition of the patient allows it, an operation should be performed, and the appendages should be removed.

Gonorrheal Bartholinitis.

Gonorrheal bartholinitis is usually unilateral, and perhaps more common on the left side. In the beginning of the gonorrheal infection the inflammation of one of Bartholin's glands becomes evident by the appearance of a swelling on the lateral part of the vulva. It is of variable size, directed from above downwards, and covered by a tense, red, smooth, and swollen mucous membrane. The inflamed gland can be easily felt between two fingers, and thus its consistence and volume, and the permeability of its duct can be made out. If the latter is patent, a greenish-yellow, often fetid, pus often escapes from the gland duct on slight pressure between the two fingers. Once the acute stage has passed off, the inflammation may become chronic, and this chronic bartholinitis is one of the most common localizations of gonorrheal infection in women. The orifice of the duct may give issue to a slight intermittent discharge, and subsequently a fistula may develop; or the abscess formed may burst in some part of the gland

or other, and lead to the formation of a fistulous tract of variable length, which is usually sinuous.

Gonorrheal bartholinitis is most tenacious, and apt to shelter gonococci for a long time. After the acute stage, with its characteristic findings, has subsided, there may be merely a painless lump left, which does not worry the patient. One should therefore make it a matter of routine to look for an inflamed gland of Bartholin, especially in chronic cases in which the contagiousness of the woman has to be decided. By palpating the labia majus and minus between thumb and index, Bartholin's gland can easily be made out. In chronic bartholinitis a small swelling of the size of a cherry or larger is palpable, which is painless. It runs away under the finger, like a cherry-stone.

Within a few months I had occasion to observe two absolutely similar cases of gonorrheal infection of Bartholin's gland.

In the first one I had to deal with a couple who had been together for several years. After having been separated for a few weeks they met again, and indulged freely in sexual intercourse. A few days later the man, who so far had been free from any gonorrheal infection, developed a profuse discharge, which was full of gonococci. The woman was most carefully examined, but no gonococci were found in the urethra, para-urethral ducts, cervix, or vagina. I, however, discovered that she was suffering from a chronic bartholinitis, and cured her by excising the gland.

The second case is almost identical.

It would thus appear that chronic inflammation of Bartholin's glands is of the same importance in women as chronic littritis and lacunitis in man. Like the latter, they often harbour the gonococcus for a considerable time when they have become infected, and they are apt to give rise to sudden recrudescences after long intervals—many months, and even years. These organs should therefore always be examined, and treated if necessary.

Acute bartholinitis is best treated by means of antiphlogistic measures in its early stage—hot baths, hot injections, etc. Once an abscess has formed, the knife should be used without any hesitation. It is better to excise the entire gland and its duct than to make a simple incision, which would probably only lead to a partial evacuation of the infected glandular pouches.

It is permissible to inject a solution of permanganate into the cavity of the gland by means of an instillation syringe fitted with a very fine needle, which one passes into the duct of the gland. This treatment may be carried out repeatedly, and may be combined with evacuatort massage. But efforts of this kind are seldom crowned with success, and then the surgical intervention (incision, or preferably excision) becomes necessary.

The operation is not very difficult. Once one has rendered the gland

prominent and incised the superficial parts on the inner side of the labium majus, a few snips with a pair of curved scissors free it from the neighbouring structures, and allow it to be shelled out. One liberates the gland in this way up to the duct, which one frees as much as possible. The latter is then ligatured at its far end. In certain cases the gland is so intimately adherent to its surroundings that it can only be separated with difficulty, or a certain amount of hemorrhage may take place. It is therefore always a wise precaution to insert a small drainage-tube, which is left *in situ* for twenty-four hours.

GONORRHEA IN CHILDREN.

Gonorrhea is by no means rare in children. Little girls are more often affected than little boys.

Wolbarst[1] observed personally thirty-seven boys between the ages of sixteen months and fourteen years who were suffering from gonorrhea. The greatest incidence of the infection was between four and ten years, and the diagnosis was established by microscopical examinations, which demonstrated the presence of gonococci.

The chief *indirect causes* are soiled clothes and the sharing of toilet articles. Certain parents are in the habit of taking their children into their bed, even when they are suffering from gonorrhea. Their bedclothes are soiled with the virus, and contaminate the children. The infection can also be conveyed by dressing the children in old discarded clothes which have been infected. Lastly, the common use of surgical instruments may be responsible. Wolbarst has witnessed the case of a little boy who was infected in hospital by having a dirty catheter passed.

Suchard[2] quotes an epidemic of vulvo-vaginitis which broke out in Lavey. Several little girls were infected. The epidemic lasted twelve to fifteen days, and was only stopped after the common swimming-bath had been disinfected.

The *direct causes* are usually to be found in precocious intercourse. This mode of infection is not common in our climates, but it is met with every day amongst the negroes in South America.

De Minine[3] has witnessed many cases of this type. The black children live in a state of nudity, and often indulge in sexual games, which are considered natural out there. They are viewed in the same light as the playfulness of young animals in which the rutting instinct is developing.

[1] Wolbarst, "Gonococcus Urethritis in Male Children," *Medical Record*, October 29, 1910, p. 766.

[2] *Rev. de la Suisse Romande*, November, 1877, vii. 675.

[3] Minine, *Journ. de Méd. de Paris*, June 8, 1895.

It is occasionally, however, also observed in Europe. Dr. Prat of Nice,[1] for instance, has published a case. The victim in question was a boy of four, who found it necessary to empty his bladder whilst he was playing with several other children. Too lazy to undo his clothes, he asked a little girl of seven to assist him. The young monkey jumped at the opportunity, and dragged the little man into a deserted corner. She undid his clothes, lifted up her skirts, and cuddled him. After a few days little Arthur had great pain on making water, and his mother discovered that his clothes were soiled with pus and blood. The penis was violently inflamed and swollen. The desire to micturate became very frequent, and the pain kept the child bathed in tears.

Other direct causes are to be found in sexual perversity, such as sodomy and the intercourse with minors. The rape of little girls and the assaults committed by grown-up women on little boys are important sources of infection. The last-mentioned outrage is by no means rare. The child's enemies are often in the household (maids, governess, etc.). Dr. Chaumier of Tours has collected eleven cases of this kind.[2]

Gonorrhea in Little Boys.—Gonorrhea takes the same course in boys as it does in adults, and is characterized by a definitely purulent discharge. There is generally considerable inflammation and edema of the prepuce. Retention of urine is also not uncommon. The latter is chiefly due to the intense pain on micturition, which frightens the child, and induces him to delay the act to the last moment.

Gonorrhea in boys may heal without leaving a trace, but usually some hall-mark is left, such as a stricture.

Kammer has reported on a boy of two and a half who developed retention one month after the onset of his illness. He was found to be suffering from a stricture, through which not even the smallest sound could pass. The bladder had therefore to be punctured, and this measure had to be resorted to on three consecutive days. Under ether three strictures were discovered in the anterior urethra, and an impassable one at the level of the membranous portion.

Amongst the other complications, purulent ophthalmia is common. Cystitis has also been observed, but so far no case of epididymitis has been reported to our knowledge.

Gonorrheal rheumatism of the acute arthritis type has also been known to occur.

As a rule, these complications subside, but Wolbarst has met with a case in which cachexia and death supervened.

[1] *Bull. et Mém. de la Soc. de Méd. et de Climatol.*, vol. xxxv., March, 1912, p. 77.

[2] Édmond Chaumier, *Étude Clinique sur les Maladies des Enfants*, Paris (Asselin), 1909.

The treatment is the same as for adults. Special attention should be given to the prepuce, as most boys have a certain degree of phimosis.

The glans and the balano-preputial sulcus should be kept very clean, and, if necessary, circumcision should be performed without hesitation, in order to prevent a paraphimosis.

Gonorrhea in Little Girls.—In little girls the infection may escape notice for a time, but sooner or later a profuse vaginal discharge comes on which soils the linen. The vulva is in a state of redness, which is accompanied by irritation, and often by an intense erythema—vulvitis of little girls.

The acute symptoms soon subside, and make room for a chronic condition, which may last for a very long time. In fact, the grave character of this disease lies in its long duration and its often exasperating rebelliousness against treatment.

The same complications as in boys, such as cystitis and gonorrheal rheumatism, are also found in little girls.

The treatment is often exceedingly difficult. The parts are so very narrow, and there is the great danger of the disease spreading to the uterus. If this occurs, one is confronted with a very difficult task, as one can hardly reach that organ when the hymen is intact.

The general plan of treatment is the same as for adult women. Irrigations with a 1 : 8,000 solution of permanganate are to be recommended.

CHAPTER XI

THE TREATMENT OF ACUTE GONORRHEA

ALTHOUGH it is a matter of daily practice, the treatment of gonorrhea is complex and difficult. Both the patient and his medical adviser have to devote much thought, care and time to it. It is essential to base the treatment on a rigorously accurate diagnosis in the manner outlined above. The object of all therapy must be to apply the rational treatment which they require to the lesions found in the urethra, and for this purpose the anatomical and pathological findings described above have always to be taken into consideration (*vide* Chapter V.).

As soon as the gonococci invade the urethral mucosa, a reaction takes place which is characterized by a dilatation of the capillaries and the diapedesis of a countless number of leucocytes, which tend to engulf and to destroy the organisms. The resulting suppuration is thus a salutary measure which is necessary for obtaining a cure.

In acute confirmed gonorrhea the treatment should never aim at a radical and immediate destruction of the pathogenic organisms. Its chief and primary object should consist in aiding Nature's efforts and not in opposing them.

We know that during the first hours after infection the gonococci are on the surface of the mucous membrane, and that they very soon—*i.e.*, within twenty-four to forty-eight hours at the most—penetrate between the interstices of the epithelial cells into the substance of the mucous membrane. Once this has occurred—*i.e.*, four days after the infection took place—there can be no hope of killing the organisms immediately by means of injections or irrigations. The gonococci are deeply situated in the mucosa, and are beyond the reach of any antiseptics which one may pour on to the epithelium.

We have to consider—

1. The prophylaxis against gonorrhea.
2. The antiphlogistic treatment.
3. The treatment of confirmed gonorrhea.
4. The abortive treatment.
5. The treatment of posterior urethritis.
6. The serum therapy of gonorrhea.

1. The Prophylaxis against Gonorrhea.

A prophylactic treatment of gonorrhea is evidently the most satisfactory form of therapy. To know the evil and to prevent it is undoubtedly the best advice.

In the case of gonorrhea, the human brain has been working in this direction for a long time, alarmed by the great frequency of the illness, and of its sequelæ, which are so often disastrous.

In the first place, the factors which predispose to infection should be avoided. Ricord has given a list of them in his famous recipe (*vide* p. 22). By doing exactly the opposite of his instructions one is able to diminish one's chances of being contaminated.

In suspicious cases one should finish the coitus rapidly, without delay, ejaculate promptly, abstain from all prolonged excitation and repetition, and avoid all causes which delay the ejaculations, such as physical fatigue and inebriety. These are excellent precautions.

Finger has dwelt upon the importance of Littre's glands, situated in the anterior urethra. They undergo compression during each erection, owing to the vascular engorgement. An *alkaline* liquid is thus squeezed out of the numerous glandules, which appears at the meatus: *urorrhea ex libidine*. It is a clear viscous fluid which is secreted in variable quantities, and is alkaline. Any trace of acid left in the canal by the urine passed at the last micturition is thus neutralized. This alkalinity favours the vitality of the sperma, which passes soon after. On the other hand, it renders the mucous membrane more susceptible to gonococcal infection. It becomes sodden, and loses its resisting power, and thus it becomes easier for the gonococcus to fix itself on it and to enter its substance.

This explains why *immediate micturition after coitus* often successfully prevents contamination. The urine acidifies again the urethra as it is passed, and washes away the infective material. It may even kill the cocci deposited on the mucous surface. Immediate micturition *post coitum*, and even washings of the glans with urine, have been a popular prophylactic measure against gonorrhea for a long time.

Further precautions of value are: Before intercourse takes place, the woman should make water, take a vaginal douche with 1 : 10,000 perchloride of mercury solution, and introduce a vaginal sponge in order to protect the male meatus against any secretions from her cervix. Abstinence from intercourse during and immediately after the periods should always be insisted upon, as a flaring up of the infection is so very common under the circumstances. With these precautions one is in most cases protected against the gonococcus.

Apart from these simple, but unfortunately not always efficacious, pro-

phylactic measures, there are others which are more reliable, and have been discussed of late by Janet,[1] namely:

1. The condom, French letter (*capote anglaise*). In order to insure protection, it should neither come off nor burst. There are many men who have a marked aversion against its use. It is said to be a kind of cobweb against the danger, and an armour against pleasure.

Two kinds are made—(1) skins and (2) rubber letters. The former (*baudruches*) are made from the cæcum of sheep. They are very strong, and last for a long time. But they are inelastic, and require to be moistened when applied. The rubber pouch is more convenient, but it is thicker and much less reliable. Of late, the swim-bladder of fishes has also been used for making French letters. They are the thinnest and the most supple pattern, but they tear very easily. Certain people find that these appliances inhibit the functions of their generative organs to such an extent that they cannot possibly use them.

Guiard[2] has rightly called attention to the danger of accepting preservatives offered by women. They not infrequently use the same ones over again, and thus the contamination may be brought on directly through their use.

2. The filling up of the meatus with vaseline before connection is recommendable, if one takes care to withdraw the organ immediately after ejaculation.

3. The washing of the glans, meatus, frenum, and scrotum, with soap, or, better, with perchloride of mercury and soap, immediately after the act is an excellent prophylactic measure, which is usually successful if properly done. The soaping should be as complete as possible, and should be followed immediately by the application of a 1 : 2,000 or 1 : 4,000 solution of corrosive sublimate. Tabloids are very convenient for this purpose.

4. Injections of antiseptics by means of a syringe immediately after connection are to be avoided, as they are dangerous, and may lead to accidents or to the production of an irritative urethritis in inexperienced hands.[3]

5. Instillations into the fossa navicularis of a few drops of an antiseptic solution, such as 20 per cent. protargol, recommended by Frank of Berlin, seem, on the other hand, to represent an excellent means of aborting an attack of gonorrhea. The instruments on the market are—Blokusewski's[4]

[1] Janet, *Revue de Thérap. Méd.-Chirurg.*

[2] Guiard, *Traitement Abortif et Prophylaxie de la Blennorragie.*

[3] This view is not shared by Guiard. He recommends ten injections of 1 : 10,000 permanganate immediately after coitus. A syringe of 20 c.c. capacity is used, and this treatment is to be repeated twice or three times during the day. The liquid should, naturally, only fill the anterior urethra.

[4] Blokusewski, "Zur Verhütung der Gonorrhoischen Infektion," *Dermat. Zeits.*, 1895, No. 22; 1899, No. 5.

"Samariter," a large drop-bottle, worked by means of a rubber membrane, which contains a 10 per cent. solution of albargin; and "Viro," a little box with six paint tubes filled with 20 per cent. protargol. The contents of a tube are squeezed into the fossa navicularis after coitus. A piece of the cotton-wool contained in the box is then used to obturate the meatus and to prevent the linen from being soiled.[1]

Dr. Grosse[2] advocates oxycyanide of mercury as "prophylacticum," and has devised the "Selbstschutz," which is composed of two parts: a tube of the size of a pencil, 3 centimetres long, with a white cap, which contains a 1 : 1,000 solution of oxycyanide of mercury, and another tube of similar size, with a red cap, containing a mixture of sterilized lanoline and vaseline. Before connection, the glans and prepuce are inuncted with the vaseline mixture, and after coitus a little mercury is injected into the urethra and retained for a minute. The remainder of the solution is used for washing the parts.

Drs. Spitzer,[3] Frank,[4] Zeissl,[5] Steckel,[6] Salmon and Rheuss,[7] have also introduced similar contrivances for the same purpose.[8]

Henry[9] recommends the following formula:

Calomel	50 grammes.
Liquid vaseline	80 c.c.
Lanoline	70 grammes.

The injection of this mixture is carried out by means of an ordinary glass syringe, and is said not to be followed by any irritation.

Henry's results have been most satisfactory. Of 529 sailors who had exposed themselves to infection, only four acquired gonorrhea.[10]

All these prophylactic measures reduce the risks, but they *do not guarantee against infection.*

2. The Antiphlogistic Treatment of Acute Gonorrhea.

Antiphlogistic treatment is not destined to cure, but to relieve. As acute gonorrhea is a cyclic disease, its course should not be interfered with, but favoured.

[1] Stordeur, *Rev. Prat. des Mal. des Org. Génito-Urin.*, Lille, July 17, 1909.

[2] Grosse, *Münch. Med. Woch.*, 1905, No. 2.

[3] Spitzer, *Allgem. Wien. Med. Zeits.*, 1907, No. 2.

[4] Frank, "Zur Prophylaxis des Trippers," *Allgem. Med. Centr. Zeits.*, 1899, No. 5.

[5] Zeissl, *Wien. Med. Woch.*, 1901, No. 8.

[6] Steckel, *Klin. Therap. Woch.*, 1901.

[7] Salmon and Rheuss, *Méd. Moderne*, 1903, p. 404.

[8] The text of the original gives a fuller description of these proprietary articles. They are all very much alike, and of doubtful value. Moreover, we do not wish to advertise this outcome of German pharmaceutical enterprise (A. F.).

[9] Henry, *The Military Surgeon*, vol. xxx., May, 1912, p. 590.

[10] I am afraid that this prophylaxis is based on views belonging to the pre-Hunterian period (A. F.).

The antiphlogistic treatment of gonorrhea was one of the first to be invented and to be used, its beneficial effects having been recognized empirically a long time ago. It has been chiefly advocated by the French school, by men like Cullerier, Fournier, Diday, Horteloup, Mauriac, etc. Its aim is to facilitate the running, and it even favours the development of the gonococcus in the initial stage.

Its first indication is to remove all factors which could influence the disease unfavourably. Complete rest in bed, although highly desirable, will seldom be consented to, and thus one has to content oneself with forbidding all violent exercise (running, dancing, gymnastics, long walks, swimming, riding, excursions in a motor-car or on a cycle, etc.).

Suspensory Bandage.—The wearing of a well-fitting and suitably padded suspensory bandage is to be recommended. It should support both the penis and the scrotum, and keep them at rest without compressing them.

A bandage which fixes and supports the scrotum only, is not sufficient, especially in acute cases. The penis also requires a suspensory bandage which keeps it in a vertical position. The normal bend of the urethra at the peno-scrotal angle is a point of lesser resistance in which lesions are apt to develop. Practical experience bears out this fact; for one commonly finds in chronic cases localized diseased areas at the peno-scrotal angle.

It is therefore necessary to do away with this curve. The ordinary suspensory bandages are of no use for this purpose; many of them even accentuate the angle. Paul Asch[1] therefore rightly recommends the use of a special bandage, by means of which the penis can be straightened out and be attached to the abdomen. It obliterates the peno-scrotal angle, and prevents the pus from being pent up in the perineo-bulbous portion.

This result can also be obtained by fixing a suitable sheath (like the finger of a glove) to an ordinary bandage. The penis is placed into the pouch, which is attached at its closed end to a ribbon worn around the neck. In this way the organ is kept erect.[2]

All sexual intercourse should, naturally, be strictly forbidden. The same statement holds good for sexual excitement, and therefore thoughts, pictures relating to sexual matters, lascivious literature, female company, and certain theatres and plays, should be avoided.

The **Diet** requires careful attention. Spicy and indigestible food should be avoided. Very acid or salty dishes, asparagus, tomatoes, game, shellfish (lobster, langouste, etc.), are injurious. In a few words, all substances which bring about constipation or excite the generative organs are contra-indicated.

[1] Paul Asch, *Mikroscopische Beiträge zur Diagnose, Therapie und Prognose des Trippers and seiner Folgen*, Berlin, 1907.

[2] *Vide* also Roucayrol, "De l'Utilité d'un Suspensoir de la Verge dans l'Urétrite Aigüe," *La Clinique*, December 27, 1907, p. 829.

The **Intake of Fluid** should also be regulated. A great quantity of liquid is one of the best means of diminishing the pain during micturition. Undiluted wine, liqueurs, beer, cider, whisky, champagne, aqua vitæ, strong tea and coffee are harmful. A moderate amount of wine may be allowed with the meals, if it is well diluted with water; for instance, a little claret in preference to burgundy, mixed with plenty of Vittel or Evian, or a slightly alkaline water (eau de Pougues). Highly recommendable are certain infusions made from plants, such as dog's tooth, cherry stalks, or buchu, and fruit syrups, such as cherry, raspberry syrup, etc.

One takes a glass every two to three hours, to which 15 grains of sodium bicarbonate have been added. The association of sodium salicylate and sodium bicarbonate is also excellent, as prescribed by Balzer:

Sodium bicarbonate	30 grammes.
Sodium salicylate	10 ,,

Two teaspoons of this powder are added to a litre of lemonade taken between meals.

Or one may simply prescribe a little salicylate (2 to 3 grammes per day). Between meals the infusion is taken. One of the best is the one made from folia uvæ ursi according to Chevalier's formula: three cups per day, a teaspoon of the leaves per cup, and every cup is flavoured with a teaspoon of the following:

Syrup of tolu	300 grammes.
Sodium benzoate	15 ,,

Tobacco is a stimulant to non-smokers, but smokers are usually immune in this respect, and therefore there is no need to forbid its use.

The patient should be most clean in regard to his person. He should wash his hands every time he has touched his penis, and should be very careful not to bring his hands near his eyes when they are soiled with pus, as he would thus expose himself to the danger of contracting a violent conjunctivitis. It is best to cover the inflamed meatus with frequently renewed pieces of wool, which are replaced at the end of each micturition. Thorough cleansing of the hands every time the generative organs have been touched must be insisted upon.

Warm baths of long duration, say at 97°, and lasting forty-five minutes, are to be recommended, and should be taken at least three times per week. Local washings of the penis should be made with hot water, as hot as the patient can bear. They have a marked decongestive action. In some cases ice-water used in the same way gives excellent results.

The genitals should be kept scrupulously clean. The glans should be frequently uncovered and be carefully washed, as well as the balano-preputial

fold. One has often observed recurrences in patients who, unaccustomed to cleanliness, failed to wash their balano-preputial sulcus.

Urinary Antiseptics.—Urotropin, or one of its substitutes (uraseptine, helmitol, urodonal, etc.), is to be recommended in doses of 1·5 to 2 grammes per day.

Local Blood-letting is an excellent sedative for very acute cases, and gives marked relief. Fifteen to twenty leeches may be applied to the perineum for that purpose, but not to the penis.

Against Erections.—Camphor, in the form of bromide of camphor, is an excellent sedative, and a cachet, containing 0·75 to 1 gramme, may be prescribed, which is taken half an hour before going to bed. Belladonna, nenuphar, lupulinum, and potassium bromide, have but an uncertain action. Opium, either pure or associated with antipyrin, is more reliable, and is best administered as an enema composed of warm water, 10 to 20 drops of laudanum, and 1·5 to 2 grammes of antipyrin.

Duration of the Antiphlogistic Treatment.—The antiphlogistic treatment should be carried out as long as there is pain during micturition and during erection—*i.e.*, usually for a fortnight.

3. The Treatment of Confirmed Gonorrhea.

The local treatment is nowadays the most important part of our therapy for gonorrhea. The medicinal and hygienic presciptions are purely adjuvants, although they are very useful.

Various methods are employed for the local treatment, namely :

1. Urethro-vesical irrigations without a catheter.
2. Injections.
3. Balsam therapy.
4. Treatment by means of Bier's method.

Lastly, there are some special points in connection with the treatment of acute posterior urethritis which will be dealt with separately.

1. **Urethro-Vesical Irrigations.**—These irrigations consist in the passing of a liquid, which is under pressure, over the whole surface of the urethral mucosa into the bladder, no catheter or sound being used. To Janet belongs the credit of having rendered this treatment popular, for which a great number of drugs had been advocated. The principal ones are the following:

1. Potassium permanganate.
2. Silver salts : nitrate of silver, protargol, albargin, argyrol, argentamin, argonin, citrate of silver, ichthargan.
3. Mercurial salts: perchloride, oxycyanide, cyanide.
4. Bismuth salts: subnitrate, carbonate.

Various other substances, such as sodium salicylate, hydrogen peroxide picric acid, and bile, have also been used for irrigating the urethra.

As we will discuss the merits of these various drugs as far as irrigation therapy is concerned, later on, we will consider for the moment irrigations with potassium permanganate only. As they are most commonly employed, they will be described more fully, and may serve as paradigm.

The Technique of Urethro-Vesical Irrigations with Permanganate.

When should Cases of Acute Gonorrhea be irrigated?—There is a divergency of opinion as to the most suitable time for beginning irrigation treatment in acute gonorrhea. Some who are excessively timid, advise to wait until fifteen or twenty-one days have elapsed since the beginning of the disease. The others, who are more enterprising, begin at once—*i.e.*, as soon as the discharge appears. Those who are best advised, adopt an intermediate course, and, in agreement with them, one may say the *irrigations should be begun as soon as possible*, when there are no contra-indications.

Contra-Indication.—There is only one contra-indication against irrigation treatment in gonorrhea—namely, a very acute local condition. When the meatus is markedly edematous, when its lips are red and turgid, when micturition and erection are horribly painful, then irrigations are contra-indicated. They would under these conditions merely increase the pain, render the discharge more profuse, and cause the urethra to bleed. Anti-phlogistic treatment should take their place under those conditions.

But as soon as the acute inflammatory symptoms have subsided, the irrigations should be taken up again. There is no sense in "watching" a profuse purulent discharge which soils everything, tires the patient, and remains a source of danger to its owner and to his surroundings. The immediate well-being experienced by the patients after the first irrigations is sufficient proof of their necessity and of their urgency.

One has objected that irrigation treatment instituted immediately tends to prolong the presence of the gonococcus on the urethral mucosa, and that this could be avoided by waiting two to three weeks before starting the irrigations. Statistics have even been put forward to prove that the disease lasts longer when irrigation treatment is resorted to.

This objection only holds good for those cases in which the irrigations have been badly carried out and without method, or when the patient is troublesome. It is then certainly better to do without them. But a properly-given irrigation with 1 : 8,000 permanganate should enter the bladder without difficulty. Plenty of fluid should be used, and the irrigation should be repeated often. The permanganate can always be made to enter the bladder easily by using a local anesthetic (*vide* p. 280).

If carried out in this fashion, irrigations never give rise to accidents. On the other hand, if the patient contracts, if the fluid does not enter the bladder properly, or if the irrigations are painful, then nearly always complications arise, such as epididymitis and prostatitis. But these troubles are never met with when the irrigations are done properly. Carelessness on the part of the patient is also apt to bring about complications, and this is by no means a rare occurrence. Violent exercise in any shape and form, such as cycling, riding, dancing, and excessive drinking, should not be tolerated.

On the Necessity of making the Liquid enter the Bladder.—In acute gonorrhea irrigations are only of value if they pass along the whole channel.

There is no occasion to fear that the bladder could be injured by the anti-gonococcal solution which enters it. It should be our endeavour in every case without exception, even when there is no sign of a posterior urethritis, to get the fluid to run into the bladder. The risk of thus infecting the deep parts of the passage exists only in the imagination of certain people. If the liquid carries with it some gonococci, they are so much more exposed to its action, and cannot fail to undergo destruction.

Preparation of the Solution.—The water used for irrigations should have been boiled, and, if possible, be distilled water. It is preferable to use a warm solution instead of a cold one, but one should not exaggerate; the fluid should be of a tepid and agreeable temperature, and not scalding. Cold solutions come, so to say, as a surprise, and cause the sphincter to contract and to prevent the fluid from reaching the bladder.

In the beginning very dilute solutions should be used; 1 : 10,000 is sufficient to start with. One then gradually increases the strength to 1 : 8,000, and proceeds in this fashion until one reaches 1 : 4,000, or 0·25 gramme of potassium permanganate per litre. To go beyond this strength is seldom necessary, and dilutions of 1 : 2,000 and 1 : 1,000 are rarely used, especially the latter.

For making up the solutions one can use tablets or small packets containing the required dose; but it is more practical for the medical man to work with a mother solution, containing, say, 10 per cent. of permanganate. Every cubic centimetre is then equivalent to 0·1 gramme of permanganate, and by means of graduated metric measures one can prepare any strength required with the greatest ease.

A 1 per cent. mother solution gives a dilution of 1 : 1,000 if one uses 100 c.c. of it per litre. For a dilution of 1 : 2,000, 50 c.c. have to be used, etc.

This question of dosage must become a matter of routine, as the strengths have to be varied constantly in the treatment of gonorrhea. Three symptoms of the greatest importance are relied on for the dosage—namely:

1. The amount of discharge. As long as it remains copious, the solution last used was either too weak, or too long an interval elapsed between the irrigations.

2. The examination of the urine. If the contents of the first glass are turbid, whilst the last ones are clear, the solution was too weak. If, on the other hand, the urine contained in the first glasses is turbid, and also in the last ones, which may even be blood-streaked, then the irrigations have been too strong, or they have been repeated too often, and it becomes necessary to use a weaker dilution.

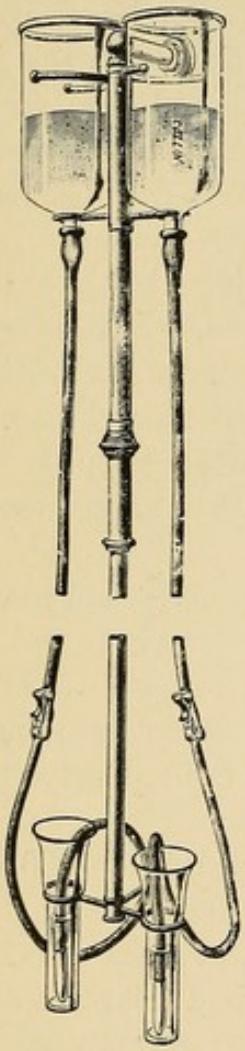


FIG. 138.—IRRIGATOR FOR URETHRO-VESICAL IRRIGATIONS.

3. Functional symptoms characterized by pain during and after micturition are also precious indications for telling if the urethra has reacted to the irrigations.

One should not forget that in some cases it is extremely difficult to ascertain if the pain on micturition is due to the drug, or if it is simply due to the inflammatory reaction set up by the presence of the gonococcus in the urethra. A very careful analysis of all the symptoms is then required.

Operative Technique.—For the urethro-vesical irrigations, an irrigator or douche-can of 1 to 1·5 litres capacity is usually employed. This irrigator is either fixed to the wall, or mounted on a stand which allows one to raise or lower it. As a rule a position 3 to 5 feet above the level of the bed or couch is sufficient. The irrigator is connected by a long rubber tube with a cannula such as Janet's, which has an opening of 2 millimetres. The permanganate should always be used in a warm solution, preferably 38° to 39° C.

The patient makes water, and then lies down on the couch, a basin being placed between his legs. The glans, the prepuce, and the balano-preputial fold are then cleaned with an antiseptic solution.

The surgeon seizes the glans with the left hand, and holds apart the lips of the meatus, whilst his right hand brings the cannula into contact with the orifice. At first, the anterior urethra is alone irrigated by withdrawing the cannula on and off as soon as the passage is filled, and before there is any great pressure.

When the anterior urethra has been well cleansed—and this can usually be done with 500 to 800 c.c.—the point of the cannula is introduced into the meatus, and pressed against it in order to close the canal. The patient is then requested to remain quiet, to breathe freely, and to strain a bit, as if he wished to make water. The liquid enters the bladder under these conditions with the greatest ease, and flows until the patient has the sensation of having to empty his bladder. In certain cases, however, the patient

persists in contracting his sphincter spasmodically, and prevents the liquid from flowing. If this be the case, one can lower the head of the patient, or bring it to a level with the body, or one can ask him to move his arms,

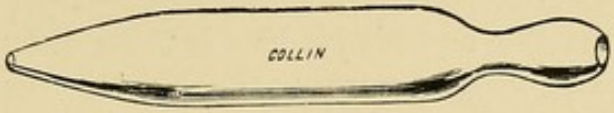


FIG. 139.—JANET'S CANNULA.

imitating artificial respiration, etc., and very generally these little dodges will have the desired effect.

The flow of the liquid can be controlled, if a small air-bubble is in the

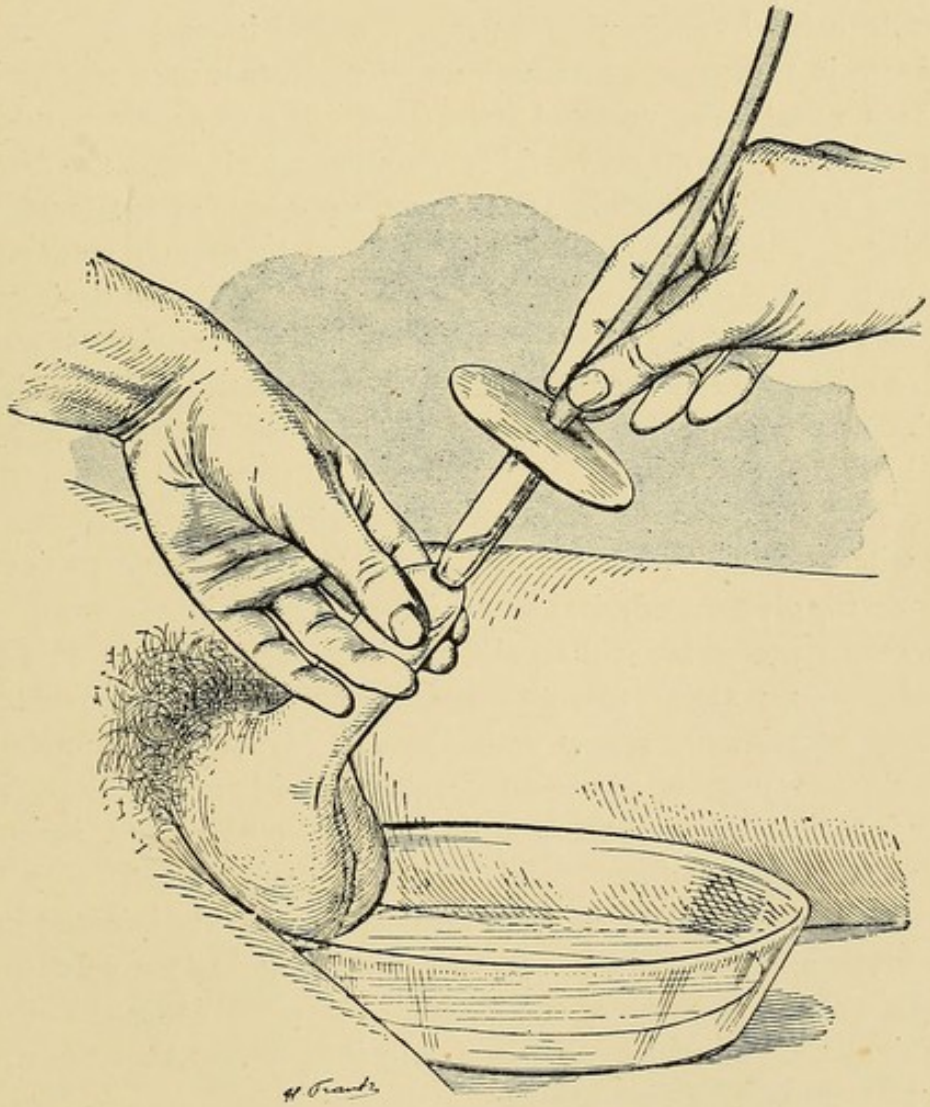


FIG. 140.—URETHRO-VESICAL IRRIGATIONS WITHOUT A CATHETER.

cannula, by the appearance of little, easily recognizable waves when the fluid is running into the bladder.

Another means of telling that the fluid is passing into the bladder is the

wave-like sensation along the urethra which can be felt with the left hand. As long as the sphincter is contracted and prevents the fluid from passing, the urethra dilates and the penis swells. Furthermore, the column of liquid in the irrigator diminishes, and the patient feels that something is flowing along his urethra and his bladder is being distended. At a given moment the desire to make water supervenes. The cannula is then withdrawn, and the patient is asked to make water. At the first micturition the permanganate is often mixed with urine. It has then a muddy brown colour, owing to the reduction of the salt by certain constituents of the urine. When one recommences the operation, it leaves the bladder in the same condition as it ran in.

On the Value of Local Anesthesia of the Urethra.—It is often indispensable to resort to a local anesthetic for urethro-vesical irrigations. Its services are immense in most cases, although many patients do not require it.

Without anesthesia, urethral irrigations are often very painful. The sphincter responds by an energetic contraction which stops the flow, and if under these conditions one raises the pressure, one only makes matters worse. The sphincter replies by further contractions, the permanganate does not begin to run, but the urethra becomes twice as painful, and begins to bleed. The subsequent effect is an exacerbation of the inflammatory symptoms.

With local anesthesia the intervention is much easier; the solution passes the sphincter almost without the knowledge of the patient, and gradually fills the bladder.

Ten c.c. of a 1 per cent. solution of stovain, injected into the anterior urethra with a syringe (*vide* Fig. 103, p. 151) and allowed to act for five minutes or so, give an admirable anesthesia which is free from any risk. Stovain seems preferable to cocain, for it never produces, as far as my experiences goes, malaise, collapse, or any of the other disagreeable sensations which occasionally follow upon the use of cocain. One should also remember that a number of cocain disasters have been published, in which an acute intoxication characterized by collapse, cold sweats, syncope, or a chronic poisoning known as "cocain delirium," supervened.

Some patients complain of pain, despite the stovain injected into their anterior urethra. This pain is, however, not located in the canal itself, but is the result of the pressure of the glass nozzle on the inflamed meatus and fossa navicularis. In some cases this pain is so severe that the irrigations have to be temporarily discontinued.

This trouble can also be avoided if one soaks a mounted swab in a 10 per cent. solution of stovain, and introduces it through the meatus as far as the fossa navicularis, where it is left for a few minutes. If necessary, this procedure may be repeated a few times; it allows one to relieve all pain, and then the irrigation can be given without any difficulty.

Should one use an Irrigator or a Syringe?—Urethral Lavage with a Syringe.—Some practitioners prefer the syringe, and others the irrigator. In most cases an irrigator seems preferable, as it gives a continuous, even flow, whilst manipulations with a syringe are always irregular and jerky. An irrigator is most satisfactory, especially if one injects previously a little stovain as indicated. However, chiefly in nervous patients, who tightly contract their sphincter, and thus prevent the fluid from reaching their posterior urethra and their bladder, irrigation with a syringe is often of great service.

When, for instance, despite the injection of stovain and the pressure of the column of fluid from the irrigator, the sphincter refuses to yield, although the patient has been asked to keep himself relaxed and to breathe quietly, as if he were asleep, then it is unreasonable to insist. One is bound

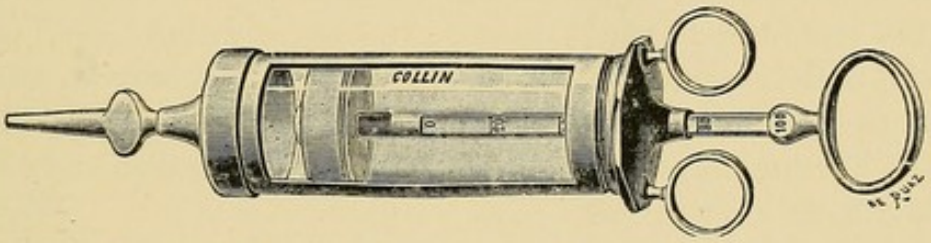


FIG. 141.—LUYS'S SYRINGE OF 100 C.C. CAPACITY.

Its piston is made of earth-flax, and the whole can be sterilized by boiling.

to do the patient more harm than good. The anterior urethra is abnormally distended, the sphincter is in a state of spasm, and the mucous membrane usually begins to bleed.

If one discards the irrigator in cases of this kind, and uses a syringe instead, one often finds to one's surprise that the fluid enters the posterior urethra without any difficulty, even in the absence of great pressure and local anesthesia.

It is sufficient in these cases to press the piston of a syringe of 100 c.c. capacity gently home for a short distance in order to drive the liquid into the bladder.

The resistance of the sphincter can be overcome in nearly every instance by this means; but this is not achieved by force. The value of the syringe lies in this fact, that it allows one to surprise the sphincter when it relaxes, and to "sneak the fluid in" rather than to inject it. The muscle is not in a state of permanent contraction. Its contractions are intermittent, and the intervals must be taken advantage of in order to inject the fluid with "an extremely light thumb" (Guiard).

The pressure should be varied constantly; sometimes it should be very weak, then again more vigorous. At times it should be jerky, and at others

continuous and sustained. In this way all obstacles are ultimately overcome. After a while the patients become accustomed to having fluid injected into their bladders in this fashion, and then one can go back to the irrigator without experiencing any further difficulties.

The use of a syringe is not without danger. If used gently and carefully, the sphincter can be gradually overcome at the right moment, but if the manipulations are brutal and violent, the patient is submitted to unnecessary suffering, and considerable injury can be done to the walls of his urethra. To resume, the use of a syringe is only justifiable in the hands of a highly experienced and skilful practitioner who is gifted with a light touch.

Should a Catheter be used for Urethro-Vesical Irrigations?—Diday advocated for certain difficult cases to pass a catheter into the urethra and to irrigate through it. It did not matter much how far the instrument was introduced, and whether it passed the sphincter or not, as experience had shown that very often the fluid entered the bladder without great difficulty, if the point of the catheter was lying in front of the membranous region.

De Pezzer invented short catheters of a small diameter which were perforated by three rows of little holes arranged at angles of 120 degrees over a length of 5 centimetres.

Duchastelet[1] took up this method, and became one of its most ardent advocates. In the course of six years he never saw any untoward effect (orchitis or retention or the slightest trouble on micturition). He used rubber catheters of a special make, which he called "sondules." Those for the anterior urethra were straight, and those for the posterior coudé. They had one large eye close to their end through which the irrigation fluid passed rapidly. Duchastelet claimed that the urethra thus never became distended, and that these irrigations could be carried out by the patient. He said: "The slender sondule makes its way within a vein of fluid which surrounds and precedes it." It opens out the virtual cavity of the urethra in accordance with the physiological tolerance of the open passage.

There is no doubt that this method is of value in certain cases—for instance, if the patients are very nervous and if the spasm of the sphincter is difficult to overcome. But it does not seem probable that this method will ever replace the irrigations without a catheter, which will always remain the method of choice.

What Intervals should elapse between the Irrigations?—It is always preferable to irrigate frequently, using plenty of fluid and a solution of suitable strength, than to give a few irrigations with a small amount of highly concentrated solution. It is advisable to entrust the patient with these irrigations after he has become familiar with their technique. He can then

[1] Duchastelet, *C. R. de l'Ass. Franç. d'Urol.*, 1906, p. 216.

cleanse himself twice daily at twelve hours' interval with a 1 : 8,000 solution to his best advantage.

After-Effects of the Irrigations.—In most cases urethro-vesical irrigations with permanganate, if properly done, cause no appreciable suffering. At the most the patient may find his urethra hot, or he may complain of slight heaviness about the perineum, or display a little vesical tenesmus for an hour or so.

How Long should these Irrigations be Continued?—These irrigations are indicated as long as a discharge is present, and as long as the urine contained in the first glass remains turbid. As a rule, it is necessary to irrigate once or twice daily for fully two weeks. After that period one may wash every other day, or every four days, and finally once a week. When the patient has been eight days without irrigations and shows no discharge, the treatment may be discontinued.

At the end of every irrigation the hands of the surgeon and the parts of the patient are usually stained with permanganate. Their normal colour is easily restored by applying a concentrated solution of sodium bisulphite.

The Action of Permanganate.—Permanganate of potassium seems to be superior to any other drug owing to its remarkably powerful action on the gonococcus. Its use is therefore indicated every time the microscope shows the presence of Neisser's organism in the discharge. For cases of this kind potassium permanganate is perfect, and gives splendid results if one knows how to use it.

The doses mostly employed vary between 1 : 4,000 and 1 : 8,000. The success depends on a judicious choice of the right strength for each individual case.

Permanganate was introduced by Condy in 1857, who recommended it as an antiseptic. In 1864 Rich and Van den Corput used it for urethral injections. Zeissl of Vienna and Spillmann of Nancy tried it in 1879. Gourgues (1889) used it on women. Reverdin in 1885 adopted it for irrigating men through a soft catheter, which he introduced as far as the bulb. Janet made wide use of this drug in 1889, and his writings led to its universal recognition as a drug for the treatment of gonorrhea.

It is nowadays certain that potassium permanganate has a truly elective action upon the gonococcus, and that this beneficial effect is not due to its antiseptic power, which is insignificant in higher dilutions than 1 : 1,000.

If its wonderful effect in gonorrhea is not solely due to its action on the gonococcus, one has to consider the possibility of a special influence on the urethral mucous membrane.

I have often been struck by its constricting action upon the urethral mucosa. If one attempts, after having irrigated with permanganate, to pass an instrument into a normal urethra, one notes a very definite re-

sistance, even if the instrument is very well lubricated. In the case of an irrigating dilator, one commonly finds, if one has irrigated with permanganate through it after its introduction, that one can hardly withdraw it. It is firmly gripped, and seems to have contracted adhesions with the mucous membrane. One never makes this observation after the use of boric lotion or oxycyanide of mercury solution. It would thus appear that one should take this constricting effect on the mucous membrane into consideration. As the mucosa is being made to shrivel up, a regular massage of the glands of Littre and the lacunæ of Morgagni takes place, which empties their contents. The permanganate has, however, also a decided action on the gonococcus.

Janet has pointed out this fact with great clearness, and has shown that permanganate produces a slight *serous reaction*, which, however, is durable, and is accompanied by a mild edema of the mucosa. "As long as this state of things lasts, it is impossible to find any cocci in the urethral secretions, and if one maintains this condition of the urethra long enough, the destruction of the organisms is assured."

The permanganate treatment should, therefore, aim at producing a *brown urethral secretion*, which makes the canal a bad soil for the gonococcus.

To chose the proper quantity, to find the correct strength, and to give the right number for producing this brown reaction after every irrigation—herein lies the art.

Failures occur under the following conditions:

1. When the intervals between the irrigations are too long.
2. When the solutions are too strong.
3. When the patient resumes his sexual activity too soon, or neglects the necessary dietary rules.
4. When para-urethral foci are present which the irrigations cannot reach.

In the last-mentioned case, these para-urethral localizations, which Janet has so well described, should be explored, and also the fistulæ so commonly present in men suffering from hypospadias. The same may be said of the prostate, which is palpated *per rectum*, and of Cowper's glands.

Lesions in these structures are the commonest causes of insuccess, and a minute examination of all the glands connected with the urethra becomes imperative whenever a discharge containing gonococci is left after ten to twenty irrigations which were given properly and at suitable intervals.

On the Other Substances used for Urethro-Vesical Irrigations.

Silver nitrate is seldom indicated in the treatment of confirmed gonorrhea. It is unquestionable that this drug has a marked action on the gonococcus. Daily experience tells us that an irrigation with silver nitrate is sufficient to bring on a discharge, containing plenty of gonococci, which

shows itself on the next day or the day following in cases which showed no longer any gonococci in their urethral secretion. For this reason, silver nitrate should only be used in order to ascertain whether the urethra is completely freed from gonococci or not. This is the "silver nitrate test."

So far no satisfactory explanation has been given for this curious property of silver nitrate to resurrect the gonococci after they had apparently completely vanished. The most rational view, which is based upon personal experience with the urethroscope, is the following:

If one applies, under the control of the urethroscope, silver nitrate in a more or less concentrated form to the urethral mucosa, one sees that the latter contracts violently, and becomes markedly corrugated. It thus becomes, after the silver nitrate has been applied, almost impossible to move the urethroscope farther on in the part which has been cauterized. One is checked by a vigorous contraction, which in many cases cannot be overcome. From this one may conclude that silver nitrate acts chiefly by causing the muscular fibrillæ of the mucosa to contract.

In this way the various crypts (lacunæ of Morgagni and glands of Littre), in which the gonoccoci are hidden, are partially emptied, and the organisms come to the surface. To resume, silver nitrate is never to be recommended for irrigations in confirmed gonorrhea; but it is a most valuable drug in the treatment of gleet.

Albargin is very widely used in Germany, where it is preferred to permanganate. It is a silver albuminate, and is decomposed by light, like all silver salts. Unlike the nitrate, it does not form a coagulum when it comes into contact with the urethral mucous membrane; this advantage it shares with the other organic compounds of silver. It compares favourably with protargol, as it decomposes less readily and can be used in warm solutions —an impossibility with protargol; moreover, it is cheaper.

It has an undoubted bactericidal action upon the gonococcus, and a trial in many cases has shown me that it causes these organisms to disappear rapidly from the discharges which contained them previously. It is, however, also true that, despite repeated irrigations with this substance, the discharge fails to stop soon, although it may be microscopically free from gonococci, whilst permanganate used at this stage works wonders.

A considerable quantity of albargin, even in a strength of 1: 1,000, is practically always painless; its use is indicated, therefore, in certain cases where the permanganate irrigations are excessively painful. If after five or six albargin irrigations the discharge remains copious, permanganate may again be resorted to with the greatest benefit.

Protargol should, according to Neisser and Barlow,[1] be preferred to all other antigonorrhoica, as it is absolutely harmless and really antiseptic.

[1] Barlow, *Münch. Med. Woch.*, 1897, Nos. 45 and 46.

They also claim for it a curative action similar to that of silver nitrate, without producing the same amount of irritation.

It is a fine yellow powder which is easily soluble in water. It is an intimate and very stable compound of silver and a protein.

Like all the other silver albuminates, solutions of protargol do not precipitate albumin, and are not precipitated by common salt; they are therefore, theoretically at any rate, capable of acting on the gonococci which are deeply located within the epithelium.

Protargol contains 8·3 per cent. silver, and is used for irrigations in the dose of 1:2,000 or 1:1,000 (Barlow). According to Wossidlo, protargol is much more irritating than albargin.

Argyrol, another organic silver salt, was discovered by Barnes of Philadelphia, in 1902, and has been chiefly advocated by Swinburne[1] and De Sard,[2] who claims it to be superior to any other known urethral antiseptic. It contains 30 per cent. silver, does not coagulate albumin, is not caustic, and produces no inflammatory reaction in the urethra.

According to De Sard, histological examinations show that in cases treated with argyrol irrigations the epithelium is almost completely deprived of its epithelial cells. Moreover, argyrol causes no pain, and has a soothing effect during the acute stage, doing away with all sharp pain. In the beginning 1 or 0·5 per cent. solutions may be used.

The chief advantages of argyrol are, thus, that it is well borne, and that it is to a certain extent analgesic, even in the acute stage. It is, however, not always harmless, as Janet[3] has pointed out. Its repeated use in strong doses may be followed by changes in the urethral epithelium which are not without importance for its future. Janet therefore advises relatively weak solutions, such as 2:1,000 and 4:1,000, for irrigations, and follows them up by an injection of a 5 to 20 per cent. solution given with a syringe. He always administers two irrigations, followed by injections, per day during the first half-week. He gives one irrigation on the following two to six days, and in favourable cases all is over in five to seven days.

Janet holds that argyrol is a very powerful remedy in the initial stage, as long as the gonococci are on the surface. When the disease is confirmed —*i.e.*, after the gonococci have penetrated into the substance of the mucous membrane and into the urethral glands—its value is limited. He then discards it, and continues the treatment with permanganate irrigations. Another drawback of argyrol is its expense.

Argentamin is an organic silver salt which has been used by Schaffer in the dose of 1:2,000 to 1:1,000, and appears to have an energetic bactericidal action.

[1] Swinburne, *Medical Record*, October 11, 1902.
[2] De Sard, *Presse Médicale*, February 13, 1909.
[3] Janet, *Ass. Franç. d'Urol.*, 1910, p. 263.

Argonin belongs to the same class, and contains 4 per cent. of silver. It has been used by Zydlowitz and Lewin, and also by Jadassohn in 7·5 per cent. solution for instillations, and in 1 : 4,000 solution for irrigations. Follen Cabot, of New York, speaks highly of it.

Silver citrate, or *itrol*, has, according to Werler,[1] a very marked bactericidal action, and is superior to all other antigonorrhoica known. He uses it in solutions of 1 : 1,000 to 1 : 4,000. He claims for it a very marked penetrating power and a strong antiseptic action within the mucosa.

Ichthargan has been highly recommended by Lohnstein. This compound contains 30 per cent. silver, and is used for irrigations in a dilution of 1 : 4,000 to 1 : 1,000. For instillations it should be used in a strength of 0·5 to 5 per cent.[2]

Largin is a greyish powder containing 11 per cent. of silver, which is soluble in water, glycerine, and blood-serum. Its aqueous solutions are clear, slightly alkaline, and very stable. Chemically it is closely allied to protargol, and shares all its qualities, but it has a much more potent bactericidal action. Stark[3] has successfully employed solutions varying in strength from 1 : 400 to 1 : 100. For instillations 1 : 200 to 1 : 50 may be used.

The experiments quoted by Wossidlo give some information as to the relative penetrating powers of these various compounds.

Schaffer took pieces of rabbit liver, and left them for ten hours in contact with solutions of silver nitrate (1 : 2,000) and argentamin of corresponding strengths. They were then put into a solution of ammonium sulphide, which precipitated the silver as a brownish mass wherever it was present. In this way he was able to demonstrate the penetration of argentamin to be three times greater than that of silver nitrate.

Pezzoli made similar experiments with human liver, impregnating the pieces with silver nitrate, argentamin, protargol, and largin, respectively. He found that, whilst the penetrating power of argentamin was 100 millimetres, those of silver nitrate, largin, and protargol, were 65, 58 and 38 millimetres respectively.

Benario has also carried out some interesting researches on the penetration power of protargol. He took agar tubes, which he inoculated with bacterial cultures; he then poured a little 0·5 per cent. protargol solution into them and incubated them. On the following days he noted that growth had only taken place 12 to 13 millimetres below the surface of the agar. The protargol had thus penetrated to that depth, and checked all growth where it was present.

[1] Werler, *Derm. Zeits.*, 1897, vol. iii., Nos. 5 and 6.

[2] Paul Rychner, "Traitement de l'Urétrite Blennorragique par l'Ichthargan," *Ann. Génito-Urin.*, 1903, p. 1281.

[3] Stark, *Monatsch. f. Pract. Derm.*, 1899, vol. xxviii., p. 165.

Pezzoli undertook interesting researches of a similar character which have since been confirmed by Kamen.

Glass tubes of equal size were filled up to a height of 5 centimetres with sterilized gelatin, and each of these tubes was subsequently inoculated with a drop of a broth culture containing *Bacillus coli*. The tubes were well shaken in order to spread the bacilli evenly, and then the gelatin was allowed to set. The tubes were then filled with different silver solutions to a level of 12 centimetres, and placed in an incubator, where they were protected against light.

After three or four days one found that growth had taken place in every tube, but that they all showed a sterile zone which varied in extent with the silver salt used—16 millimetres with argentamin, 4 millimetres with silver nitrate, 10 millimetres with largin, and 5 millimetres with protargol.

The penetration power of these organic salts of silver is definitely proved by these experiments; but in practice—as has been pointed out by Finger—this penetration power is insufficient. There are, according to him, always cocci left within the mucosa and the glands, which these silver salts fail to affect.

Corrosive sublimate is an excellent drug for cases in which the microscope has shown that only the ordinary adventitious organisms are present. It should only be used in high dilutions—1 : 10,000 or 1 : 20,000—and the solutions should not contain any tartaric acid or spirit.

The curative effect of irrigations with perchloride of mercury is absolutely remarkable, when only ordinary organisms are present. They disappear after four to five irrigations, as a rule.

But even these very weak solutions are sometimes painful, and therefore their use is somewhat limited, and a certain amount of caution is required. The drug has no specific action on the gonococcus.

Oxycyanide of mercury has almost the same properties as the perchloride, but it is free from its drawbacks. It can be used in much bigger doses, and seldom gives rise to any pain. Solutions varying between 1 : 4,000 and 1 : 1,000 are generally used; it is also void of any special action on the gonococcus.

It is indispensable to be acquainted with some of the peculiarities of this salt. Even in small doses it occasionally gives rise to pain in some patients, whilst others experience no inconvenience with much larger doses.

This phenomenon seems to depend on the presence of iodine in the body, and therefore it is always advisable to ask the patient if he has been taking potassium iodide or any other iodine preparation lately. If the answer is in the affirmative, the oxycyanide should on no account be used.

The presence of iodides in the circulation leads to a decomposition of the salt within the bladder. Iodide of mercury is formed within the vesical mucous membrane, and this chemical reaction often produces intense pain.

Cyanide of mercury has been advocated by Escat for gonorrheal discharge. This drug is supposed to cause a considerable sero-hematous exudation, which renders the soil inapt for the growth of the gonococci.

It is not quite so toxic as one would think at first sight. Both bladder and urethra tolerate 5 : 1,000 solutions without inconvenience.

Escat ranks this salt first amongst the antigonorrhoica; its antiseptic properties are considerable, the mucous surface tolerates it well and reacts to it in a special manner. Moreover, it does not coagulate albumin like the perchloride.

Escat uses for abortive treatment 2 to 5 per mille solutions. One usually begins with a dilution of 0·5 or 1 gramme per 1,000.[1]

Collargol.—Dr. Uteau[2] has recommended the use of collargol for irrigations in gonorrheal urethritis. These irrigations are said to have the great advantage of being painless even during the acute stage; they can therefore be used as preparatory treatment, even if they are not curative.

Salicylic acid may be used in dilutions of 1 : 3,000 or 1 : 2,000.

Sodium salicylate has been used with success by Malécot.

Hydrogen peroxide, tried by Castan of Béziers, has given no result in his hands.

Picric acid, according to the same author, has no definite action on the gonococcus. It is, however, not useless in the treatment of chronic cases.

Citrate of bismuth, used by Balzer and Leroy[3] towards the decline of gonorrhea, gives good results, but no better ones than those obtained with permanganate. These authors use a 1 : 2,000 solution to begin with, and rapidly increase the strength to 1 : 500.

Nitric Acid.—Dr. Porosz of Budapest thought that the action of silver nitrate was mainly due to its nitric radical, and therefore recommended the use of nitric acid. He irrigates the urethra with solutions of nitric acid in a dilution of 1 : 3,000 to 1 : 1,000.

The use of *Thallin* has been advocated by Casper for treating gonorrhea.[4]

2. **Urethral Injections.**—Urethral injections are given by means of a syringe or a rubber ball for the purpose of introducing a modifying liquid into the urethra.

Advantages.—This treatment is very simple, and appeals to the patients, hence the favour which it enjoys even nowadays. The number of drugs used for these injections is simply enormous.

[1] Escat, *C. R. de l'Ass. Franç. d'Urol.*, 1898, p. 182.

[2] Uteau, "Traitement des Blennorragies par les grands Lavages Urétro-Vésicaux au Collargol," *Rev. Prat. des Mal. des Organ. Génito-Urin.*, Lille, 1909-10, vol. vi., p. 41.

[3] Balzer et Leroy, *Presse Médicale*, October 3, 1900.

[4] Casper, *Berl. Klin. Woch.*, 1900, No. 22, p. 482.

Drawbacks.—Generally speaking, the drawbacks overweigh the advantages.

In the vast majority of cases the injections are badly done, and lead to complications sooner or later. They often give rise to prostatitis, cystitis, vesiculitis, and orchitis, and almost invariably set up a littritis.

Technique.—In order to avoid these accidents the patients have to take certain precautions. Firstly, they should not be given any syringes which hold more than 5 or 6 c.c. (maximum). Secondly, they should make water before using the injection, in order to free the canal from any secretions which may have accumulated in it. Thirdly, they should cleanse the glans and the meatus and wash the anterior urethra once or twice with the syringe, allowing the fluid to run out immediately. After these preliminaries the injections proper begin. The patient injects again the contents slowly, and closes the meatus with his fingers. The fluid is thus retained for five minutes or so, and then allowed to escape; this process is repeated a few times, and the patient tries to make water as seldom as possible in the intervals.

Indications.—The use of injections is rarely indicated. One should be especially reluctant to prescribe them in cases of acute gonorrhea, as they are then almost certain to lead to complications.

Their use is least unjustifiable immediately after dilatation treatment, once the latter has produced its full effect—*i.e.*, they are hardly ever indicated except in chronic gonorrhea.

Substances used for Injections.—The most active and most recommendable drugs for this purpose are the silver salts, amongst which the following may be used with advantage:

1. *Silver nitrate* in a 1: 1,000 solution, which is well borne; the strength may be raised to 1: 500.

2. *Protargol.*—To be used in various doses; for instance, one may prescribe a treatment lasting three weeks, a 1: 300 solution being injected on the first seven days thrice daily; during the next week a 1: 200 solution is used, and then a 1: 100 solution. Protargol always brings on a fairly well marked inflammatory reaction of the urethral mucosa, and therefore its dose must be graduated according to each individual case.

Ahlstroem has used 4 per cent. solutions.

From the lengthy list of prescriptions for injections a few of the most important ones may be quoted here:

Ricord's Injection.

Zinc sulphate	1 gramme.
Lead acetate	2 grammes.
Water	200 c.c.

The "Three Sulphates" Injection.

Zinc sulphate	0·5 gramme.
Copper sulphate	0·5 ,,
Iron sulphate	0·5 ,,
Water	200 grammes.

Sulphate of iron was used in 1% solution, and amongst the other drugs :

Sulphate of copper	in 1–2%	solution.
Sulphate of zinc	,, 0·2–1%	,,
Tannin	,, 1%	,,
Alum	,, 1%	,,
Lead acetate	,, 1%	,,
Claret diluted with two or three parts of water.		
Bismuth subnitrate	used in 2–5%	suspension.
Resorcin	,, 1–4%	solution.
Quinine sulphate	,, 0·5–1%	,,
Argentamin	,, 0·5–1%	,,
Largin	,, 0·25–1%	,,
Albargin	,, 0·25–1%	,,
Itrol	,, 0·25–0·5%	,,
Ichthargan	,, 2%	,,
Novargan	,, 0·25–0·5%	,,
Ichthyol	,, 1–5%	,,
Thallin	,, 2%	,,
Hydrogen peroxide	,, 3%	,,

Picric acid has been used by Brun of Beyrouth in 0·5 and 1 per cent. doses. His patients have to inject 5 to 6 c.c. into the closed meatus, and to leave the fluid in the urethra for three minutes; these injections are repeated two or three times per day.

Hermophenyl has been used by Boudin in the treatment of gonorrhea. A 1 : 250 aqueous solution is injected by the patient six times per day.

Wolbarst recommends *thallin*, which does not irritate, and soon checks the inflammation.

Airol.—Legeu and Levi in France, Merlin in Germany, Vignolo-Lutati, and Benassi, have recommended the use of airol for injections in acute gonorrhea. Its action seems doubtful; it is used in 1 per cent. solution.

Vignolo and Benassi prescribe as follows:

Airol	25 grammes.
Glycerine	100 ,,

Collargol has been used in 1 : 1,000 dilution by Tansard.

Citrate of bismuth has been tried by Balzer and Leroy in solutions of 1 : 1,000 to 1 : 500.

Argyrol has been advocated by De Sard, who gives an injection of 10 c.c. of a 10 per cent. solution into the anterior urethra, which is retained for five to ten minutes.

Kervin[1] recommends a 20 per cent. solution, of which 7 c.c. are injected into the anterior urethra and retained ten minutes.

Some other formulæ, such as the following, have also been used:

Suspended calomel	.. ..	1 gramme.
,, iodoform	.. ..	5 grammes.
,, bismuth subnitrate	.. .. ..	5 ,,
Distilled water	.. ..	100 ,,

or—

Suspended dermatol	.. ..	5 grammes.
,, airol	.. ..	5 ,,
,, xeroform	.. ..	4 ,,
,, thioform	.. ..	4 ,,
Distilled water	.. ..	100 ,,

Bile.—Jungano[2] has studied the action of bile upon the gonococcus, and found, as Neufeld did in the case of other organisms, that it has a definite antigonococcal action. He then discovered that a 10 per cent. solution of sodium cholate had similar properties. He finally experimented with a 1 per cent. solution of sodium cholate on human beings, and obtained a decided improvement in each case.

3. **The Balsam Preparations.**—The balsam preparations are administered by the mouth, and have the property of diminishing, if not of stopping altogether, the pathological secretions of the urethra. They were far more widely used formerly than nowadays, and one can easily understand that they should have met with much favour. To cure one's gonorrhea by taking a drug is so easy and so simple that the public were bound to turn their attention to them. Unfortunately, their action is not constant, and in some cases they do harm. It is quite true that they dry up the secretions, but they do not kill the gonococcus; they are therefore apt to mislead the patient, who sees his discharge diminishing under their influence, and then considers himself safe. He gives up all treatment, and allows his gonorrhea to continue its torpid course. In a great number of instances the patients were so convinced of having been cured by the use of balsam preparations that they married and infected their wives. Others developed a stricture ten to twenty years later in their urethra, to their great astonishment. "I certainly was cured of my gonorrhea; for I had taken balsams for a very long time," is a statement which one often hears.

It is certain that the balsam preparations are most important drugs for the treatment of certain conditions, and should not be withheld in certain cases (see Cystitis, Chapter IX.).

The best-known balsam preparations are cubebs, copaiba, and sandal-

[1] Kervin, *Medical Record*, June 6, 1903.

[2] Jungano, *Ass. Franç. d'Urol.*, 1909, p. 261.

wood-oil; others which have a less specific action are balsam of Tolu, Peru balsam, Canada balsam, and kawa-kawa.

Copaiba.—Copaiba is a transparent, oily, amber-coloured liquid of a peculiar and disagreeable odour with a persistent bitter taste. It has been in use for two centuries.

It is the resin derived from a tree of the Copaifera species, which grows in South America, Mexico, and Brazil, and is collected in the summer by incising the trunk of the trees.

Dose.—In order to obtain any effect, 8 to 12 grammes should be taken within twenty-four hours. Chopart's famous prescription, which is a masterpiece in its way owing to its unsurpassed nauseating taste, consisted of—

Syrup of copaiba	50 grammes.
Rectified alcohol	50 ,,
Syrup of Tolu	50 ,,
Peppermint-water	100 ,,
Nitric alcohol	5 ,,

Three to six tablespoons were to be taken every day. This mixture often led the stomach to protest, and inspired the patients with a feeling of disgust and revolt.

It is usual to prescribe copaiba in gelatin capsules containing 1 gramme each (10 minims in this country—A. F.).

Balsam of copaiba is given in doses of 4 to 5 grammes per day; one can also prescribe the resin or sodium copaivate.

Action.—The antigonorrheal action of copaiba is *indirect*, and takes place only through the urine. It does not affect the gonococcus directly, and unless the urine containing the active principles of the balsam comes into direct contact with the diseased surfaces no therapeutic effect is noted.

Ricord in 1849, and Roquette in 1854, have shown that the active principles of copaiba pass into the urine and are thus brought into contact with the urethra. The drug therefore exerts its action locally, and modifies the urethritis favourably. Two patients who suffered from urethral fistulæ, were treated for a urethritis by giving them balsam of copaiba internally. The part of the urethra behind the fistula, which was frequently irrigated by the urine, healed under its influence, whilst the part in front remained inflamed until it was treated by injecting it with the urine of the patient.

Ricord also administered copaiba to a patient who was free from gonorrhea, and used this patient's urine successfully for injections into patients who were suffering from gonorrhea (Finger).

It follows from these facts that, in order to obtain the maximum effect

from balsam preparations, the patients should take as little fluid as possible. Their urine is then less in amount, and the drug is present in it in a higher concentration. It is also advisable that the patients should make water frequently, in order to renew the curative action of their urine. Moreover, one of the chief conditions of success with balsam therapy is its prolonged use—*i.e.*, the administration should be continued at least eight days beyond the disappearance of all oozing from the urethra, and then it should not be left off suddenly, but the doses should be diminished gradually.

Very often copaiba upsets the alimentary canal; nausea, vomiting, colic, and diarrhea, are common after its use. The urine acquires a special odour, which is noticeable about two hours after the drug has been taken. It sometimes irritates the kidneys, and a little albuminuria or hematuria may be observed, in which case the use of the drug should be discontinued. The skin and the sweat also acquire a peculiar odour. A roseolar rash affecting chiefly the wrists, ankles, knees, hands, and feet, and accompanied by fever, is also occasionally noted.

The administration of copaiba is thus not free from objections. The drug is digested only with difficulty, and gives rise to indigestion. Rashes are common, such as erythemata, sometimes papular in character, roseola, or urticaria, or purpura, and small macules which may be circumscribed or confluent, and vary in colour from a violet to a red. All these ill-effects cease immediately as soon as the use of the drug is discontinued.

Cubebs.—This substance, which is collected in Java and in Sumatra, has been known for more than a century. It is the small, spherical, brown or blackish fruit of *Piper cubeba*, and is less irritant than copaiba, but inferior in its action. Cubebs has been chiefly recommended in the form of a powder, because it is free in this form from the ill-effects of copaiba, and is less dangerous. It can also be given in cachets or in the shape of ethereal or of ethereal hydro-alcoholic extracts.[1] According to Guiard, a dose of 2 to 6 grammes per day is required in order to obtain any effect. He gives this drug for three weeks in the following way: During the first week twelve capsules per day, which contain each 0·5 gramme of the ethereal hydro-alcoholic extract, during the second week ten capsules per day, and during the third week eight capsules. This treatment should be continued uninterruptedly up to the end, even if the first doses appear to have accomplished a cure.

The balsam preparation most commonly employed in France is the *opiate*, which is a mixture containing copaiba and cubebs in variable proportions.

[1] The B.P. preparations are an *oil*, dose 5 to 20 minims, and a *tincture*, dose ½ to 1 drachm (A. F.).

One of the most-used formulæ is the following:

Copaiba	30 grammes.
Cubebs	40 ,,
Powdered cachou	5 ,,
Essence of peppermint	5 drops.
Essence of canella (wild-cinnamon)	5 ,,

This opiate is taken in the form of little balls, of the size of a hazelnut, six to eight per day in unleavened bread. This dose is reached gradually, and after eight to fourteen days one reduces the dose daily by one boulette, until finally no more are taken.

Some patients object to the opiate. It sometimes causes irritation of the alimentary canal; colic, diarrhea, vomiting, and retching, are not uncommon after its use. It is therefore better, in the case of private patients, to prescribe according to one of the following formulæ:

Powdered cubebs	10 grammes.
Copaiba	3 ,,
Tar syrup	q.s. to bind.

or—

Copaiba	10 grammes.
Cubebs	20 ,,
Tartrate of iron and potash	2 ,,
Syrup of krameria (rhatany)	q.s.

Sandalwood-Oil.—This substance comes from Oceania, Southern Asia, and East Africa.

Its action is at least equal to that of copaiba, and is infinitely less irritating to the alimentary canal. Its administration is, however, often followed by pain in the loin and symptoms of renal congestion. It is a clear yellow essence obtained by distilling sandalwood. It is prescribed in doses from 1 to 8 or 10 grammes per day, put up in capsules of 0·25 or 0·5 gramme. The average daily dose is 3 grammes.

Santalol B., or Eumictin.—This drug is better tolerated than the ordinary preparation. It is given in 0·25 gramme capsules in a dose of 1 to 2 grammes per day.

Arrheol.—This preparation is one of the active principles of sandalwood-oil, and has the same therapeutic action. It has the advantage of being a definite chemical compound, and of being more active than the essential oil if equal weights be given. It is administered in 0·2 gramme capsules, of which six to twelve per day are given.

Its analgesic action is well marked, and it causes no renal or digestive disturbances.

Libanol has been advocated by Professor Gémy of Algiers for the treat-

ment of gonorrhea. It is best given in capsules containing 0·25 or 0·3 gramme. The daily dose varies from 3 to 8 grammes.

It never affects the kidneys and the alimentary canal.[1]

Buchu appears to act as a diuretic and as a modifier of the urethral mucous membrane. The tincture is the best preparation, as it contains all the active principles of the plant.

Tincture of buchu[2] can either be prescribed by itself with pure water, or in a diuretic infusion (uva ursi, etc.). The average dose for two days is 20 to 60 drops.

Fluid Extract of Kawa-Kawa.—M. Abramovitch recommends the use of the fluid extract of kawa-kawa. This plant, which grows in the Pacific Islands, is gifted with antigonorrheal properties.

The extract of kawa-kawa is administered three times per day in doses of 20 to 40 drops.

It is completely inoffensive, and in this respect it is superior to the other balsams.[3]

Gonosan.—This is a resin extracted from the kawa-kawa plant. It is a greenish-yellow, transparent, oily liquid which is soluble in alcohol, ether, and chloroform, and has an aromatic odour. Its use is said to obviate the drawbacks of balsam treatment (pain on making water, dyspepsia, etc.). Six to nine capsules, containing 0·5 gramme, are given daily.

This drug contains 20 per cent. of sandalwood.

Salol appears to be useless in the treatment of gonorrhea. It is often given together with santal—"salol-santal," which contains 33 per cent. of salol.

Arhovin, Thyresol, Santyl, are other German "antigonorrhoica" of similar composition.[4]

Method of Administering the Balsam Preparations.

The balsam preparations were formerly only prescribed in the treatment of gonorrhea when all the congestive symptoms had disappeared; they were therefore usually given about the beginning of the fifth week. An indispensable precaution consisted in always ascertaining that the patients were free from albuminuria. Large doses were given for fifteen days to three weeks.

[1] Gémy, *Presse Médicale*, November 29, 1902, p. 1150.

[2] Martinet, *Presse Médicale*, January 4, 1902, p. 20.

[3] I believe kawa-kawa to be absolutely useless, and have never seen any benefit from gonosan (A. F.).

[4] They are all equally useful and useless according to the point of view which one takes (A. F.).

4. **The Treatment of Acute Gonorrhea by Bier's Method.**—Dr. Miles of Edinburgh has recommended the use of Bier's treatment for acute gonorrheal urethritis, and has given an account of 300 cases treated in this way.[1]

He uses a glass cylinder, fitted at its open end with a rubber diaphragm which adapts itself accurately to the root of the penis. By means of a small pump a vacuum is made in the cylinder, which is 18 centimetres long and 5 centimetres in diameter.

After the patient has emptied his bladder, the apparatus is applied and a partial vacuum is made. The penis becomes immediately congested, and a few drops of pus appear at the meatus. After ten to fifteen minutes air is allowed to enter the cylinder. One lets the patient rest for five minutes, and then makes another similar application, which again lasts ten minutes or so. This process is repeated three times at each visit, which therefore lasts about an hour. This treatment, which should not give rise to any pain, is carried out once in twenty-four hours, and in mild cases applications lasting twenty minutes are sufficient.

If one examines the pus before and after each congestion treatment, one finds some interesting changes, which are remarkably regular and constant. The number of polymorpho-nuclear leucocytes is increased, and they contain a larger number of gonococci. In one instance, Miles noted an enormous number of extracellular cocci before the treatment. After the application of the suction, there were fewer organisms, and they were nearly all intracellular.

The therapeutic results are very satisfactory. One visit is sufficient to diminish the pain and the dysuria considerably, and after two visits these symptoms have disappeared completely. If the case be treated early, the discharge dries up within a fortnight, a slight moisture being perhaps left for another week. In some patients the discharge disappeared after three to four visits. Others only got well after three to four weeks. Noteworthy is the almost complete absence of complications in patients who are treated by Bier's method. There were only two cases of epididymitis amongst Miles's material; the posterior urethra was hardly ever affected; prostatitis, prostatic abscess, cystitis, and peri-urethral abscess, were never noted. However, mixed infections and buboes were observed twice, and two other cases developed gonorrheal rheumatism.

Bier's method is not applicable to chronic cases. In "gleet" (chronic gonorrhea) it increases the discharge and brings on pain and dysuria.

The advantages of this congestion treatment are its simplicity and its

[1] Miles, Med.-Chirurg. Society, Edinburgh, May 4, 1910.

cleanliness. Moreover, the patients can treat themselves, and it is most useful when injections cannot be given—for instance, in cases of tight phimosis or of edema of the prepuce.

4. The Abortive Treatment of Acute Gonorrhea.

The term "abortive treatment" it is not absolutely accurate, strictly speaking. The gonococci penetrate, as we have pointed out above, with great rapidity into the substance of the epithelium. A really abortive treatment would therefore imply the destruction of the epithelial layers, as otherwise the chorion would not be reached, and the gonococci would not all be killed immediately.

Such therapy, if it were at our disposal, would work such havoc that the advantage derived by the wholesale destruction of the gonococci would not compensate for the damage done, or justify its use.

However, in a looser sense, one may speak of an "abortive treatment," and it is really remarkable what good results can be obtained by the immediate injection of antiseptics into the urethra under certain well-defined conditions.

As has been explained in Chapter V., the gonococci reach the surface of the cylindrical epithelium almost at once, and enter it from the third day on. They conceal themselves in it, so much so that they cannot be dislodged by irrigations and injections, which merely pass over the mucous membrane.

It is thus evident that an abortive treatment can only be successful if it is instituted within the first forty-eight hours after the first signs of the discharge appeared. After that time it is bound to be useless, and it may even do harm and give rise to complications, such as hemorrhage from the urethra, cystitis, etc.

Quite a number of methods may be used for aborting an attack of gonorrhea—namely:

1. Injections.
2. Irrigations.
3. Intra-urethral dressings.
4. Écouvillonnage of the urethra.

1. **Abortive Injections.**—A great number of substances have been advocated for aborting rapidly an attack of gonorrhea. The chief ones are the following:

Silver Nitrate.—For over a century attempts have been made to abort gonorrhea by means of intra-urethral injections of silver nitrate. The salient point—and all the advocates of this treatment are agreed in this respect—is to apply the drug during the first two or three days after the infection took place.

Diday used injections varying in strength from 1 to 5 per cent., employ-

ing occasionally a 20 per cent. solution. He obtained an average of 60 per cent. of cures.

Ricord never used a stronger solution than 3 or 4 per cent.

The immediate effects of this abortive treatment consisted in an intense pain, especially along the cauterized region, reddening and swelling of the lips of the meatus, a thick, sometimes yellowish, sero-sanguineous oozing, and severe discomfort during micturition for one or two days. If the abortive injection was successful, the inflammatory manifestations subsided, and all discharge disappeared. But this was not common. Therapeutic failures were the rule, and often complications set in, such as complete retention, epididymo-orchitis, cystitis, prostatitis, etc.

Delfosse practised instillations at the level of the bulb with a 2 per cent. solution of silver nitrate, which he repeated every other day. If after four or five instillations the gonococci were still found, he discarded this abortive treatment.

Pontoppidan instilled a few drops of a 2 per cent. solution of silver nitrate into the fossa navicularis after the patient had passed water, and thus he cured a third of his cases.

Ulmann was in the habit of injecting 3 to 5 c.c. of a 2 per cent. solution of silver nitrate into the urethra, where the liquid was allowed to act for two minutes.

Feleki passed a urethroscopic tube as far as the bulb, and then, as he gradually withdrew it, he painted the urethral mucous membrane with a brush soaked in a 5 per cent. solution of silver nitrate. In very early cases with a barely noticeable secretion, one of these applications was sufficient to produce a cure. In the others this intervention had to be repeated several times after two or three days.

Engelbreth[1] of Copenhagen also uses silver nitrate for aborting gonorrhea. In cases which are one to three days old, he irrigates the anterior urethra with 500 c.c. of a warm solution at body heat, containing 0·25 to 0·5 per cent. of the salt.

Four irrigations of the anterior urethra are required—one at the first consultation, the second one six to twelve hours later, and the others at intervals varying between ten and twelve hours. The whole treatment is thus completed in forty-eight hours.

This abortive treatment is only indicated on the second and third day of the disease, when the meatus is not inflamed, and the urine in the first glass is clear, although it contains flakes.

Engelbreth claims to have had great success with this treatment; 85 per cent. of his cases were cured.

[1] Engelbreth, *Rev. Prat. des Mal. des Org. Génito-Urin.*, March 1, 1904, p. 26, and *Ann. d. Org. Génito-Urin.*, 1904, p. 922.

Melun of Bucharest[1] also believes in aborting gonorrhea by means of concentrated solutions of silver nitrate. He discounts Engelbreth's method, which, according to him, is liable to convey some of the strong silver solution into the bladder. He thinks that the vesical mucous membrane could thus be injured, and in order to obviate this he has invented straight metal tubes which are perforated by a great number of little holes at one end, and are attached to a syringe at their other extremity. These tubes, which are used in sizes corresponding to Nos. 24 to 28, efface the folds in the urethral mucous membrane, and allow it to be cauterized more thoroughly.

For recent cases, which are not older than three days, Dr. Melun proposes to proceed as follows: The patient makes water, and the anterior urethra is then washed with distilled water, in order to give the silver a chance of exerting its maximum effect. One of Melun's tubes (No. 24, 26, 28) is then passed. A syringe is affixed, and a 20 to 33 per cent. solution of silver nitrate is injected. This infection is given from behind forwards, as the instrument is being gradually withdrawn, and only affects the anterior urethra. Violent pain, accompanied by a profuse discharge, usually follows upon this treatment. It is repeated after twelve to twenty-four hours, a weaker solution, 10 to 20 per cent., being used. After this the gonorrhea is cured.

This treatment is exceedingly painful, and Dr. Melun dwells upon the necessity of always obtaining the formal consent of the patient previously.

Protargol.—Bettmann[2] uses the following solution:

Protargol	10 grammes.
Hot distilled water	45 ,,
Glycerine	q.s. ad 100 c.c.

He has a special instrumental outfit which allows him to apply this solution with a brush to the urethral mucous membrane. The manipulations are delicate, and could not possibly be carried out by the patient.

Ahlstrom[3] uses a 2 or 4 per cent. solution, of which he injects 5 to 10 grammes twice daily for four to five days. After three to five days he injects a 1 or 2 per cent. solution twice in the twenty-four hours, and allows it to be retained for ten to fifteen minutes. In 100 cases he claims to have had only thirteen failures, and in eight complications arose (posterior urethritis, prostatitis, epididymitis, and strictures).

Argonin has been chiefly advocated by Dr. Follen Cabot,[4] of New York, for the abortive treatment of gonorrhea. He only attacks recent cases in which the discharge has only been noted for thirty-six to forty-eight hours. He begins by washing the urethra with hot water, and then he passes a soft

[1] Melun, *Rev. Prat. d. Mal. d. Org. Génito-Urin.*, September 1, 1904, p. 213.
[2] Bettmann, *Münch. Med. Woch.*, 1904, No. 28.
[3] Ahlstrom, in Wossidlo, *loc. cit.*
[4] Follen Cabot, *Philadelphia Medical Journal*, January 26, 1901.

catheter as far as the bulb. He injects 5 to 8 c.c. of a 10 per cent. solution of argonin through the instrument and withdraws it, taking care that the solution is retained in the urethra. This is achieved by pressing the lips of the meatus together. After five to ten minutes he arms himself with a mounted swab soaked in a 10 per cent. solution of argonin, and pushes it into the anterior urethra. As the walls are kept apart by the fluid which has been injected, the wool and holder reach the bulb without difficulty. The fluid is then allowed to escape. All parts of the mucous membrane thus come into contact with the wool and the argonin, with which it has been impregnated, as the holder is gradually withdrawn. This treatment is repeated twice daily, stronger and stronger solutions being used, until a strength of 30 per cent. is reached. The solutions should always be fresh and be specially prepared for the occasions, because this silver salt does not keep well in solution. Cabot claims to have obtained excellent results with his method. In seven out of eight cases he aborted the disease. According to him, there is no risk, and, as far as his experience goes, no complications arise during or after the treatment.

Argyrol has been advocated by De Sard, Janet, and Paul Guillon (*vide* p. 286).

Albargin is used by Wossidlo[1] in 1 : 3,000 solutions, which the patient has to inject four to six times per day, as required, into his anterior urethra, where it is retained for five minutes.

2. **Urethro-Vesical Irrigations with Permanganate.**—Amongst the drugs which are destined to render the urethral mucous membrane less susceptible to the action of the gonococcus, and less favourable for its growth, *potassium permanganate* occupies the first rank.

Janet's Abortive Treatment.—Janet was the first, in 1892, to carry out urethro-vesical irrigations without a catheter on a large scale, and to render them popular. The principle of his treatment was based on the fact that, unlike the silver salts, which give rise to a purulent reaction, permanganate produces a serous secretion within the urethral membrane which renders it a bad soil for the development of the gonococcus.

The chief points in connection with the abortive treatment by means of permanganate irrigations are the following:

1. *When should one attempt to abort an Attack of Gonorrhea by Means of Permanganate Irrigations?*—Only within the first forty-eight hours after the first appearance is there any likelihood of this treatment being successful.

2. *What Doses should be used?*—Janet recommended, in 1892, to give three irrigations on the first day at five hours' interval, using dilutions of 1 : 2,000, 1 : 1,500, and 1 : 1,000, respectively. For the second and following days, five days in all, he recommended two irrigations with a

[1] Wossidlo, *loc. cit.*, p. 87.

1 : 2,000 solution per day. This treatment proved most irritating to the urethra, so much so that the patients were unable to continue it.

Janet has since then regulated his method in all its details, as shown in the table below. A.U. stands for anterior urethra; 2 U. indicates that both the posterior and the anterior urethra should be irrigated.

Day.	8 a.m.	Noon.	9 p.m.
1st	—	A.U. 1 : 1,000	A.U. 1 : 1,000
2nd	A.U. 1 : 3,000	—	A.U. 1 : 4,000
3rd	2 U. 1 : 2,000	—	2 U. 1 : 4,000
4th	—	2 U. 1 : 2,000	—
5th	2 U. 1 : 2,000	—	2 U. 1 : 2,000
6th	—	2 U. 1 : 2,000	—
7th	—	2 U. 1 : 1,000	—
8th	—	2 U. 1 : 1,000	—
9th	—	2 U. 1 : 1,000	—
10th	A.U. 1 : 1,000	2 U. 1 : 1,000	—

We fully endorse this second method of his, but it should be clearly understood that it is only applicable within forty-eight hours after the appearance of the discharge, before micturition and erection have become painful, and in the absence of any severe local inflammation. With these restrictions this treatment is capable of giving excellent results.

If applied on the first day, it yields 87 per cent. of cures, but on the fifth day only 11 per cent.

Under the influence of this treatment a marked serous discharge is developed, which diminishes and stops within a few hours, making room for the ordinary whitish discharge.

When the gonorrheal discharge is profuse, and has lasted for three days or more, and when micturition and erection have become painful, this therapy is, in our opinion, contra-indicated. The irrigations should then be replaced by the antiphlogistic treatment outlined above.

Once this latter therapy has led to the disappearance of all painful and inflammatory phenomena—*i.e.*, towards the end of the second or beginning of the third week—then the permanganate irrigations may be resumed without fear. At that stage the inflammation is much less acute and the gonococci are much less aggressive. It is therefore usually sufficient to give but one urethro-vesical irrigation in the course of twenty-four hours. The doses employed should vary between 1 : 4,000 and 1 : 1,000.

In the vast majority of cases this treatment removes the discharge. As a rule, the latter disappears after twelve to fifteen irrigations. Failures are either due to a faulty technique or to a complication which should be sought for carefully; *the urethritis has become chronic.*

There is a great difference in the behaviour of individual cases. The first attack of gonorrhea is hardly ever curable by means of abortive measures; but in patients who have had attacks previously, and whose urethral mucous membrane has therefore been modified, the results are much more encouraging. It is almost usual to find the abortive method successful.

Janet's irrigations, whether used at an early stage as abortive therapy, or later when the discharge was already diminishing, have been accused of being frequently the cause of complications: posterior urethritis, orchitis, epididymitis, cystitis, lymphangitis, para-urethral abscesses, prostatitis, and strictures.

The fear of seeing a posterior urethritis develop during the treatment of acute anterior urethritis is certainly not unfounded, and this complication may occur. But it seems unjust to blame exclusively the irrigations. In most cases a posterior urethritis only develops under well-defined circumstances. Complications are relatively common if the patients are unwilling, if they contract their sphincter unconsciously and prevent the fluid from passing into the bladder; but they are rare if one makes use of the little manipulations which render the penetration of the liquid into the posterior urethra easy, and especially if one watches daily the condition of the prostate by rectal palpation, as long as the irrigations are given.

Although this method is of great service for the abortive treatment of gonorrhea, it is true that doctor and patient are very much tied by it, and therefore it is almost impossible to apply it to hospital patients as a routine measure.

3. **Intra-Urethral Dressings.**—Boureau[1] has recommended the use of intra-urethral dressings for aborting attacks of gonorrhea.

His "urétro-mèche" was a kind of wick, made of cotton-wool, which he impregnated with a 0·1 per cent. perchloride of mercury ointment. It was soft and pliable, and was introduced into the urethra, after the usual aseptic precautions had been taken, by means of a stilette. One of its ends was provided with a piece of string, which served as guide, and was allowed to hang out of the meatus. One then covered the orifice with a piece of wool, and brought the prepuce into its normal position. This tampon was supposed to be retained for three to seven hours, after which time it was washed away by a normal micturition. It should never be pulled out. Further curative measures resorted to by Boureau consisted in injections of corrosive sublimate, which were given through a soft rubber catheter for eight days or so. Only the anterior urethra was treated, twice daily in the beginning, and later on only once in twenty-four hours.

Insufflations with Powders.—It has been proposed to insufflate antiseptic powders into the urethra, and boric acid, bismuth subnitrate, iodoform,

[1] Boureau, Moscow International Medical Congress, 1897.

calomel, etc., have been used. The instruments invented for this treatment are partly very ingenious, but the results do not appear to have been very encouraging.

Medicated Bougies (urethral suppositories, "gonostyli," etc.), consisting of solidified glycerine or cocoa-butter, or some other suitable basis, and a certain percentage of an antiseptic, have also been advocated. But they have not given any appreciable therapeutic results.

4. **Écouvillonnage of the Urethra.**—Huguet in 1889 practised "écouvillonnage" before he gave an injection. He first anesthetized the urethra with cocain, and then he swept the urethra with a brush resembling a test-tube brush. The result of this intervention consisted in profuse bleeding from the mucous membrane.

It was intended to bring about the desquamation of the mucosa by destroying the epidermis completely, and in this way to enable the subsequent injections of antiseptics to reach the recesses in which the pathogenic organisms had sought shelter.

Guiard has also practised this treatment, following it up with injections of 1 : 1,000 permanganate.

It does not seem as if this procedure could be recommended.

5. The Treatment of Acute Posterior Urethritis.

The treatment of acute posterior urethritis should be above everything prophylactic—that is to say, one should, in accordance with Janet's table given above, allow the permanganate to enter the posterior urethra during the course of the treatment. If, as we have explained above, these irrigations reach the posterior urethra easily and without difficulty, the occurrence of a posterior urethritis will be frustrated in the overwhelming majority of cases.

Posterior urethritis is a disagreeable complication which should be traced and diagnosed by the surgeon as soon as it makes its appearance. The cardinal symptoms which indicate the implication of the posterior urethra, and prove that the inflammation of the anterior urethra has spread to the posterior, should always be looked for carefully, whilst the patient is under treatment.

These cardinal symptoms are, briefly: turbid urine in the last glass or glasses, frequency and difficulty of micturition, and sometimes also terminal hematuria.

Once these symptoms have been found to be present, urethro-vesical irrigations with permanganate should be resorted to immediately. It is essential that the permanganate should reach the bladder, that rectal palpation be carried out, and that the prostate be massaged. Such is the local treatment, which we cannot advocate too strongly, and in particular we wish to recommend its early application. The technical details are described farther on (*vide* Chapter XII.).

This local treatment should be combined with the use of rectal suppositories, such as—

Ung. hydrarg.	0·05 gramme.
Cocoa-butter	q.s.

One suppository of this composition to be introduced every night when going to bed.

Hot rectal irrigations (45° or even 50° C.) given daily are also of great service if the patient can bear them. Absolute rest is to be recommended. Hot baths of long duration, and, lastly, 1 to 2 grammes of helmitol or urotropin per day, taken at mealtimes, should also be prescribed.

Such is, broadly speaking, the treatment of a posterior urethritis which makes its appearance towards the decline of gonorrhea. If an acute posterior urethritis develops suddenly shortly after the beginning of the infection, and when the inflammation is very considerable, then any kind of irrigation should be strictly forbidden. For cases of this kind the hygienic and general measures which we have indicated are required, and balsams should be given internally. The latter will cope with the first accidents, and have a favourable influence on the illness, providing they are not given for too long a time.

6. **The Serum Therapy of Gonorrhea.**—The serum therapy of gonorrhea is of quite recent date.

It is nowadays established beyond doubt that the gonococcus is capable of entering the blood-stream, and of thus setting up a genuine *gonococcal pyemia*, in the course of which a variety of manifestations develop, as the organism enters the different organs. This knowledge has been the starting-point of a new therapy, as far as gonorrhea is concerned. Curative attempts have been made in two directions: one has endeavoured firstly to modify the blood, in order to render it refractory to the invasion by the microbe, and secondly to increase its gonococcocidal powers after the cocci had entered it.

The idea of giving a little hypodermic injection, and of thus freeing the whole body immediately from all gonococci, is so seductive that it necessarily obtained a favourable reception in all quarters. Unfortunately, the results have so far not justified the hopes which had been raised by this therapy.

Daily experience shows that a first attack of gonorrhea conveys no immunity of any duration.

Rogers[1] thought that the exasperatingly chronic course of certain gonorrheal joint lesions was due to a natural deficiency of antibodies or to their inadequate formation within the infected person. In both alternatives the therapeutic administration of antibodies could be expected to hasten the

[1] Rogers, *Journal of American Medical Association*, 1906, vol. lxvi., p. 263, No. 4.

curative process, and thus he conceived the plan of preparing and injecting an antigonococcal serum.

For this purpose he cultivated gonococci on peptonized broth to which ascitic fluid had been added. After ten to fifteen days these cultures were injected into the peritoneal cavity of a rabbit. After six injections the animal was held to be sufficiently immunized, and was bled from the vein of the ear. The serum was collected aseptically, and put up in sealed glass tubes. Its specific antitoxic properties were tested by means of the following experiment: Rabbits, which had been injected with 1 c.c. of the specific serum, received subsequently 3 c.c. of gonococcal toxin. They displayed merely a slight rise of temperature, whilst the control animals, which had not been immunized with the serum, died within three hours.

Rogers treated eight cases of gonorrheal rheumatism with his antigonococcal serum. Two of them failed to respond, whilst the six others reacted in a characteristic manner. Twenty-four or thirty-six hours after the first injection the fever disappeared, the pain diminished, and the articular swellings subsided. In eight or ten days no symptoms were left.

Rogers is thus of the opinion that antigonococcal serum is of considerable value in the treatment of gonorrheal joint lesions.

In 1909 Carlos Mainini[1] made some interesting researches on gonorrheal vaccines in Professor Widal's laboratory. He inoculated tubes containing Wertheim's ascites-agar medium with gonoccoci taken from a case of acute urethritis. After the cultures had well developed, 5 c.c. of a 0·9 per cent. saline solution, to which 0·5 per cent. phenol had been added, were poured into each tube. The tubes were then well shaken in order to free the colonies from the agar surface. An emulsion containing gonococci was thus obtained and drawn up into the bulbous portion of a pipette. After the ends of the latter had been sealed in the flame, the emulsion was heated on the water-bath for thirty minutes to 70° C. The organisms were then counted, and the emulsion was diluted to 1 : 100, or 1 : 1,000 if necessary.

Mainini has treated six patients with these vaccines, and found the pain to disappear in every case. According to him, gonococcal vaccines have a marked analgesic effect upon gonorrheal articular lesions.

Dr. Schmidt[2] of Chicago has also studied the vaccine treatment of gonorrhea. He uses two different preparations—a serum and a vaccine.

His *serum* is prepared by injecting a virulent culture of gonococci into the peritoneum of a non-castrated ram. During the following three weeks the animal receives one dead culture of virulent gonococci per week, and

[1] Mainini, *Presse Médicale*, January 15, 1909.

[2] Louis E. Schmidt, "The Gonorrheal Vaccine Treatment and the Antigonococcic Serum Treatment in Reference to Gonorrhea and its Complications, but with Particular Reference to Joint Involvements" (reprint from the *Therapeutic Gazette*, September 15, 1910).

then for another seven weeks an injection of living virulent organisms every seven days. When this process is completed, the ram is immunized and ready for bleeding. One ascertains that the blood is sterile, in which case it can be used; 2 c.c. are injected into patients suffering from gonorrhea for one, two, three, or four consecutive days.

Schmidt's *gonococcal vaccine* is made from a virulent culture of gonococci which has been heated to 60° C. for fifty minutes. The cocci are then counted, and tubes containing 10,000,000, 20,000,000, 100,000,000, and 500,000,000 gonococci per 1 c.c. are prepared. These dead organisms, which are suspended in normal saline solution, are put up in sealed ampoules. According to the requirements of the case, 2 to 10 c.c. of this vaccine are injected on two to four occasions at intervals varying from three to twelve days.

Dr. Mauté[1] has studied the action of vaccines prepared by Wright's method on gonorrheal affections. His fourteen male patients suffered of acute gonococcal urethritis. All of them except one had their first attack, and the first injection of vaccine was given three to six days after the onset of their discharge. They had not undergone any other treatment previously.

Excepting two cases, the vaccines were prepared specially for every patient from the gonococci found in his own urethra. The organisms were cultivated on ascites-agar, and killed by heating to 53° C. for one hour. The doses injected varied from 5,000,000 to 30,000,000.

The injections were given into the subcutaneous cellular tissue, and produced no local reaction. On the other hand, if the patients have gonococci in their system, an intradermic injection, even in the dose of 5 drops of a vaccine containing 25,000,000 per c.c., produces a red, purplish, edematous halo of 20 to 30 millimetres diameter around the point of injection. This local reaction could be used as a diagnostic means for detecting a gonococcal infection, if numerous researches prove it to be constant.

The immediate effect of every injection upon the course of the disease was nil, except in one case. In this instance the first injection of 5,000,000 caused an exacerbation of the discharge for ten hours, which was followed on the next five days by a diminution of the discharge. The second injection was given six days after the first, the same dose being used. The discharge again increased for twelve hours or so, whereupon it diminished. At the end of the third week the patient could be considered to be cured.

In the other cases the duration of the illness was not modified by the vaccine therapy. The discharge disappeared four weeks to two months after the onset of the illness, and in one case it lasted over three months. Perhaps one should note certain peculiarities in the evolution of the disease.

[1] Mauté, *Soc. Biol.*, March 27, 1919, and *Journ. des Praticiens*, May 29, 1909.

As a rule, the florid state passes rapidly into the period of definite cure. The morning discharge of the period of decline often ceased abruptly in a few days. For instance, a patient who five or six days previously had a copious discharge, from which gonococci could be cultivated, showed at the following examination only a few light muco-epithelial filaments which contained no gonococci. One should, however, not forget that the peculiar course of the illness may have been largely due to the complete absence of local treatment. During the height of the disease the discharge was definitely gonorrheal, but the other phenomena were reduced to a minimum: hardly any pain or none on making water, and the erections painful in four cases only. All fourteen cases remained uncomplicated. A fifteenth patient, who had been suffering for seven weeks and had developed an attack of epididymo-orchitis whilst he was being treated with permanganate irrigations, showed no improvement or other change after he was injected with vaccines.

To resume, apart from one case the course of the illness was hardly affected by the vaccine therapy. A cure was obtained after the same time as that which is required with the classical irrigation treatment. There seems no reason for supposing that the patients would not have been cured equally quickly without the vaccines, if they obeyed the few hygienic prescriptions of the expectant therapy.

According to Dr. Mauté, vaccine therapy is often efficacious in the treatment of gonococcal pyemia, of which gonorrheal rheumatism is the most common manifestation. Arthralgia, sero-fibrinous exudates, and purulent articular lesions, all improve with vaccines.[1]

After vaccination the pains disappear, and the fever falls usually in a constant fashion. The effusions are absorbed rapidly, and in some cases one can begin to move and to massage the joint in eight days.

Vaccine therapy by means of Wright's opsonizing method has also been studied by Dr. Jarvis.[2] He finds that the treatment is harmless, and that an autogenous vaccine is unnecessary. One may therefore use a stock vaccine instead of preparing a special vaccine for every case from its own gonococci.

The injections are practically always followed by a negative phase which lasts forty-eight hours, and is characterized clinically by an exacerbation of the symptoms; a marked improvement then sets in, which lasts three to five days. At the end of this time a fresh injection of vaccine should be given, but in a bigger dose.

Vaccine therapy is more successful as a treatment of the complications of gonorrhea than as a cure for the urethritis.

[1] Mauté, *Presse Médicale*, March 15, 1911, p. 202.
[2] *Presse Médicale*, March 5, 1910, p. 161.

CHAPTER XII

THE TREATMENT OF CHRONIC GONORRHEA

It is difficult to give an accurate definition of the term "chronic gonorrhea," for it is practically impossible to determine the exact moment at which an acute case becomes chronic. Several authors have tried to draw the line between the two stages by fixing a time limit for acute gonorrhea. Others laid special stress on the amount of pain. In themselves, neither of these two points yield a definite distinction, but it would seem that they should be taken into account as well as a third one, which is very important —namely, the amount of discharge and the condition of the urine.

We may therefore say that all attenuated attacks of gonorrhea are chronic if they have lasted longer than is usual, if they are not accompanied by pain, and if the urine is mostly clear.

In former days, "gleet," as the disease is generally called, drove the patients to despair owing to its tenacity, and it proved a severe test for the patience of the medical man, who in the end very often pronounced the patient to be incurable, and made no attempt to ascertain the cause of the chronic nature of the illness.

"If I should go to hell," Ricord used to say, "I know what I will be in for: I will find myself surrounded by patients suffering from gonorrhea, who incessantly implore me to cure them."

This celebrated dictum of the master of venereology is a good illustration of the difficulties met with in the treatment of gonorrhea.

Ricord was also fond of declaring that one knows perfectly well when a clap begins, but that it is the privilege of God of being able to tell when it will end.

Twenty years ago this statement corresponded to the facts, but nowadays it is no longer justified. The methods of treatment have been vastly improved, and, if used methodically and rationally, they allow one to cure nearly every case of gleet. There are no localizations which cannot be made out and treated with our modern therapeutic and diagnostic means. When a patient tells us that he has tried all recognized and known measures without obtaining a cure, one is entitled to reply: "You have, however, forgotten one—namely, the one which would have cured you."

The guiding principle of the treatment of chronic urethritis consists in applying a local therapy to the localized lesions present. If one is able to diagnose the latter accurately, and knows how to treat them, a cure is necessarily obtained.

The first step, therefore, consists in making an accurate diagnosis of the lesions, as we have explained in previous chapters (VII., VIII.).

When the whole urethral mucous membrane has been inspected with the aid of the urethroscope, and been found to be healthy, and when all the glands connected with the urethra (prostate, seminal vesicles, Cowper's glands, Littre's glands) have been expressed and been shown to yield no pathological secretions, then it is impossible that the chronic urethritis should not have been cured.

General Plan of the Treatment of Chronic Urethritis.

Chronic urethritis means a *urethritis with localized inflammatory areas.* It thus differs from acute urethritis, in which the pathological process is *diffuse and superficial.* Hence these two conditions require a totally different treatment, and in the case of chronic urethritis the best therapy consists, obviously, in dealing directly with the localized areas. In order to be able to do this, one must know how to search for these lesions and to discover them.

Broadly speaking, the following plan should be adopted for the treatment of chronic urethritis:

1. **Urethro-Vesical Irrigations.**—The urine should first be rendered clear, and this is achieved by irrigating the patient with potassium permanganate, oxycyanide of mercury, corrosive sublimate, boric lotion, silver nitrate, protargol, etc. Once the desired effect has been obtained, and when the urine in the first glass is much clearer, a methodical exploration of the urethra becomes indicated, and all the localized patches, which may be prolonging the disease, are sought for.

2. **Massage of the Prostate, of the Seminal Vesicles, and of Cowper's Glands.**—Once the diagnostic measures have shown the prostate, or the seminal vesicles, or Cowper's glands, to be affected, massage of the diseased gland or glands should be resorted to until nothing abnormal can be found in connection with them—*i.e.*, until the discharge ceases, the pain and tenderness disappear, and the composition of the material expressed from them becomes normal.

3. **Dilatation by Means of Curved Metal Sounds.**—After the foci just mentioned have been properly attended to and been restored to health, it becomes justifiable to introduce dilators into the urethra, providing the urine has become perfectly clear.

The urethral and para-urethral foci are then treated by means of slow and methodical dilatation with curved metal sounds.

This dilatation treatment is of great importance, and serves a twofold purpose—to treat appropriately the diseased patches within the urethral mucous membrane, and especially to widen the passage and to prepare it thus for urethroscopy.

4. **Urethroscopy.**—Urethroscopy should only be resorted to after the dilatations with curved sounds have opened the passage sufficiently to admit No. 60 G without difficulty. One can then inspect the urethral mucous membrane, see the diseased areas, and determine the places which require to be dilated most.

5. **Dilatation with Four-Bladed Dilators.**—The other methods of dilatation which require special instruments, such as those of Oberländer, Kollmann, and Frank, are then applied according to the indications yielded by the urethroscopic examination.

6. **Urethroscopic Treatment Proper.**—After all these dilatations have been carried out, the passage should be again urethroscoped; and if localizations are found which have withstood the dilatation, then, and only then, should endo-urethral interventions be resorted to.

By following systematically these indications it seems to us impossible not to cure all cases of chronic urethritis.

DESCRIPTION OF THE MODERN METHODS OF TREATING CHRONIC URETHRITIS.

The different modern methods proposed for treating chronic urethritis are the following:

1. Destruction of external para-urethral foci.
2. Urethro-vesical irrigations.
3. Urethral injections.
4. Massage of the glands connected with the urethra.
5. Dilatation of the urethra.
6. Urethroscopic treatment.
7. Instillations.
8. Application of heat to the urethral mucous membrane.
9. Ionization treatment of the urethral mucous membrane.
10. Urethral suppositories.
11. Electrolysis of the urethral mucous membrane.

1. The Destruction of External Para-Urethral Foci in Chronic Urethritis.

We have pointed out on p. 92 the importance of searching systematically for any para-urethral foci which by their presence may give the gonococcus a permanent shelter and prolong the urethritis for ever. We will now discuss their treatment.

They are most commonly found in hypospadias and in the immediate neighbourhood of the meatus. One variety, which is not sufficiently known, is Tyson's gland.

Nearly all these para-urethral localizations have a small, usually minute orifice which leads to a more or less extensive cul-de-sac.

Their treatment consists in their *destruction*, for which several methods have been proposed:

1. **Injections.**—One has attempted to inject liquid caustics, such as concentrated solutions of silver nitrate or of potassium permanganate, through the minute orifices of these fistulous tracts, and to obtain thus their destruction. This method, for which exceptionally fine needles are required, never leads to a radical cure, and cannot be recommended. The

Fig. 142.—Janet's Trajectotome.

liquids cannot be injected satisfactorily, and hardly ever reach the fundus of the infected cul-de-sac. Their action on the walls of the tract is much too weak.

2. **Incision.**—To lay the fistulæ widely open by incising them is certainly an excellent method when it is applicable.

Janet has invented a special instrument, his trajectotome, for opening these para-urethral ducts. They subsequently heal by granulating from the depth to the surface.

In certain cases it is impossible to use this method, which, moreover, occasionally leads to considerable laceration and causes disagreeable scarring.

3. **Cauterization by Means of the Galvanic Cautery.**—Preference should be given to the galvano-caustic method in all cases of para-urethral ducts. A finely pointed platinum loop is introduced, whilst cold, into the opening of the tract; the current is then switched on, and in a few moments the entire tract is destroyed. This method gives excellent results, and is certainly superior to any other which has been proposed.

In some cases it is of advantage to be able to limit the action of the cautery—for instance, if the patient is afflicted simultaneously with a para-

urethral duct and hypospadias. Excessive burning can then be prevented by the following excellent method (*vide* Fig. 143):

A mounted swab, which has been saturated with stovain, is introduced into the fossa navicularis, and its holder is allowed to drop by its own weight. One then applies the cautery. This procedure has three advantages: (1) The region which is operated on is anesthetized to a certain extent; (2) the para-urethral fistula is made prominent and becomes more visible; and (3) the action of the galvanic cautery cannot extend too far.

2. The Urethro-Vesical Irrigations.

The urethro-vesical irrigations should be continued in chronic gonorrhea as long as the urethral mucous membrane remains markedly inflamed, and as

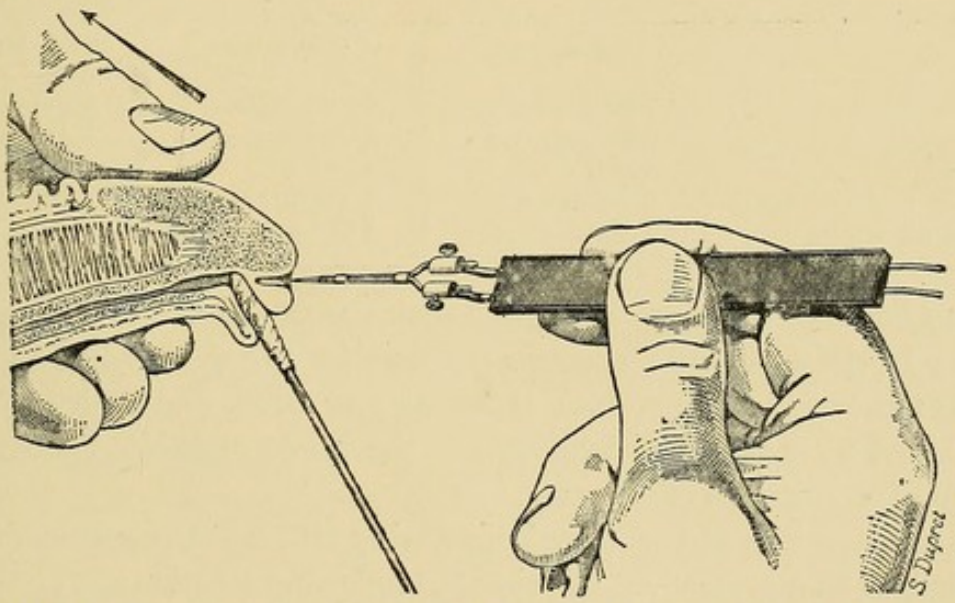


FIG. 143.—DESTRUCTION OF A PARA-URETHRAL TRACT WITH THE CAUTERY.

long as the urine in the first glass is turbid. The technique is the same as in acute gonorrhea, and has been fully described in the previous chapter (*vide* p. 278).

3. The Urethral Injections.

The technique and the indications of urethral injections have been discussed in connection with acute gonorrhea (Chapter XI.), and need not be gone into again. There are, however, three methods of treatment, which may be grouped under this heading, and which require some comment, as they have some peculiar features of their own:

1. Permanent dressings.
2. The combined action of two drugs on the urethral mucous membrane.
3. The application of antiseptic gases to the urethral mucous membrane.

1. **Permanent Dressings.**—Certain authors gained the impression that a short application of even a powerful drug could not have a sufficiently strong action on the deep infiltrations of the mucous membrane; they therefore advocated prolonged applications of certain antiseptics. Unna, Casper, and Janet, used medicated bougies or ointments containing a large proportion of silver nitrate. Motz was of the opinion that only aqueous solutions could be relied on for an efficient and easily controllable action.[1] He introduced 4 to 5 c.c. of an antiseptic solution into the urethra, compressed the fossa navicularis with two fingers of the left hand, and subsequently constricted the glans with a tight dressing. The patient retained the fluid in this way for one to three hours. Motz uses chiefly hermophenyl and oxycyanide of mercury; he has three solutions of different strengths, which are chosen according to the tolerance of the patient:

	Weak Solution.	Medium Solution.	Strong Solution.
Hermophenyl ..	0·50 gramme	0·75 gramme	1 gramme
Protargol	0·50 gramme	0·75 gramme	1 gramme
Glycerine	30·00 c.c.	30·00 c.c.	30·00 c.c.
Cocain hydrochloride	1 gramme	1 gramme	1 gramme
Distilled water ..	1 litre	1 litre	1 litre

If no hermophenyl is at hand, one may use as substitute oxycyanide of mercury in the dose of 0·2 gramme per litre for the weak solution. These dressings are applied every two, three, or four days, and their use should be preceded by a thorough irrigation of the whole urethra with a 1: 2,000 solution of oxycyanide of mercury.

If the secretions of the chronic urethritis still contain gonococci, Motz recommends as a permanent dressing the following solution:

Medicinal hydrogen peroxide	5 c.c.
Distilled water	95 „

This fluid should be used daily, and be retained for 2 to 3 hours.

It is impossible to recommend these dressings as an exclusive treatment for chronic urethritis. They are useless unless they are combined with other measures. They, for instance, cannot bring about the resorption of deep infiltrations in the urethral mucous membrane; but they can be used with advantage in the treatment of these inveterate lesions, if a profuse discharge due to adventitious organisms be present. They stand no comparison with the methodical dilatation of the urethra.

2. **On the Combination of Silver and Zinc in the Treatment of Chronic Urethritis.**—Sabouraud[2] recommended the systematic cauterization with

[1] Motz, *Ann. Génito-Urin.*, 1903, p. 426.

[2] Sabouraud, "Les Cautérisations aux Deux Crayons," *La Clinique*, February 23, 1906, p. 118.

two different caustics, which were to be used in succession, as a treatment for chronic non-specific ulcerations. This interesting method, which is applicable to all wounds which are sluggish in their healing, is said to have given excellent results in dermatology.

It was thus natural that one should have attempted to benefit the urethral mucous membrane by applying this apparently so active and efficacious treatment. Balzer and Tansard[1] carried it out in the following way:

An instillation of 10 to 20 drops of a 1 or 2 per cent. solution of silver nitrate is given into the anterior or posterior urethra. One then passes immediately a sound, made of zinc, No. 40 G, and leaves it in the urethra for one to two minutes, until a reaction is obtained. At the end of this time the silver nitrate is reduced, and flows out of the meatus as a blackish mass. A double decomposition has taken place; the silver nitrate is split up into free nitric acid and nascent colloidal silver, and, on the other hand, the liberated acid combines with the zinc, forming nitrate of zinc. The salt last mentioned is said to be the most active caustic in the method, which, according to the authors, is suitable for almost every case of chronic urethritis. They say that it is immaterial whether the anterior or the posterior urethra be affected, and that it makes no difference whether gonococci are present or not. The most suitable cases are those in which an acute urethritis is subsiding, but very slowly, and which are likely to become chronic.

If used under these conditions, the cauterizing effect of this treatment is not too severe. Balzer and Tansard controlled the results of their therapy by means of the urethroscope, and never saw any trace of sloughing.

This new weapon of our therapeutic arsenal seems to be of value for the treatment of chronic urethritis, and to be more efficacious than silver nitrate alone.

3. **The Action of Antiseptic Gases on the Urethral Mucous Membrane.**—The investigations of morbid anatomy have established that the lesions produced in the urethral mucous membrane by the gonococcus are deeply seated, and not superficial. Most authors who have devoted their attention to curing this so rebellious affection have therefore sought for means of driving the drugs they used into the substance of the mucous membrane. As vehicles for the therapeutically active substances, water, oil, ointments, and medicated bougies, have been tried; the idea of experimenting with gases was thus not far-fetched.

One has tested mainly the action of the following gases in chronic urethritis: Ozone, oxygen (Motz), formalin and iodine vapours.

[1] Balzer and Tansard, "Traitement de la Blennorragie Chronique," *Ann. Génito-Urin.*, May 1, 1906, p. 641.

I have experimented in 1903 with formalin vapours in treating chronic gonorrheal urethritis. I used a flask three-quarters filled with pure formalin, and closed by means of a tightly-fitting stopper through which two tubes passed. One of them was connected with a pair of bellows, which drove air through the formalin, whilst the other one was connected through rubber tubing with the meatus. As the air bubbled through the formalin, formaldehyde vapours were carried with it into the urethra. One could thus handle the gas as if it were a liquid, and impregnate the mucous membrane with it. In most cases this treatment was well borne and did not give rise to any untoward symptoms. In a few instances, however, it produced a disagreeable tingling. The therapeutic results were not encouraging. The gonococci disappeared, certainly, with great rapidity from the discharge, which soon became less white and more fluid, assuming finally a serous character; but the mucous membrane showed signs of marked irritation, accompanied by a profuse serous discharge. On the whole, one may say that formalin vapours produce a considerable oozing from the mucous surface of the urethra, and that the discharge comes on again as soon as one ceases the treatment, and that the gonococci reappear. I have therefore given up all experiments of this kind.

The Insufflation of Iodine Vapours in the Treatment of Chronic Urethritis.—Hamonic[1] advocated the insufflation of iodine vapours as a treatment of chronic urethritis in the male.

His experiments on animals and his clinical experience had shown him that iodine vapours have no detrimental effect upon the urinary mucous surfaces, and that they are practically painless. He therefore devised a special sound, which was attached to a vessel containing metallic iodine, and connected the two with a pair of bellows. In this way he drove iodine vapours into the urethra and into the bladder by working the bellows and heating the vessel. The vapours are at first violet; they then become brown, and as the iodine fuses they turn blackish-brown. The insufflation of these black vapours into the urethra is quite harmless.

According to their degree of concentration, they give rise to a more or less severe sensation of burning. Their immediate effect is to convert the red purulent liquid into an absolutely transparent fluid.

Pfannestihl, who had used nascent iodine for treating chest complaints, also tried it on the urethra. He made his patient take 1 gramme of sodium iodide per day by the mouth, and injected 20 drops of a 33 per cent. solution of hydrogen peroxide shortly afterwards with a syringe into the urethra.

Others have modified this treatment in the following manner: They commence by injecting with a syringe fitted to a catheter 20 drops of a

[1] Hamonic, "Traitement de la Blennorrhée par les Insufflations de Vapeurs Iodées, *Soc. de Méd. Prat.*, June 21, 1888, and *Journ. de Méd. de Paris*, July 8, 1888.

5 per cent. solution of sodium iodide into the posterior urethra. They then inject immediately 20 drops of a 10 per cent. solution of hydrogen peroxide.

The treatment is painful, but the reaction is less marked than with silver nitrate. The amount of pain depends largely on the concentration of the hydrogen peroxide.

A better method of utilizing iodine vapours is Kaufmann's, who carries out this treatment under the control of the urethroscope, and thus only attacks the diseased spot. He paints the latter, working in sight, with a concentrated solution of sodium iodide, and then applies immediately afterwards a few drops of hydrogen peroxide (12 volumes).

4. Massage of the Glands connected with the Urethra.

To the urethra is attached a well-developed system of glands, which consists of three chief groups:

1. The *glands of Littre*, found mainly in the penile portion of the anterior urethra.

2. The *prostate* and the *seminal vesicles*, connected with the posterior urethra.

3. *Cowper's glands*, situated at the bulb.

These organs require massage under certain conditions.

1. *Massage of Littre's Glands.*

The inflammatory secretions can be removed from Littre's glands by massaging the penile urethra, but, as a rule, this method is inadequate. It is only efficient when these glands are in an early stage of inflammation. After a certain time the orifices become obstructed and the excretory ducts become closed. Indirect pressure on the bodies of the glands is then useless. However, in cases which are not inveterate, this method is capable of giving good results.

At which Stage should this Massage be resorted to?—According to the rule which we have laid down above, the treatment of the inflamed glands of Littre should not be begun until the urine has become clear, or at any rate almost clear, and until all pain on making water or during erection has disappeared.

Technique.—One begins with urethro-vesical lavage, using potassium permanganate or a boric solution or oxycyanide of mercury, and passes a straight metal bougie, taking the largest size which the meatus admits (*vide* Fig. 43). One then exerts methodical pressure on the lower circumference of the urethra with the pulp of the first three fingers of the right hand, and stretches the organ by drawing it upwards with the left hand (*vide* Fig. 44).

After having carried the massage out in this way for a few minutes, one withdraws the sound and asks the patient to empty his bladder, which, as mentioned, had been filled with an antiseptic solution.

If the discharge contains gonococci, a second urethro-vesical irrigation with permanganate should be given, in order to kill off those germs which may have been squeezed out of Littre's glands.

This double irrigation method is better than a single irrigation, because in the latter case the massage is less comfortable and less efficient. Moreover, the withdrawal of the sound is sometimes painful, and may be accompanied by a little bleeding.

In 1905 Janet[1] showed a special instrument for massaging the glands of the penile urethra, which consisted of a narrow metal tube presenting a hole near its end. Its other extremity was fitted with two taps, one of which was connected with a syringe. The tube was covered by a rubber sheath, which presented a series of olive-shaped swellings. By means of the syringe this cover could be filled with water. On pressing the piston home the ampoules were dilated; by letting it go the olives contracted and drove the piston back again. In this way an alternate expansion and retraction

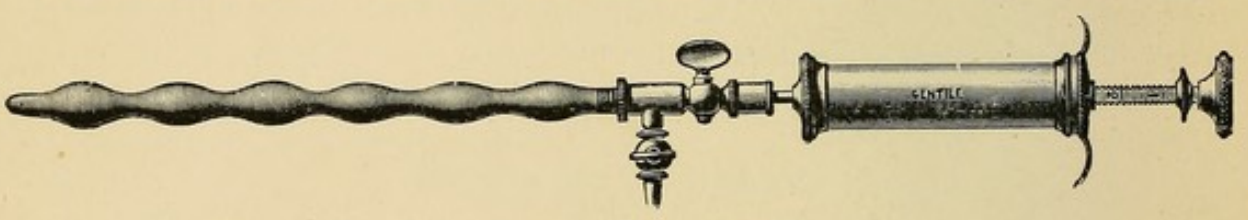


Fig. 144.—Janet's Urethral Masseur.

of the olives was obtained. One can also use this instrument for sweeping the urethral mucous membrane. The olives are distended with water, the tap is closed when they are filled, and the "masseur" is moved to and fro. Owing to the elasticity of the dilated rubber sheath, this treatment is very gentle and harmless.

Dr. Stordeur[2] of Brussels has also devised a special massage instrument for Littre's glands. It consists of a straight hollow tube which is 28 centimetres long, and carries at one end a series of twelve olives, which are about 1 centimetre apart. The heel of each olive is directed towards the surgeon, and has rounded edges. The size of these nobs is No. 21, and the last one is perforated at its basis by two openings, which allow one to inject an antiseptic fluid during the massage. The penis is held firmly, and the instrument is introduced; the operator then moves it to and fro in the passage. The duration of the massage depends on the susceptibility of the patient. This apparatus certainly favours the evacuation of the glands.

[1] Janet, *Ass. Franç. d'Urol.*, 1905, p. 296.

[2] Stordeur, "Traitement de l'Urétrite Antérieure par le Massage et l'Aspiration Intra-Urétrale," *Ann. d. l. Soc. Belge d'Urol.*, No. 1, 1910, p. 43.

Intra-urethral aspiration of the urethral glands has also been carried out by Dr. Stordeur,[1] by means of an apparatus consisting of a straight metal sound, which is 12 centimetres long and drawn out. Its narrow end is

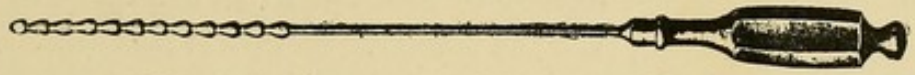


FIG. 145.—STORDEUR'S URETHRAL MASSEUR.

surrounded by a silver wire spiral, and terminates by an opening. Its size corresponds to No. 21 or 22.

Owing to its design, this instrument distributes the aspiratory effect over the mucous surface, and prevents the latter from being aspirated at the

FIG. 146.—STORDEUR'S INTRA-URETHRAL ASPIRATOR.

level of the opening in the sound. The vacuum is made by means of a syringe. At the moment when the aspirator is withdrawn, there is a copious flow of a clear or pink serous fluid. These aspirations are repeated every six to eight days, according to the tolerance of the patient.

2. *Vibratory Massage of the Urethral Mucous Membrane.*

Dr. Dreuw of Berlin[2] has contrived a special system of massage for the urethral mucous membrane, which is carried out by means of a special instrument of his own invention. The vibratory massage is obtained by the issue of a fluid under pressure through a series of small openings. The liquid passes then through larger holes to the outside. There are two models—one for the anterior urethra, and one for the posterior urethra.

The instrument consists of a double channel sound with double walls, and is covered with a rubber membrane. Its outer wall is perforated by a number of holes of the size of a pin's head, placed at a distance of 1 to 2 centimetres from each other. Between them are other openings, which lead to the inner wall. In this way the fluid which passes through the former holes into the urethra finds its way again into the sound, and through it to the outside. This circulation sets up vibration; the urethral mucous membrane is alternately aspirated and distended. The greater the pressure of the liquid, the greater is the vibratory effect, which is not only noticed by the patient, but can be easily felt by the surgeon as he uses the instrument.

This interesting apparatus may render good services when one wishes to obtain a marked action on Littre's glands and Morgagni's lacunæ. Their evacuation can be brought about by this treatment.

[1] Stordeur, *loc. cit.*, p. 49.

[2] Dreuw, *Zeits. f. Urol.*, 1910, vol. iv.

3. *Massage of the Prostate.*

Indication.—The prostate should be massaged in all cases of chronic urethritis. This treatment should be resorted to as soon as one has the least ground for suspecting that the posterior urethra is inflamed. In cases of this kind this procedure is of value, because it facilitates the treatment of the posterior urethra even when there are no gross lesions in the prostate which would be easily palpable *per rectum.*

Contra-Indication.—Prostatic massage is only contra-indicated when the gland is in a state of acute inflammation or when an epididymo-orchitis is present.

Technique.—The patient makes water to begin with, as a safeguard against errors. One eliminates in this way all purulent débris originating in the kidneys or the bladder which may be suspended in the urine. One then gives a urethro-vesical irrigation, and makes certain that the liquid is perfectly clear when it leaves the bladder. This procedure eliminates all secretions which could come from the urethra. One then fills the bladder with boric lotion, and asks the patient to assume the position for massage.

Two positions can be made use of, as described above (*vide* p. 105, Fig. 46; and p. 106, Fig. 47).

One of them having been chosen, the surgeon introduces his right index finger into the rectum, and massages the prostate by moving his index from above downwards and from without inwards along the organ. By making simultaneously pressure on the abdomen with his left hand, he can render this manipulation easier. The pressure which should be exerted by the finger is variable, and must depend on the state of the prostate and on the tolerance of the patient.

Some patients find the first attempts to massage their prostate very painful, and they may even faint. It is therefore necessary to proceed very gently in the beginning. After a while the patient gets accustomed to this treatment, and stronger pressure made be made, and persevered with for a longer time.

After the massage the patient empties his bladder and passes the boric lotion into four glasses. In this way the matter expressed from the prostate can be inspected, and one notes its character and its amount.

The second position indicated is much better than the horizontal one; its advantages are—

1. The massage is more efficient, because the index acts as a powerful lever and exerts more pressure.

2. The liquid squeezed out of the prostate can be collected at once in a glass held under the meatus, and thus an idea of the amount of pus present is easily obtained.

3. When the prostate is very large or placed at a higher level than usually, this position alone allows one to reach its upper parts. The index finger cannot be introduced equally far by any other method.

Combination of Massage and Dilatation.—In certain cases of chronic prostatitis, characterized by nodules which are hard or painful on palpation, simple massage is often inadequate. It is then best to combine the massage with dilatation. The metal sound forms a firm support against which the index can press the sponge-like prostate and expel its contents.

This method is often of considerable value, especially in fat subjects, in whom a firm support cannot be obtained by pressing on the abdominal wall.

Technique.—After the patient has made water, one fills his bladder with boric lotion, and passes a large sound, preferably No. 50 G or so. One then massages the prostate whilst the sound is *in situ*.

The instrument is then withdrawn and the patient makes water. It is often astonishing how much epithelial and glandular débris comes away after this intervention.

Massage of the Prostate by Means of Special Instruments.—Some prefer to use special instruments for massaging the prostate.

These instruments, of which Feleki's, shown in Fig. 48 on p. 107, is an example, are sometimes useful—for instance, in very stout people in whom the prostate is situated at such a distance from the anus that only the tip of the finger reaches it, and that it cannot be properly massaged with the index. An instrument of greater length is then very welcome. But in the vast majority of cases digital massage is infinitely preferable. No instrument can equal the finger as far as palpation is concerned. The latter alone can enable one to feel the spot where the inflammation is located, and it gives a much more complete evacuation of the gland pouches.

Vibratory Massage of the Prostate.—De Sard[1] has advocated vibratory massage. This treatment may be indicated in certain patients who are especially nervous and impressionable.

Electric Massage of the Prostate.—Others make use of electricity, especially of alternating currents for expressing the contents of the prostate.

All these instruments are composed of a rectal electrode which is introduced independently or fixed to the finger, and an electrode which one places on the abdomen or on the perineum. Faradic or galvanic currents can be used.

1. *Galvanization.*—Hogge of Liège prefers galvanism. His negative rectal electrode consists of a thin sheet of platinum which is covered with chamois leather and carried on a rubber finger-stall. The positive electrode consists of a pad which is applied to the perineum. A current of 5 to 10 milliampères is passed for five to ten minutes.

[1] De Sard, *Ass. Franç. d'Urol.*, 1906, p. 309.

2. *Faradization.*—Courtade uses an apparatus which consists of a metal stem, a rubber finger-stall, and a metal pad. The stem is flat and flexible. It carries a thin sheet of platinum at one end, whilst its other extremity is connected with the negative pole. The rubber finger is double, and perforated at its end by a number of little holes, through which the electricity diffuses. It is placed in contact with the rectal mucous membrane. The metal stem is interposed between the two fingers and the sheet of platinum. The metal plate is put on the abdomen and connected with the positive pole.

Instead of this somewhat complicated apparatus, a simple electrode consisting of a piece of wood or ebonite may be used. It is applied directly to the prostate, and does not require to be guided by the finger.

In any case this type of massage is much too complicated, and should be reserved for special occasions—for instance, for patients who are nervous and impressionable.

4. *The Massage of the Seminal Vesicles.*

The seminal vesicles are massaged in the same way as the prostate, and the technique is similar.

Indications.—This treatment is indicated whenever the seminal vesicles are in a state of chronic inflammation. The diagnosis is made by palpating these organs *per rectum*, as described on p. 110 and in Chapter IX.

It is always necessary to examine the seminal vesicles in the course of an attack of gonorrhea, and, as the symptoms of their infections are often vague and obscure, it should be a matter of routine to explore them.

Technique.—The technique is here practically the same as in the case of the prostate. It is, however, necessary to place the patient in the position described on p. 110, as it is impossible to reach the seminal vesicles properly in the horizontal position.

In order to ascertain if the vesicles can be reached easily *per rectum*, Feleki has measured the distance between the anus and these organs in thirty-two corpses of subjects who had died between the ages of twenty-one and sixty-four. In four cases he found a minimum of 5 centimetres as distance between the anus and the lower part of the prostate; the maximum was 8 centimetres, and was noted twice; the average of this measurement is therefore 6·3 centimetres. The distance from the anus to the upper part of the prostate is 9·2 centimetres on the average ; a minimum of 7·5 centimetres was recorded three times, and a maximum of 13 centimetres once.

The distance from the anus to the upper part of the seminal vesicles varies between 9 centimetres (minimum) and 16·5 centimetres (maximum), the average being 12·5 centimetres. These measurements were made with empty rectum and bladder.

Lewin and Böhm found 5 to 7 centimetres as average distance between

the anus and the lower end of the seminal vesicles, and 8 to 12 centimetres as average distance between the anus and the upper end of the seminal vesicles.

It is thus very difficult to feel the seminal vesicles with the index finger, which measures as a rule 7 or 8 centimetres. As in the case of gynecological examinations, the "touch" and the experience of the surgeon are the important factors in the palpation of the seminal vesicles, and not the length of his finger.

For the expression of the seminal vesicles, the index should be introduced as far as possible beyond the prostate, and gradually be brought down to that gland. In very many cases the vesicles can be expressed and emptied into the urethra in this fashion.

The secretions are collected in a glass, and should be examined microscopically in a manner similar to that used for the prostatic fluid.

The Normal Vesicular Contents.—The contents of the seminal vesicles have been studied for many years, and all the findings have been compiled by Guelliot, as far as they are laid down in the literature. The vesicular secretion is an odourless, mucous, and viscous fluid, which is somewhat sticky and of a relatively considerable density. Its reaction is alkaline, and its colour is greyish, except in very old men, in whom it is brownish. Under the microscope one often sees transparent round bodies, which Robin termed "sympexion." Their purpose and their chemical constitution are not completely known. They dissolve in acetic acid, and are often so perfectly round and transparent that they are apt to be mistaken for air-bubbles. One also finds a few spermatozoa and little mucous droplets, which resemble amorphous phosphatic precipitates.

The presence of leucocytes and red blood-cells in the secretions of the seminal vesicles is a pathological finding. Schlaginweit has described a phenomenon which appears to be characteristic of the vesicular secretion: A drop placed in water sinks vertically to the bottom, but if one adds a drop of prostatic secretion to the product of the vesicle, the latter loses its viscosity and becomes miscible with water.

The Vesicular Contents in Disease.—In chronic spermato-cystitis one is apt to find pus, blood, and bacteria in the secretion, which can be examined either immediately, in the fresh state, or after it has been dried and stained. The former method is usually sufficient for clearing up the diagnosis. Before these histological researches are undertaken, it is necessary to clean the glans and to wash the whole urethra with an antiseptic solution. It is interesting to note that expression of the vesicles often yields semisolid masses which are moulded according to the outlines of the culs-de-sac of the vesicle. The fragments thus obtained assume most curious shapes, and are of great diagnostic importance, as they reveal their origin and form a good basis for microscopic and bacteriological research.

One should also examine the whole product of vesicular expression which is passed as the patient empties the boric lotion with which his bladder had been filled. It is a great mistake to think that all the vesicular contents come away at the first micturition. In many cases the subsequent micturitions contain a certain amount of the products of the diseased vesicles, and one should notify the patient of this fact. The vesicular contents wait, so to say, in the ejaculatory ducts, and only leave them gradually under the influence of a movement—micturition, walking, etc.

There are cases in which the ejaculatory ducts are in a state of chronic inflammation and have become obliterated. All massage, however energetic, is then useless, and the vesicular pouch cannot be emptied despite all efforts. This is a most disagreeable complication; the urine remains turbid for a very long time, and one's means of action are limited.[1]

The massage should always be carried out with great care, as has already been pointed out, because an excessively active treatment may be followed by attacks of fever and by epididymitis.

One can easily understand that the thin-walled vesicle may rupture under the effect of violence, and that in this way its purulent contents may reach the peritoneum and lead to a calamity.

Both prostatic and spermato-cystic massage should not be continued for too long a period. It is certain that they may under that condition lead to debility and exhaustion, characterized by extreme weakness. Very nervous patients complain chiefly of being "light-headed" after the massage. In the case of a patient who was suffering from prostatitis and an inflammation of his left seminal vesicle, massage constantly lead to the evacuation of pus; but after it had been carried out for one and a half months, the patient became so anemic and worn out that it had to be interrupted and a period of rest in the country became necessary.

A series of instruments have been advocated for massaging the seminal vesicles. Keyes, for instance, devised an instrument consisting of two parts, which is introduced empty into the rectum. One then inflates the two halves, which, as they distend, compress the seminal vesicles and express their contents. As a rule, this apparatus is most uncomfortable for the patients; moreover, one cannot regulate the pressure easily; and, thirdly, it is almost impossible to tell if the instrument is in its proper position and if it fulfils its purpose.

Feleki has also invented a special instrument. Here again it is difficult to make out if the apparatus is in its right place and if the pressure is correct. Feleki himself realized its drawbacks, and wished to see it used only in cases in which the tenderness or the enlargement of the prostate made it

[1] *Vide* Chapter IX., Spermato-Cystitis (A. F.).

impossible for the finger to touch all its parts, and in stout people in whom the seminal vesicles are beyond reach.

Eastman's apparatus is based on a different principle. As the human finger is too short to reach the upper end of the seminal vesicle, he devised a nickel-plated metal thimble to be worn on the index, which is thus lengthened by 5 centimetres. He invented several different patterns, a flat and a bulbous one. These instruments are occasionally useful in chronic spermato-cystitis.

5. *The Massage of Cowper's Glands.*

Indications.—As Cowper's glands are frequently implicated in the course of an attack of gonorrhea, and as their inflammation does not usually give rise to characteristic symptoms, they should always be explored.

Massage of Cowper's glands is indicated whenever pressure on one of them is followed by a purulent discharge from the urethra. It is contra-indicated when no pus can be squeezed out of these glands.

Technique.—One lets the patient make water to begin with, and fills his bladder by means of a urethro-vesical irrigation with a 1 : 4,000 solution of oxycyanide of mercury. The patient then lies down on a couch with his thighs and legs semiflexed, the heels being together and the knees apart. The pelvis is raised by means of a cushion, and the scrotum is lifted up.

The massage of Cowper's glands is then carried out with two fingers in a manner similar to the bidigital palpation of these organs (*vide* p. 102 and Fig. 45). The index of the right hand is passed into the anus, the palmar surface pointing forwards. Beyond the sphincter, the finger hooks forwards until it reaches the bulb of the urethra. Simultaneous pressure is made with the right thumb on the perineum to one side of the median raphé.

In this manner Cowper's gland is felt between the index in the rectum and the thumb on the perineum. When the gland is inflamed, it may be palpable as a little roundish mass of the size of a pea. One squeezes it energetically, avoiding to make pressure on the prostate, and then asks the patient to make water into several glasses.

The first glass contains the secretions removed from Cowper's gland by massage; they are centrifuged and examined under the microscope.

In certain cases this method fails. Nothing can be expressed from the diseased gland, and the treatment merely gives rise to sharp pains. One is then confronted with an obliteration of the gland duct, and other measures, preferably excision of the gland through an incision in the perineum, become necessary (*vide* pp. 193 and 194)

5. The Dilatation Treatment of Chronic Urethritis.

Dilatation of the urethra is certainly the best method of treating and curing chronic urethritis. There are but few inveterate cases which are refractory against this therapy. However, it is only successful if *the dilatation is carried out in a very powerful manner and if it is applied with accuracy to the diseased focus.*

Dilatation should be resorted to. firstly, in those cases in which the exploratory olive has revealed the presence of a stricture; but it should also be used—and this fact does not seem to be generally known—in those cases of chronic urethritis in which the lesions consist of localized patches within the anterior urethra, which escape detection as long as the ordinary exploratory methods are used. As such we mention the lacunæ of Morgagni and glands of Littre, with everted, red, and inflamed borders, which can only be diagnosed with the aid of the urethroscope.

One need only to have seen these lesions once in order to be able to understand that irrigations and instillations cannot have any action on them The liquids introduced remain on the surface of the mucous membrane, and cannot reach the deeper parts. These deeply-seated inflammations require a mechanical treatment.

Dilatation alone can free all the glands of Littre of their contents; it flattens out the lacunæ of Morgagni and expresses them like a sponge.

As far back as 1844, Béniqué made the observation that he could cure chronic urethritis by means of dilatation. Alphonse Guérin, Voillemier, Désormeaux, and Thompson, followed his example and advocated this therapeutic measure. Otis made a clinical study of this question, and his writings on wide strictures marked a considerable advance. To Oberländer and his pupils belongs the credit of having definitely established the importance of dilatation as a treatment of chronic urethritis.

We know that the rebelliousness of certain cases of chronic urethritis resides chiefly in the presence of patches of subepithelial cellular infiltration, which gradually become converted into fibrous tissue, and ultimately give rise to strictures. It is only by far-pushed dilatation that these foci can be reached and annihilated, as the urethral mucosa is being distended.

"The normal parts of the urethra are very elastic and resistant owing to their wealth in elastic fibres. Dilatation is therefore merely a gymnastic movement for them; whilst the infiltration areas, however small they may be, are void of elasticity and give way by tearing. A new inflammation is thus set up, which leads to the disappearance of the old inflammation and favours the resorption of the elements of the shattered focus. By means

of the urethroscope one can follow step by step this process until the cure is obtained, which is characterized by the formation of a perfectly smooth and inoffensive scar.

"As these cellular foci are being made to undergo resorption and to vanish, the symptoms of chronic urethritis usually disappear, and the urine becomes free from filaments."[1]

When should one begin these Dilatations?—This treatment should not be commenced until the discharge has become insignificant and until the urine contained in the first glass has become clear.

Should the presence of the gonococcus in the urethra be regarded as a contra-indication?

Janet answers this question in the affirmative. According to him, no instrument should be passed into the urethra as long as Neisser's organism inhabits the passage.

Vigneron, whose opinion we endorse, is less strict. As long as the acute stage lasts, and as long as the urine in the first glass is turbid and micturition is accompanied by pain, it would be reckless to introduce any instrument into the urethra; but when the urine has become clear, after a well-directed treatment, although it may contain some filaments, we think it advisable to complete our examination of the urethra, and we do not hesitate to use instruments with certain precautions.

When two or three series of urethro-vesical irrigations have proved a failure, when one is certain that the disease is not prolonged by lesions in the prostate or in the para-urethral ducts, then it is necessary to explore the urethra. One naturally chooses a time in which the urine has been rendered clear by permanganate irrigations. One examines the whole passage carefully with an olivary bougie, and if one's attention is called to a stricture by the heel of the olive as it is withdrawn, one should not hesitate to resort to gradual dilatation with curved metal sounds, combining this treatment with permanganate irrigations. If the stricture is in the penile urethra, straight sounds are sufficient, and in this case there is no accident to be feared.

Preparation of the Patient.—Very often patients who require dilatation treatment, suffer from a congenital atresia of the meatus.

As dilatations are all-important in the treatment of chronic urethritis, it becomes necessary to widen the meatus either temporarily or permanently in cases of this kind.

1. *Temporary Dilatation of the Meatus.*—Kelly of Baltimore has invented a special instrument which enables one to stretch the meatus for a short time. The use of this apparatus is very simple; it is introduced into the meatus and gradually pressed farther and farther into the urethra.

[1] Menahem Hodara, *Ann. d. Mal. d. Org. Génito-Urin.*, August, 1895, pp. 704, 705.

When only one or two dilatations are contemplated, this procedure may be serviceable; but if one wishes to carry out a prolonged dilatation treatment, meatotomy is infinitely preferable.

2. *Meatotomy.*—Under normal conditions, the meatus and the neck of the fossa navicularis are the narrowest and least extensible parts of the urethra; it is therefore indicated to incise them when they prevent instruments from passing. This simple little operation can be performed with a special *meatotome* or with the *galvano-cautery*.

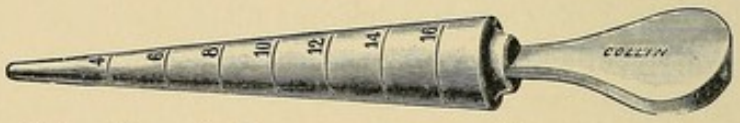


Fig. 147.—Kelly's Dilator for the Urethral Meatus.

The meatotome allows one to operate very rapidly in a few seconds, but its use is often followed by troublesome bleeding. The intervention is carried out in the following way: Once the parts have been cleansed, the instrument is closed and passed into the meatus for a distance of 3 centimetres or so. One then presses on the lever; the blade is thus made to project inside the urethra, and as it is withdrawn it divides the tissues. Care should be taken that the knife is on the under-surface, that it is made to project sufficiently, and that the cutting is done along the middle line. If the latter be followed accurately the bleeding will be insignificant. If the hemorrhage is troublesome, a little swab soaked in adrenalin may be inserted with advantage between the lips of the wound; it stops all bleeding,

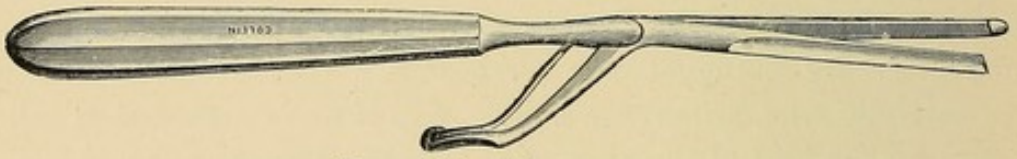


Fig. 148.—Meatotome.

and a light dressing is then applied. If the patient has a long prepuce, the latter can be made use of for holding the wool. If the prepuce is too short or if the patient is circumcised, the meatus is covered by a thick pad of wool, which is kept in position by means of a bandage. On the following days the patient should separate the edges of his wound repeatedly, as the lips have a marked tendency to stick together and to heal rapidly.

The use of the electric cautery obviates any bleeding; during and after this little operation there is hardly a drop of blood. The operation itself is, however, more complicated and more difficult. One anesthetizes, to begin with, the lower part of the meatus by injecting a few drops of a 1 per cent. stovain solution subcutaneously. One then passes a small speculum in order to separate the lips of the meatus, and divides the lower wall along

the middle line with the cautery. The section should include not only the exterior of the meatus—this would be an incomplete operation—but also the *inner wall of the urethra* for a length of a few millimetres.

Whatever method one may employ, one can always ascertain immediately if the meatotomy has been successful by inserting a big sound, 58 or 60 G. This instrument should enter the passage without any difficulty.

General Rules for Dilating the Urethra.—Broadly speaking, all dilatation treatment should be begun with curved metal sounds, unless very tight strictures are present which allow only the small olives to pass. For cases of that kind small bougies are indicated until No. 12 is reached; one then continues with the ordinary curved sounds.

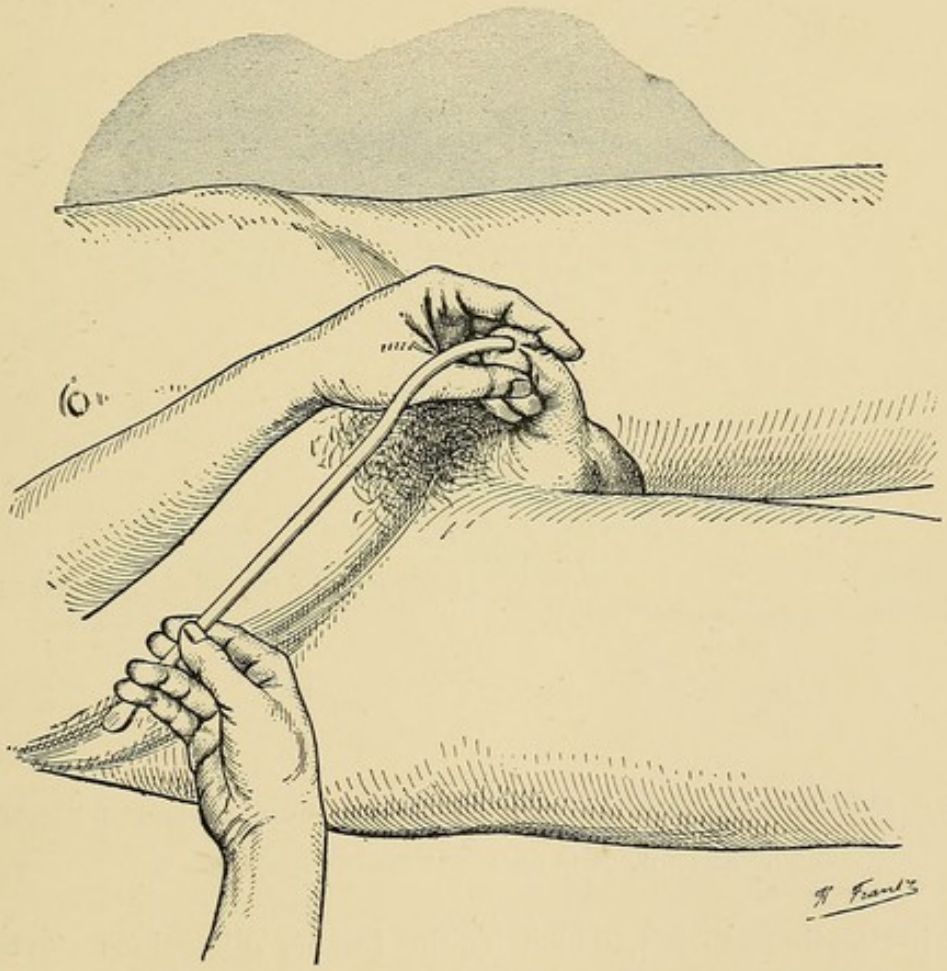


FIG. 149.—FIRST STEP IN THE INTRODUCTION OF A CURVED SOUND.
The instrument is entering the meatus; its concavity is pointing towards the right inguinal fold.

The size of the first sound which should be passed is indicated by the olivary exploratory bougie. If, for instance, an olive No. 15 gave a little jerk at the perineum, one chooses a sound No. 30 G; in the same way, if an olive No. 16 revealed the presence of a slight constriction in the penile portion, one begins with a sound No. 32 G.

The safest plan to adopt is the following:

1. The patient makes water.

2. His bladder is filled from an irrigator with a solution of boric acid or of 1: 4,000 oxycyanide of mercury.

3. Three metal sounds are passed.

4. The patient relieves his bladder of the oxycyanide or boric solution.

After bougies and curved metal sounds have been passed up to No. 60 G, the patient should be urethroscoped in order to see if any patches

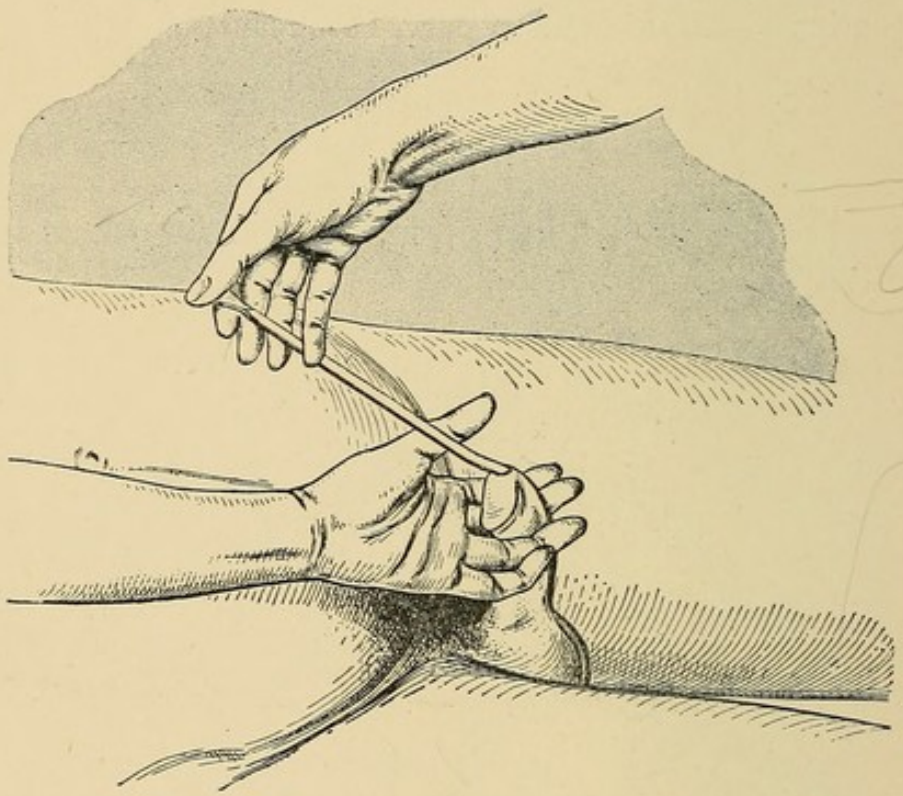


Fig. 150.—Second Step in the Introduction of a Curved Sound.

The instrument is parallel with the middle line.

of hard infiltration are left, which require further dilatations. When this is necessary, the instruments of Oberländer and Kollmann are used. In the same way as a topic should be applied to a wound, dilatation should only affect the diseased area, and the instruments just mentioned allow one to carry out this local therapy with great precision.

Gradual and methodical dilatation treatment enables one to deal effectually with chronic discharges from the urethra in the great majority of cases.

Dilatation of the Urethra with Curved Metal Sounds.—The surgeon stands to the right of the patient, seizes his penis with the left hand, and draws it towards the right inguinal fold. The well-lubricated sound is held

in the right hand and presented to the meatus, care being taken to keep its concavity directed towards the right inguinal fold (Fig. 149).

The instrument is then made to advance along the penile and scrotal portions. As it passes on, the left hand brings the penis gradually towards the abdomen; the instrument is then parallel with the middle line at the moment when it is about to enter the perineal portion (Fig. 150).

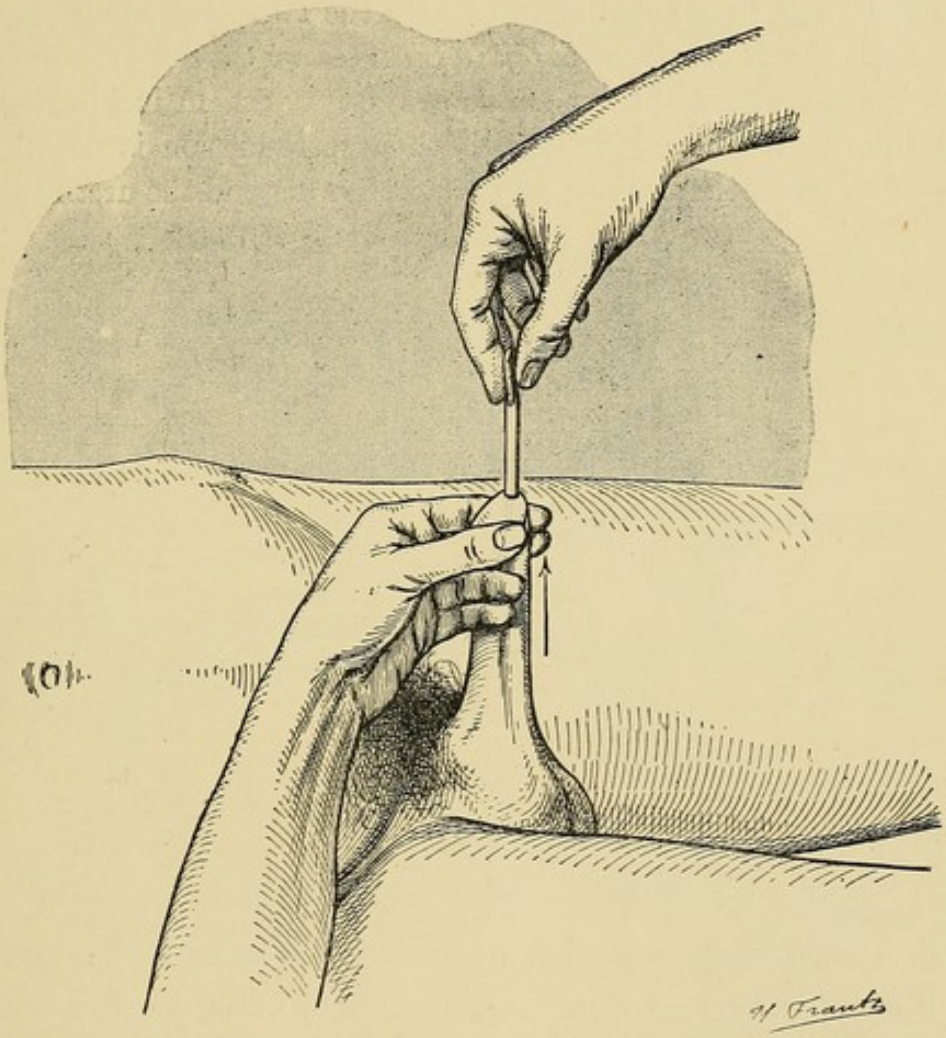


FIG. 151.—THIRD STEP IN THE INTRODUCTION OF A CURVED SOUND.

The left hand pulls vertically on the penis. The right hand holds the sound without pushing it.

At this stage the left hand makes a little traction on the penis, whilst the right hand maintains the sound in its place; it then pulls the penis over the sound and brings it to a right angle with the body (Fig. 151).

This traction with the left hand should be continued until the right hand, which supports the sound without pushing it, feels that the point is entering the membranous portion.

The left hand is then taken away from the penis, and is placed flat on the suprapubic region, pressing it and the root of the penis downwards. At the same time the right hand merely supports the instrument whilst it

dives into the bladder, describing a curve. The entry into the deeper portions of the urethra and into the bladder takes place almost automatically in this fashion. It is unnecessary to push the instrument into the bladder with force (Fig. 152).

How many Sounds should be passed at Each Visit?—As a rule three sounds are passed at each visit. One begins with the highest number passed at the last visit, and introduces subsequently the two next higher numbers.

How Long should the Sound be left in Situ?—In most cases it is sufficient to pass the instruments, and there is no need to leave them inside the urethra for any length of time. However, if their introduction is at all uncomfortable—*i.e.*, when they are so large that they distend the urethral mucous

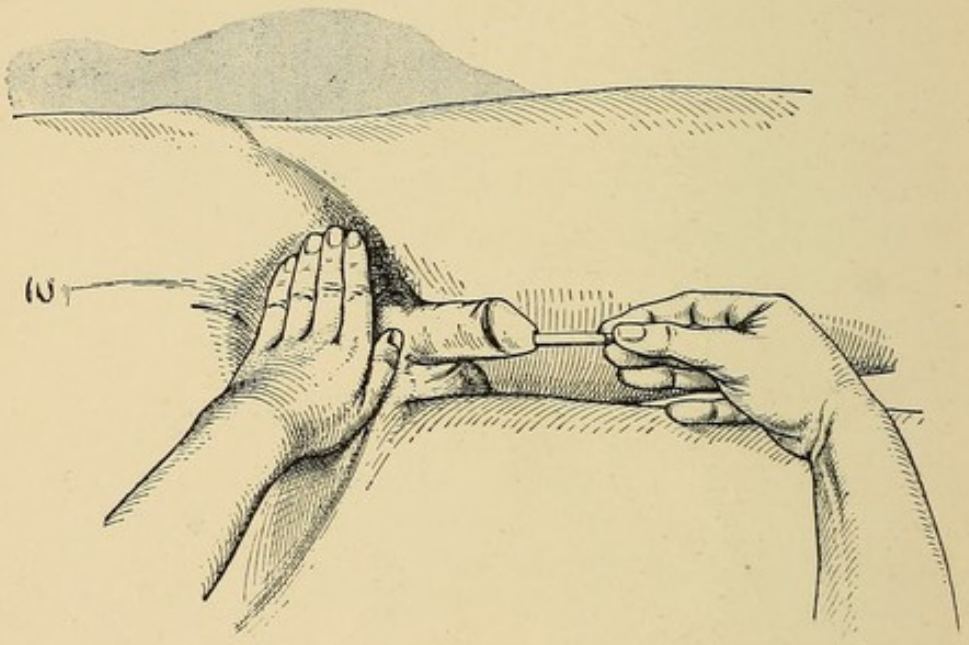


FIG. 152.—FOURTH STEP IN THE INTRODUCTION OF A CURVED SOUND.

The left hand draws the root of the penis downwards, whilst the right hand merely supports the instrument as it goes through its downward movement.

membrane—then it is well to leave them for a while until the patient feels no longer any pain. In this way dilatation produces its full effect. It should never be forcible, and it is only of advantage if it causes no discomfort.

What Intervals should be allowed to elapse between the Visits?—The intervals required between the various visits are variable. If the dilatation has not been followed by the slightest trace of bleeding, and if it has been painless, one can begin again in two days' time, and dilate three times per week. If, on the other hand, the intervention has been painful, and especially if there has been bleeding after the passing of the sounds, then one should wait longer, and dilate only once every four or five days, or even only every eight or ten days.

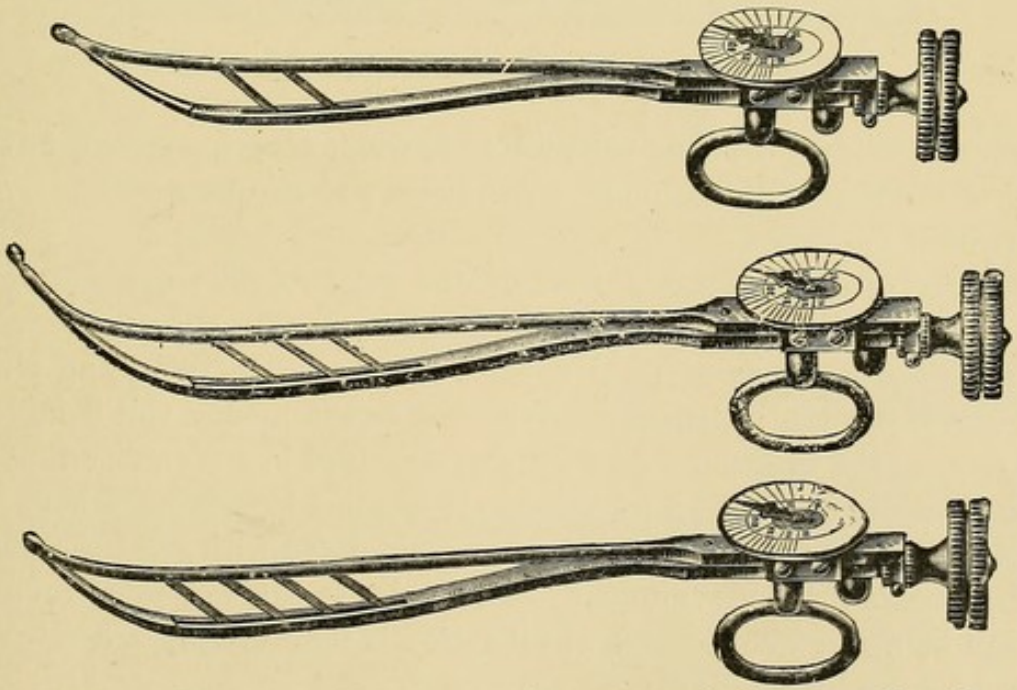
The Use of Filiform Bougies.—The introduction of metal sounds is often rendered difficult by the fact that they have to pass an excentric stricture. When the lumen of the stricture and that of the urethra are not in the same line, the instrument is caught, and some bleeding usually takes place. The best way of dealing with these cases is to use a catheter guide, or ferret, which is fitted with a screw and can be affixed to the end of the sound.

Fig. 153.—Filiform Bougie.

This instrument is screwed on to the top of the sound, and is passed first. It paves the way, as it were, for the latter.

The technique is very simple: The guide is introduced; one then screws the sound on to its end and passes it according to the rules. The latter then enters with the utmost ease; the guide renders it impossible to make a false passage, and curls up, when it has been pushed into the bladder, without ever doing the slightest harm.

On Dilatation with Four-Bladed Dilators.—The four-bladed dilators should only be used secondarily, after the urethra has been dilated with



Figs. 154-156.—Different Models of Oberländer's Straight Two-Bladed Dilator.

curved metal sounds, because their action is a different one. As a rule, the curved sounds do not stretch the urethral mucous membrane sufficiently; for instance, if there is a constriction in the region of the perineum, No. 60 G sound is inadequate. The widest part of the urethra is the bulb, and the narrowest is the balanic portion. As these metal sounds are of a uniform

diameter, the dilatation produced by the instrument will be considerable in and efficient in the penile portion when the instrument barely touches the walls of the perineal portion. One therefore requires special instruments with which the diseased area can be accurately dilated, and which are more in agreement with the anatomy of the urethra. Professor Oberländer of Dresden and Professor Kollmann of Leipzig have invented such dilators, which are mostly two-bladed or four-bladed. They are introduced closed, and their branches are separated by turning a large terminal screw, once they are in the urethra. The older models had to be covered with a rubber sheath, as without this precaution the urethral mucous membrane was apt to be nipped when one closed the instrument. The newer models no longer require the rubber sheath.[1] There are a great number of different patterns. Those intended for the anterior urethra are straight, whilst those for the posterior are curved. Some are designed in such a way that their action is confined to one special portion of the urethra. Some are thinner than others, corresponding when closed to a No. 20, and have weaker blades. They are especially suitable for cases with a small meatus and for those in which only slight dilatation is desired. Others, again, are very powerful,

Fig. 157.—Sheath for Kollmann's Dilator.

and cannot be passed unless the meatus is wide; they are chiefly intended for urethræ which contain much fibrous tissue and require a certain amount of force.

Description of Kollmann's Four-Bladed Dilator.—The older models of Kollmann's four-bladed dilator required to be covered with a rubber sheath in order to protect the urethral mucous membrane against being pinched when one closes the instrument. With the recent models this is no longer necessary, as the blades are grooved and arranged in such a way that they cannot possibly catch the mucosa when they come together. A huge screw on the end of the handle, which can be manipulated with great ease, allows one to separate the blades gradually and slowly; in this way powerful dilatation can be made. The degree of dilatation is indicated by a hand, which moves on a graduated disc.

The dilatations carried out with this instrument are of the utmost value if they be done with caution and method; they should be done very slowly and be gradually increased. Their chief object is to render the urethral mucous membrane supple again, not only in the superficial parts of the epithelium, but also in the deeper parts of the derm. The stretching carried

[1] Kollmann, "Remarques sur les Dilatateurs à Quatre Branches de Construction Perfectionnée," *Ann. Génito-Urin.*, 1903, p. 1150.

out is comparable with similar actions on tissues or on rubber; if one stretches abruptly with a certain amount of force, one produces tears and fissures. Such solutions of continuity would lead in the case of living tissue to sclerosis and fibrous scars. If, on the other hand, one stretches and

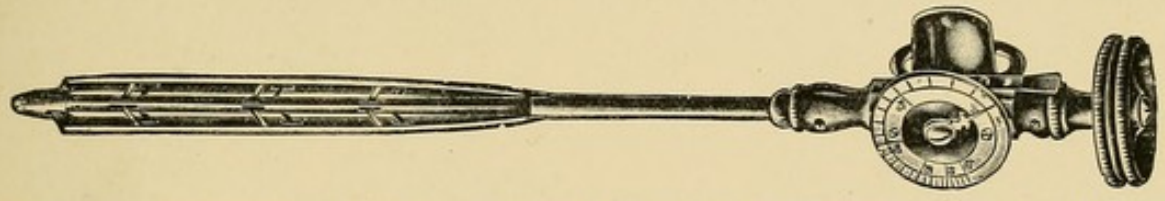


FIG. 158.—KOLLMANN'S FOUR-BLADED DILATOR: OLD PATTERN, REQUIRING A RUBBER SHEATH.

widens gently, one can elongate the tissue or rubber without damaging it. In the case of the urethral mucous membrane, the conditions and the requirements are similar.

As in the case of dilatation with curved sounds, the best procedure appears to be the following:

1. The patient should empty his bladder.
2. His bladder is filled, by means of a urethro-vesical irrigation, with boric lotion or a 1: 4,000 solution of oxycyanide of mercury.
3. The urethra is dilated by means of Kollmann's four-bladed dilator.
4. The patient passes his boric or mercurial solution.

At each visit one inserts the dilator, and turns the screw slowly and gently until the patient feels that his urethra is being dilated. There should be no pain. One leaves the instrument in the urethra for five to ten

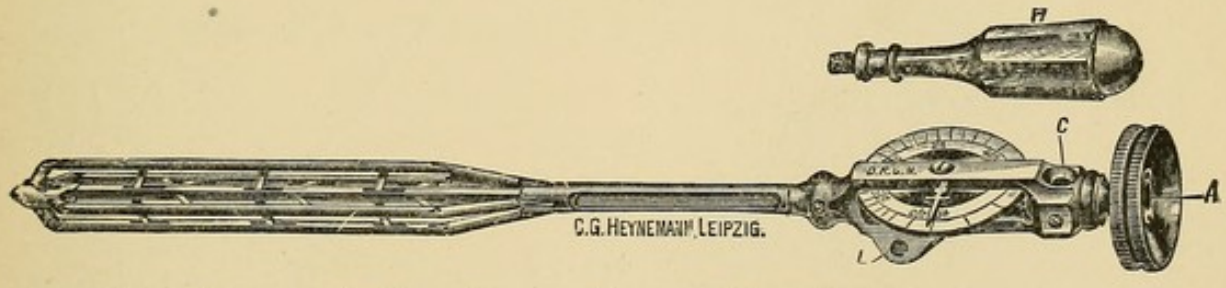


FIG. 159.—KOLLMANN'S FOUR-BLADED DILATOR: NEW PATTERN, WHICH DOES NOT REQUIRE A RUBBER SHEATH.

minutes. More than two applications should not be made within a week, and if there should be the slightest pain on making water or the least trace of hemorrhage, one dilatation is enough, and one should not increase the stretching by more than one number of the scale, or two at the outside. Occasionally, even, one should not hesitate to remain below the last figure reached, if one finds the urethral mucous membrane very tender when one

begins the dilatation. In no case should one go beyond two or three numbers at one application.

With these instruments a most satisfactory dilatation is obtained, and one can control the progress made by passing at each visit an exploratory olive. The discharge dries up and the filaments disappear.

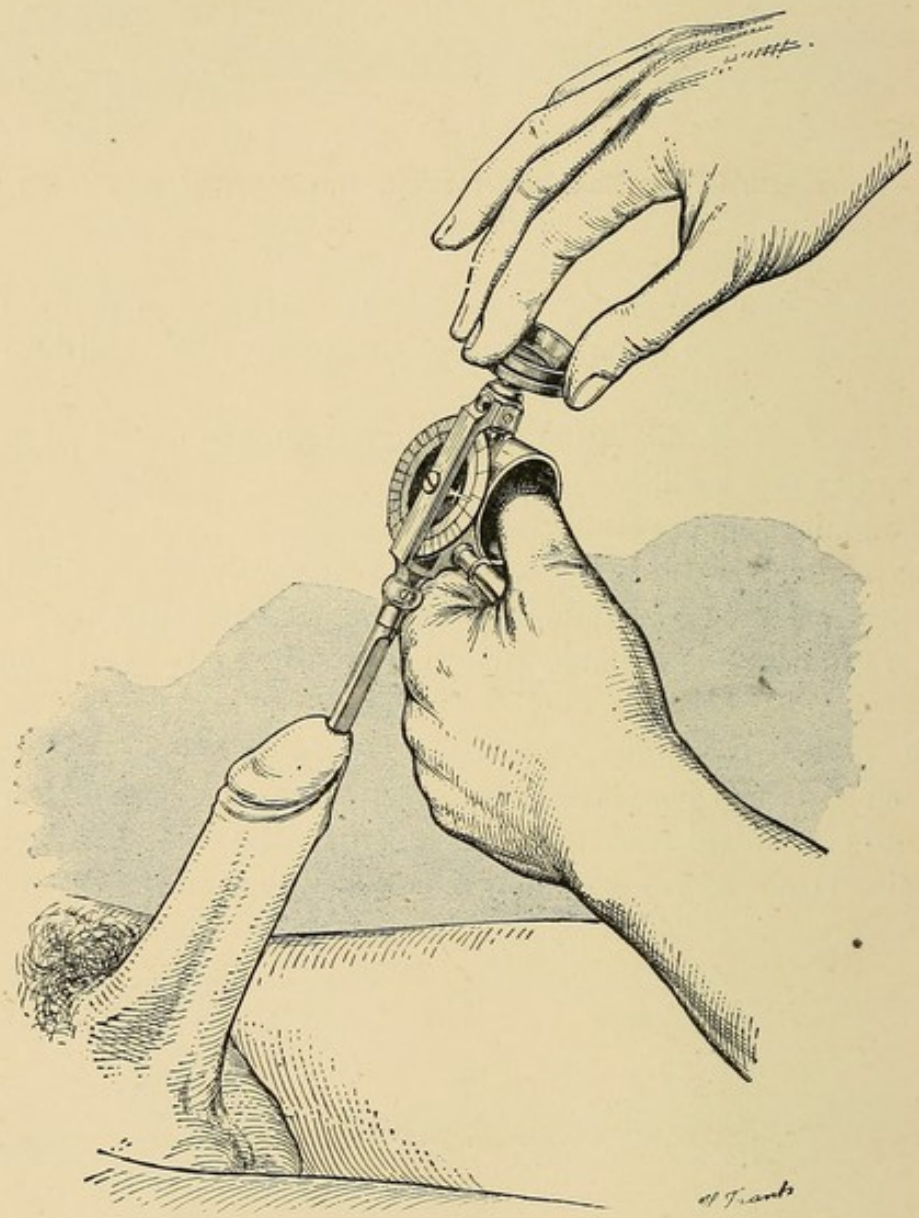


Fig. 160.—Kollmann's Four-Bladed Dilator in Use.

Irrigating Dilators.—Various authors have recommended to combine dilatation and irrigation, and have invented special instruments for this purpose.

De Sard's "béniqué laveur," for instance, consists of a curved metal sound which is fitted with four deep grooves instead of being cylindrical. The distal end of each groove presents a small hole, through which the

[1] De Sard, *Ann. Génito-Urin.*, 1904, p. 359.

irrigating fluid leaves the hollow of the instrument and reaches the urethra. This sound is passed in the ordinary way; one then adapts the special joint and runs the fluid in from an irrigator.

Jeanbrau's [1] irrigating dilator consists of a sound No. 45 G which is quadrangular in its straight portion, and is divided into four branches by

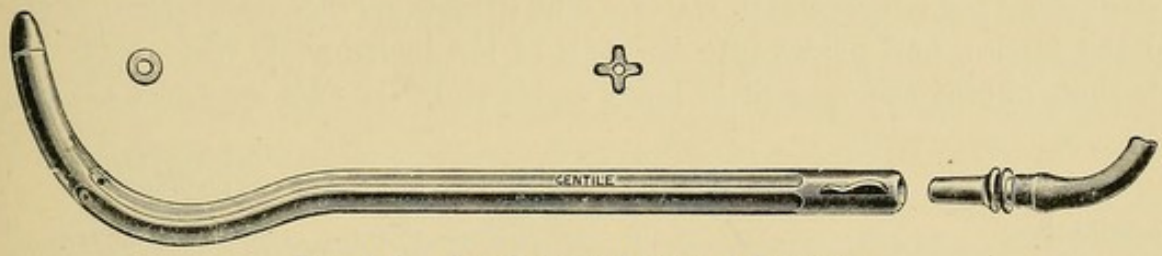


FIG. 161.—DE SARD'S BÉNIQUÉ LAVEUR.

four deep grooves. Each branch is perforated by a number of small holes, and all angles are rounded off. A hollow tube carrying four holes near its end, and fitting firmly, is passed into the sound. The liquid is run in through it, and, as it can be moved to and fro within the sound, the whole urethra can be irrigated.

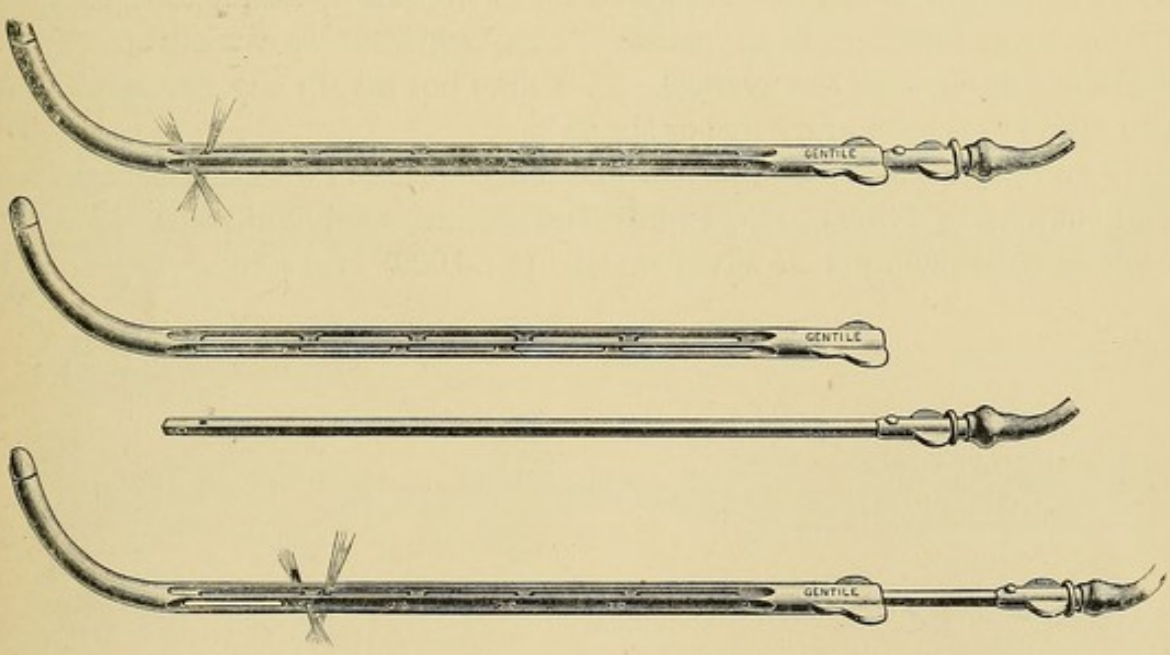


FIG. 162.—JEANBRAU'S IRRIGATING SOUND.

Besides these simple instruments we have Kollmann's irrigating dilators.[2] In order to be able to appreciate their value, one must have seen with the urethroscope the mucous plugs which occasionally occlude the orifices of Littre's glands and of the lacunæ of Morgagni. These plugs are slightly adherent, and these instruments have been constructed for the purpose

[1] Jeanbrau, "Laveur Urétral," *Ass. Franç. d'Urol.*, 1908, p. 167.

[2] Menahem Hodara, "Les Noveaux Dilatateurs-Laveurs de Kollmann," *Ann. Génito-Urin.*, 1898, No. 10, p. 1009.

of washing them away mechanically, and of rendering thus the glandular orifices widely gaping.

They carry four branches similar to those of Kollmann's other dilators. They are grooved, and do not require a rubber sheath.

There are straight and curved models. In each case there is a double channel for the circulation of water. The irrigating fluid enters through one of the blades, and passes into the axis of the instrument, which it leaves through one of the four little holes at its end. In this way the mucous

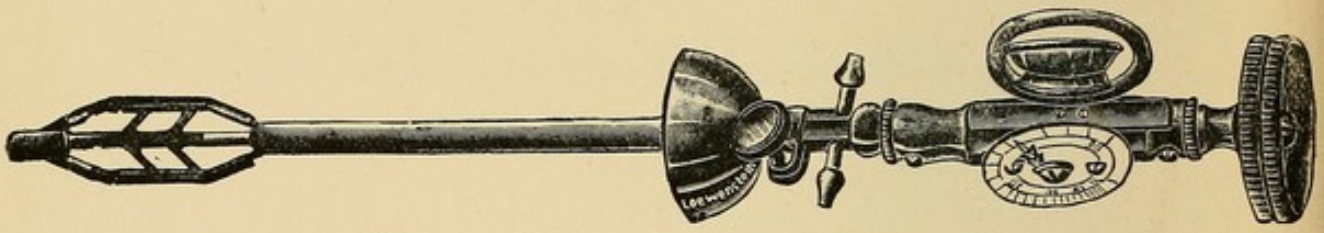


Fig. 163.—Kollmann's Short Straight Irrigating Dilator.

membrane is washed from behind forwards, and, as it is well spread out, it is properly cleansed. The muco-purulent masses are set free and washed away to such an extent that the gland ducts become accessible to the action of the drug used for the irrigation. This treatment is carried out every eight or ten days on the average. If it does not set up any irritation, one can resort to it once every five or six days.

As a rule, one uses a boric acid solution in connection with this instrument, and allows 1 to 2 litres to flow whilst the urethra is being dilated. In some cases a weak solution of silver nitrate (1 : 8,000) is useful. One should

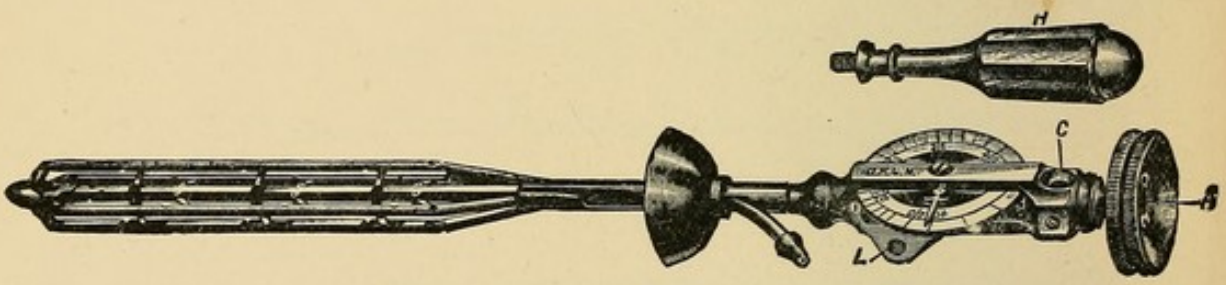


Fig. 164.—Kollmann's Long Straight Irrigating Dilator.

continue the irrigation whilst the branches of the instrument are being brought together and during its withdrawal, in order to prevent all injury to the mucous membrane.

Generally speaking, permanganate, especially in strong solution, should not be used for these irrigations. Its use is often followed by a marked constriction of the urethral mucous membrane. The dilator may then be so firmly gripped that one can hardly withdraw it, and any violence is sure to be followed by a tearing of the mucous membrane.

Another point of importance is the temperature of the solution employed.

Experience has shown that far-pushed dilatations with the four-bladed instrument are often followed by a characteristic sensation of pain, and that irrigation with a hot solution of boric acid attenuates or subdues this pain almost instantaneously. This analgesic action of hot water may be taken advantage of for dilatations of a high degree.

Curved Dilators.—These instruments are intended for dilating the posterior urethra. Some act chiefly on the bulbous portion, others dilate mainly the perineal part, and others, again, like Frank's instrument, widen especially the prostatic urethra. The more recent models no longer require a rubber sheath, their dilating blades being grooved like those of the new instruments for the anterioir urethra. There are instruments on the market

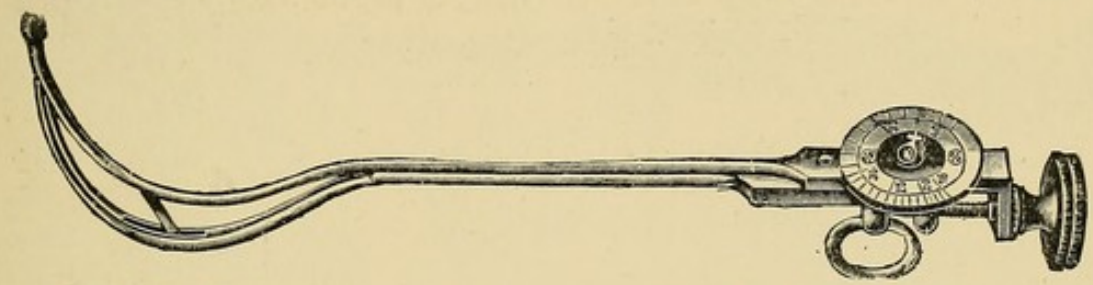


Fig. 165.—Oberländer's Dilator for the Posterior Urethra.

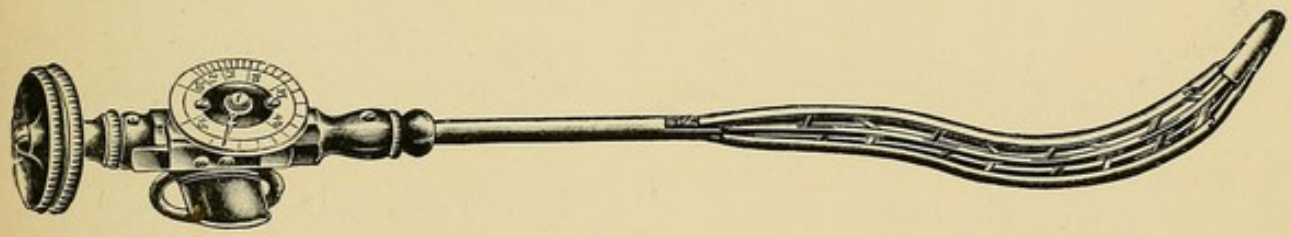


Fig. 166.—Kollmann's Curved Dilator to be used with a Rubber Sheath.

which will pass through a narrow meatus, and there are some very powerful models suitable for high degrees of dilatation. Lastly, some allow one to dilate and to irrigate simultaneously.

Dilatation of the Posterior Urethra.—The posterior urethra is dilated, to begin with, with curved metal sounds. When the urethroscopic control shows that the dilatation has been inadequate and that lesions are left, it becomes necessary to resort to special instruments. One of the best instruments for this purpose is Frank's (of Berlin) three-bladed irrigating dilator, which widens out the prostatic portion and irrigates it at the same time.

Technique.—After the patient has made water and his bladder has been filled by means of a urethro-vesical irrigation, the instrument is passed. The patient should be placed in the semi-inclined position; he should neither be sitting nor lying down; his pelvis should rest on the edge of the couch, and his feet should be supported by stirrups. His back may lean against a rest placed almost horizontally.

Once the dilator has been passed, one turns the big screw until there is a slight sensation of discomfort. One now connects the instrument with an irrigator filled with hot boric lotion, and begins the irrigation. The washings are collected in a glass as they come out, and are examined carefully. In nearly every case one will find them to be turbid, or at any rate not to be perfectly clear, and they gradually become clearer as the irrigation is continued. One can then continue the dilatation, but this should be done with

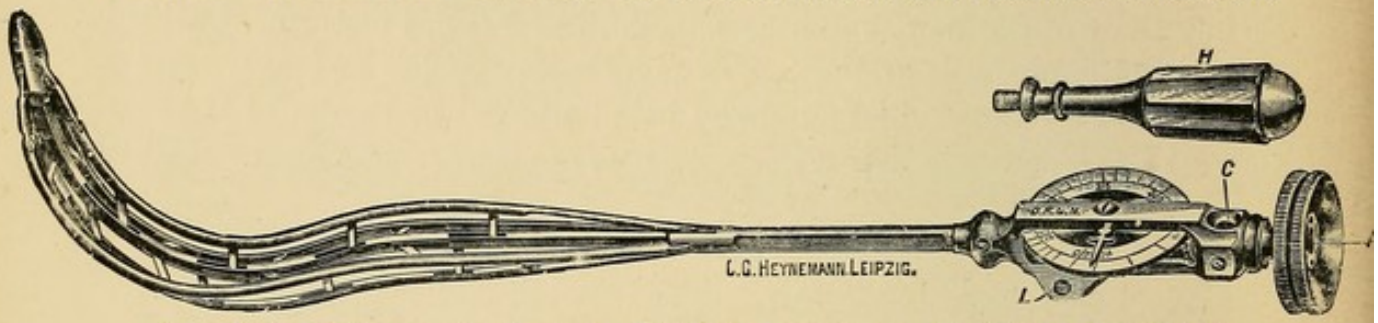


Fig. 167.—Kollmann's Curved Dilator requiring No Rubber Sheath.

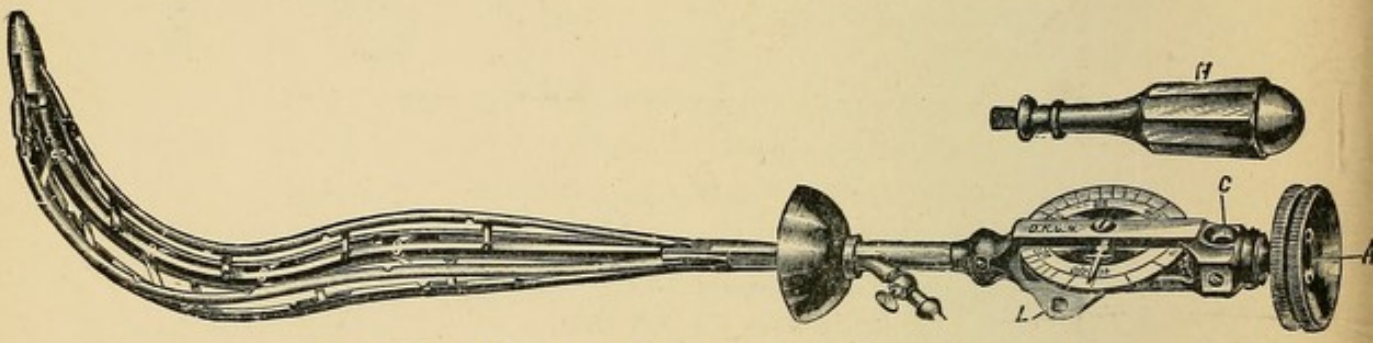


Fig. 168.—Kollmann's Curved Irrigating Dilator.

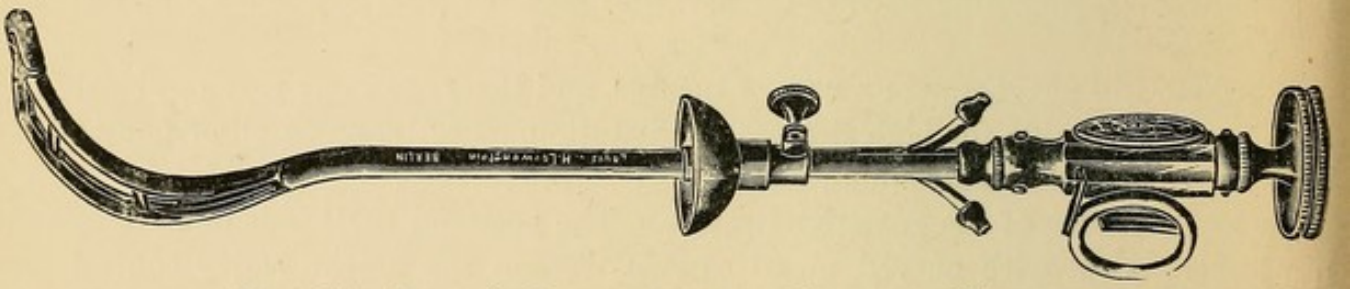


Fig. 169.—Frank's Dilator for the Posterior Urethra.

great caution, in order to avoid any hemorrhage from the mucous membrane. To a certain extent one can control the absence of bleeding by watching the irrigating fluid as it comes out.

However, this is not always reliable. There are cases in which there is no trace of blood during the dilatation. But once one has closed the instrument and withdrawn it, either drops of blood show themselves immediately at the meatus, or the boric lotion is mixed with blood as it is passed.

The first rule which should be observed when dilating the posterior

urethra with this instrument is to proceed gently and slowly. One should never increase the dilatation by more than one or two numbers during one application, and one should allow long intervals between the various visits if there is any bleeding from the urethra. In the latter case, one should not even dilate farther, but should keep to the last number reached until there

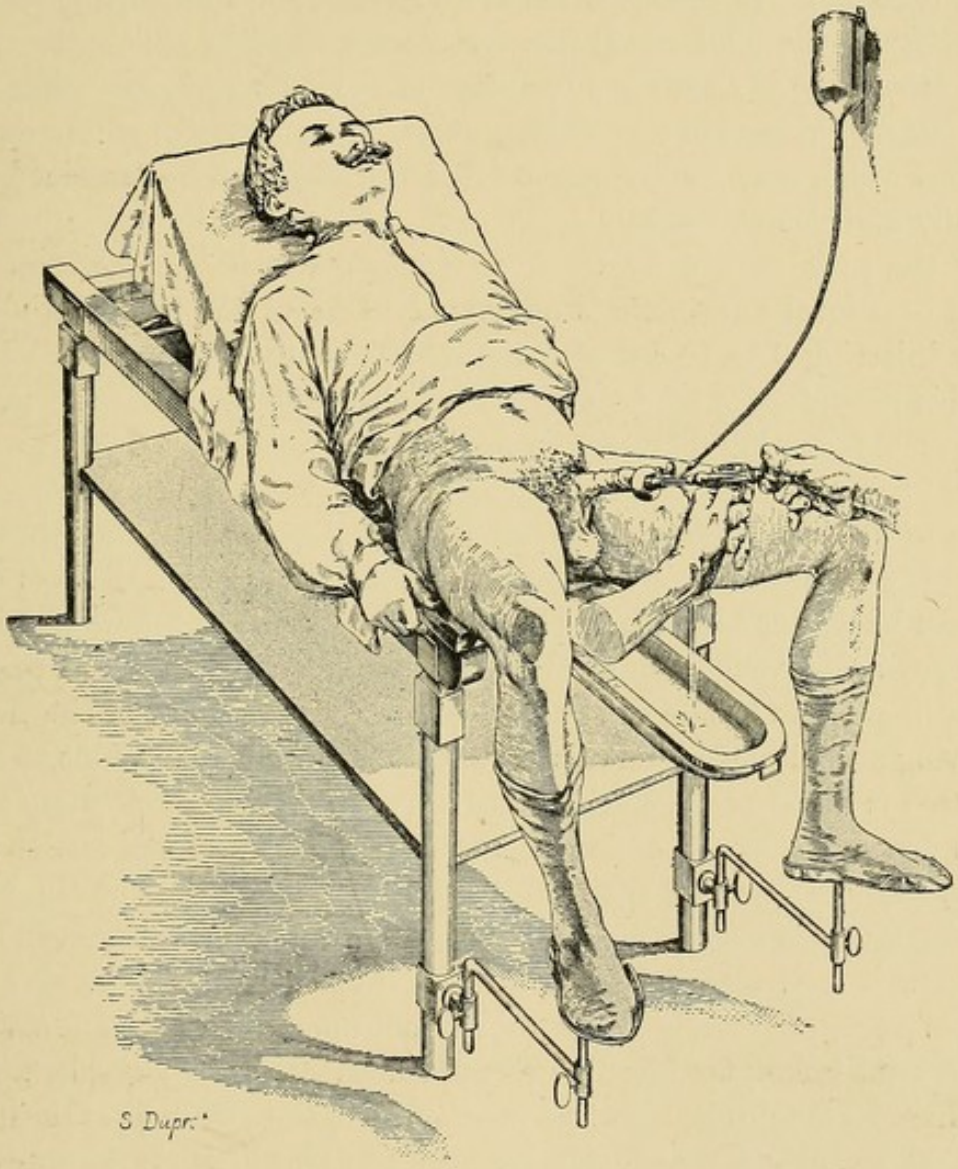


FIG. 170.—DILATATION OF THE POSTERIOR URETHRA WITH FRANK'S INSTRUMENT: POSITION OF THE PATIENT.

is not the slightest trace of blood. The intervals should last ten to fifteen days, or even three weeks.

The Precautions which should be taken with High Dilatations.—In the first place, these far-pushed dilatations should only be carried out slowly and methodically. Unless these two conditions be fulfilled, this treatment cannot do any good.

It is advisable to wash the urethra by means of a urethro-vesical irri-

gation, and to leave a certain quantity of boric lotion in the bladder before beginning the dilatation. The patient is then able, after the dilator has been withdrawn, to pass the solution and to free his urethral mucosa immediately from the glandular exudates which have been squeezed out by the dilatation. This procedure is better than a second irrigation, which would distend and stretch once more the mucous membrane, which has already been bruised sufficiently by the dilator. It also avoids the bleeding which might follow in the other case. Another advantage is the possibility of being able to collect the first stream of the boric solution, which contains any pathological secretions which may come away. The latter can then be examined macroscopically and microscopically.

For the *pain* caused by these dilatations, which is sometimes severe, the use of a local anesthetic is advisable. One of the best methods consists in injecting 8 to 10 c.c. of a 1 per cent. solution of stovain. In some cases this procedure is inadequate. It is then well to give a hot irrigation through the irrigating dilator. In nearly every instance the pain will then cease.

One of the best means of avoiding *hemorrhage from the urethra* consists in resorting to urethroscopy before one uses the dilator. All sorts of accidents can be avoided in this way, and one is enabled to follow step by step the progress achieved. Moreover, in the case of hemorrhage, one can locate the bleeding spot, the site of the tear, and convince oneself of the necessity of allowing considerable intervals between the various dilatations. As long as the tear is not completely cicatrized, any attempt to dilate merely separates its edges, whilst the action on the healthy parts of the mucous membrane is nil. Carried out with care and under the control of the urethroscope, dilatation is most beneficial; but it is valueless, and may even become dangerous, if it is resorted to in a blind, haphazard fashion. When one examines a case of urethrorrhagia subsequent upon dilatation, one invariably finds the same lesion: the bleeding always comes from the most sclerosed part, and is due to a longitudinal fissure which runs in the direction of the urethra. The blood wells up from the gap between the two lips. If we continue to dilate, we separate the edges of the wound farther and make matters worse. *The urethral walls no longer undergo dilatation; all stretching effects exclusively the tear.* In many cases the patients themselves become aware of this fact. When we increase the dilatation by one degree, the patient feels a slight pain. But when we dilate to such an extent that we rupture the mucous membrane, the edges of the tear are separated and there is no longer any sensation of pain. One should pay attention to this point, as it is diagnostic of injury. The conclusion to be drawn from all this is that it is necessary to allow a long interval every time a far-pushed dilatation has given rise to a certain amount of hemorrhage from the urethra, and that

one must not go beyond the last number reached. In many cases a pause of two or three weeks or more is necessary, and occasionally one will even not attempt to reach the last highest number. If one proceeds in this fashion, one gives the tear a chance to heal, the urethral lumen becomes wider, and subsequent dilatations stretch the whole circumference equally.

Generally speaking, we may say that this method of far-pushed dilatation gives excellent results in chronic anterior urethritis. This condition is unfortunately very common and extremely rebellious to treatment. It is characterized by small nodules which can be felt along the urethra, and a slight mucous or muco-purulent oozing from the passage, and heavy filaments in the first glass of urine. Patience is required for its treatment, and

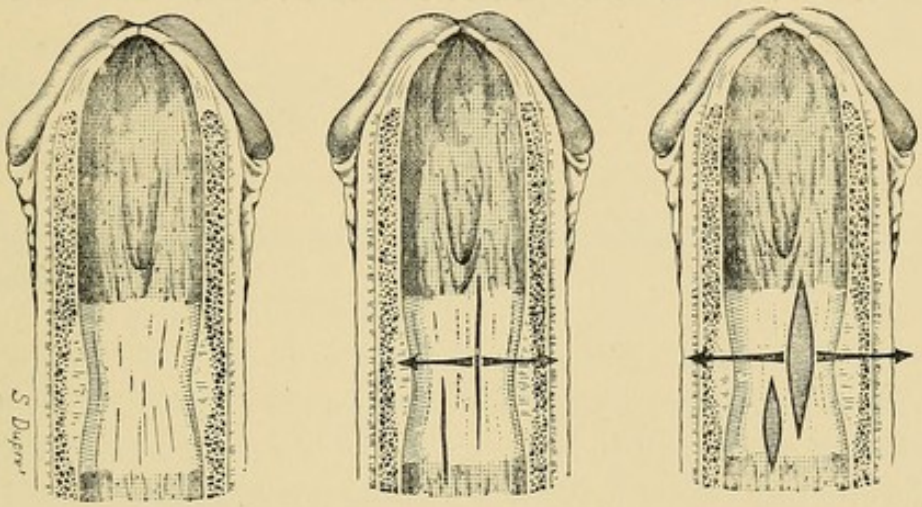


FIG. 171.—THE EFFECT OF VIOLENT DILATATION ON A SCLEROSED URETHRAL MUCOUS MEMBRANE.

The action of the dilatation concentrates itself on the tear produced. It separates its edges farther, and has no effect on the uninjured parts of the fibrous tissue in the urethra.

the patients should be informed of this fact. The dilatations should be continued slowly and methodically until the highest limit is reached. The ultimate success and the obtainment of a complete cure will compensate for these prolonged efforts.

Adjuvant Methods to Dilatation. — Whether one dilates with curved metal sounds or with a dilator, there often comes a moment when the urethra will no longer stretch. After a certain degree of dilatation has been reached, all further attempts give rise to excessive pain, or they are followed by hemorrhage, despite the long intervals which one may allow to elapse between the various treatments.

It then becomes desirable to interrupt the dilatations for a time, and to resort to a method which will prepare the urethra for further widening.

We have two means at our disposal for doing this:

1. Complementary urethrotomy.
2. Electrolysis.

1. *Complementary Urethrotomy.*—The aim of complementary urethrotomy consists in sectioning the fibrous portions in the urethral mucous membrane by means of a sharp blade.

Amongst the various instruments devised for this purpose, Kollmann's urethrotome is one of the best.

Like Civiale's urethrotome, it incises the strictures from behind forwards by means of a knife. Its distal end carries an olive, between the halves of which the blade is made to project by working a special mechanism on the

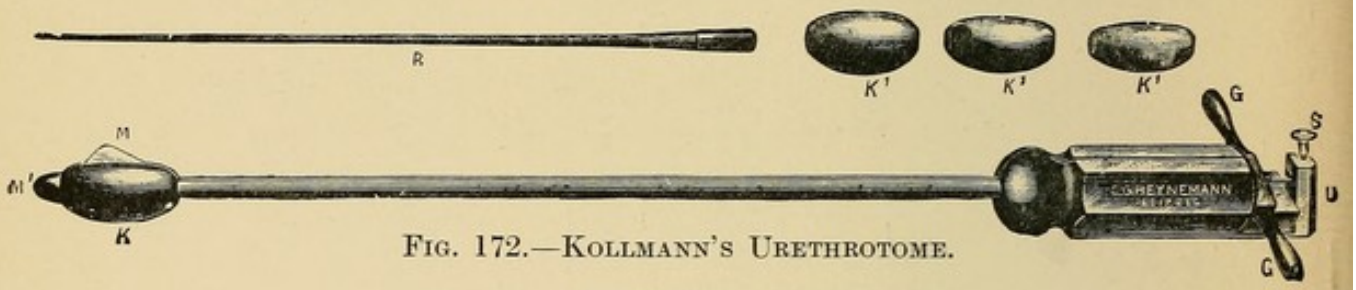


Fig. 172.—Kollmann's Urethrotome.

handle. A number of olives of different sizes are supplied, and one selects the largest one which will just enter the stricture. The blade should only divide the stricture after the latter has been rendered tense.

This instrument enables one to operate with a minimum risk, and to divide accurately and exclusively the fibrous constriction without injury to the healthy neighbouring parts. The cuts made are practically bloodless,

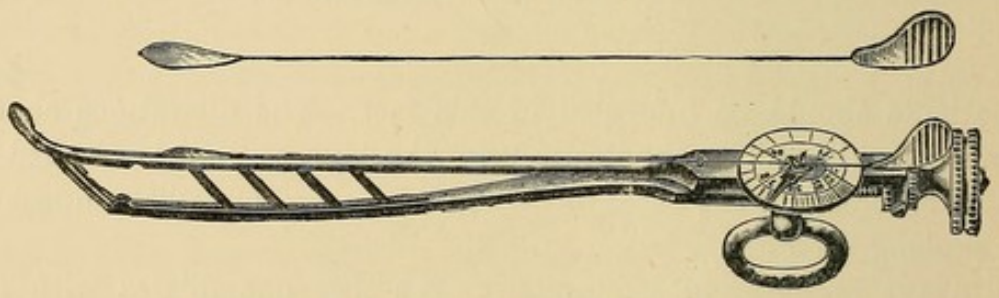


Fig. 173.—Fessenden Otis's Urethrotome.

and therefore the patient can follow his occupation and need not lie up. After two or three days one can resume the dilatations, and when again no progress is made the urethrotomy may be repeated once or twice.

Amongst the other instruments for complementary urethrotomy, those which have been designed for cutting the strictures only after they have been fully dilated are to be preferred. Fessenden Otis's instrument, which

is shown in Fig. 173, answers, but it makes longer and deeper incisions than Kollmann's urethrotome.[1]

2. *Electrolysis.*—Electrolysis is an extremely interesting and powerful method which should be frequently used as an adjuvant to dilatation.

We are only speaking here of circular electrolysis (Newman's method), which makes use of weak currents acting on a large surface.

It allows one to progress rapidly in cases in which the strictures are so marked that simple dilatation is difficult, if not useless.

It can be applied in two different ways:

(1) With ordinary curved sounds.
(2) With the electrolyser.

(1) *With Ordinary Curved Sounds.*—In the case of tight strictures which render the dilatation with ordinary curved sounds difficult or impossible, circular electrolysis gives excellent results, as Desnos has shown.

Technique.—After the patient has made water, one fills his badder with boric lotion by means of a urethro-vesical irrigation. The battery, which should be fitted with a milliampèremeter, should be close at hand. A sheet of lead is connected with the *positive* pole and placed on the right thigh of the patient, where it is kept in position and in close contact by the right hand of the patient. The *negative* pole is attached to the metal sound by means of a pair of artery forceps. One then introduces the sound in the usual way; at the same time a current of 8 to 10 milliampères is passed. Normally, the point of the sound is stopped when it reaches the narrowest part of the stricture. It is most wonderful to witness how the sound passes, after a few minutes, with the greatest ease, as if one had given an injection of oil at the level of its tip. One should never go beyond 8 to 10 milliampères, and should not prolong the electrolysis for more than five or six minutes. One should also not take too large an instrument for the purpose of overcoming the stricture with the aid of electrolysis. One takes one size larger than the biggest sound which passed unassisted. With this technique accidents are practically excluded.

(2) *The Use of the Electrolyser.*—A good number of cases of chronic urethritis are considerably improved by the dilatation of curved metal sounds up to No. 60 G, but they are not cured.

The urethroscope often shows in these cases well-marked zones of fibrous tissue, for the cure of which one resorts to dilatation by means of Kollmann's four-bladed instrument.

After a few applications one reaches a maximum beyond which the dilatation will not advance, even if one uses a certain amount of force. The

[1] Another excellent instrument is Albarran's urethrotome in its modification by Desnos (A. F.).

instrument is fixed, as if it were embedded in cement, and its blades cannot be separated any farther.

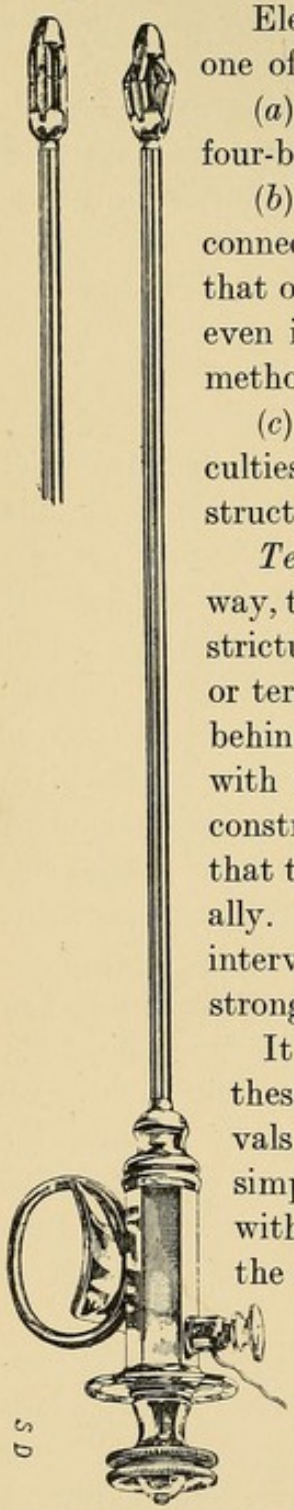


Fig. 174.—Luys's Electrolyser.

Electrolysis is then most useful, and can be carried out by one of the three following methods:

(*a*) The negative pole can be connected directly with the four-bladed dilator. This procedure is not always satisfactory.

(*b*) One can use Newman's metallic olives, which must be connected with the negative pole. However, it is not often that one can find a meatus which will admit sizes beyond 60 G, even if one has dilated up to this number previously. This method is therefore restricted to very few cases.

(*c*) *With the Electrolyser.*—In order to remedy these difficulties, I have devised a special electrolyser which is constructed on the principle of Kollmann's four-bladed dilator.[1]

Technique.—After the bladder has been filled in the usual way, the instrument is introduced closed beyond the stricture or strictures. One then opens out its blades by turning the large or terminal screw. The strictures are thus approached from behind, and one has only to keep the instrument in contact with them for a few minutes to find that it passes the most constricted places without any great difficulty. It is essential that these manipulations be carried out gently and very gradually. The electrolytic dilatation should be increased after long intervals of eight days, or, better, of two weeks, and a current stronger than 5 to 10 milliampères should not be used.

It is most interesting to find that, under the influence of these applications, ordinary dilatation practised in the intervals gives results which are beyond all expectation. By using simple and electrolytic dilatation alternately, one is enabled, with patience and time, to remove all indurated patches in the urethra—even the most inveterate ones.

6. Urethroscopic Treatment.

Urethroscopic treatment comprises all those direct applications to the urethral mucous membrane which are carried out under the control of the urethroscope.

The advantages of this form of therapy are easily understood owing to their precision. It allows one to apply the topic exactly to the diseased spot without interfering with the healthy portions in the neighbourhood. This method is apt to render one

[1] This instrument was shown in 1909 at the Société des Chirurgiens de Paris.

enthusiastic, and one experiences a great pleasure when one finds that one has produced a radical and complete cure after having burnt and destroyed one certain circumscribed lesion in the urethra.

However, one should not exaggerate the advantages of this method which should be reserved for certain special cases. As we have already mentioned, this form of treatment should be restricted to those cases of chronic urethritis in which dilatation has exerted its entire effect. Its use should therefore always follow upon dilatation; it is not a primary treatment.

The chief endo-urethral interventions in chronic urethritis are—

1. Local cauterization of the diseased areas with caustics.
2. Electrolysis of inflamed lacunæ and follicles.
3. Intra-urethral cauterization with the galvano-cautery.
4. Surgical incisions of the urethral mucous membrane.

1. **The Local Application of Caustics.**—Local applications of caustics, carried out under the control of the eye, which produce a certain and powerful action on the diseased patches without injuring the healthy tissues, are incontestably superior to all other methods which have the same purpose.

For urethro-vesical irrigations and injections with a syringe only weak solutions can be used. Moreover, their action is a "blind" one, as they affect the healthy parts as well as the diseased ones. If they be too strong, they damage the healthy tissues unnecessarily, and if they be too weak, they do not modify the diseased surfaces.

The instillations have been invented largely for the purpose of overcoming this defect. There is no doubt that this latter method, which aims at depositing a few drops of a concentrated caustic solution on the diseased focus, often gives good results; but it has serious drawbacks (*vide* Instillations).

The urethroscopic method is preferable for various reasons: Firstly, the diseased points are treated directly under the guidance of the eye; secondly, they alone are modified and the surrounding healthy parts are not tampered with; and, thirdly, they allow a most powerful effect if one uses a highly concentrated caustic.

Technique.—After the urethroscopic tube has been passed according to the rules laid down in Chapter VIII., and after one has made out accurately the site of the lesion which one wishes to cauterize, one tries to get the diseased area well within the field of the tube.

One should never fail to pass the urethroscope as far as possible into the urethra, and to cauterize the deep lesions first. As one withdraws the tube, one deals with the more anterior ones. It would be a great mistake to act in the inverse fashion, and to pass the tube over patches which one has already cauterized, because it would lead to unnecessary bleeding.

Moreover, before applying a caustic to any place, the latter should be properly cleaned with swabs, and any blood or secretion covering it should be wiped away. One can then see what one is doing, and treat the lesions thoroughly without interfering with the surrounding healthy parts.

A light touch is required and a complete control over the instruments. In certain cases only a gentle dab with the caustic is required; on other occasions one has to apply it firmly.

After having inspected and treated all the diseased areas, one withdraws the urethroscopic tube, and leaves the urethra alone for at least a week.

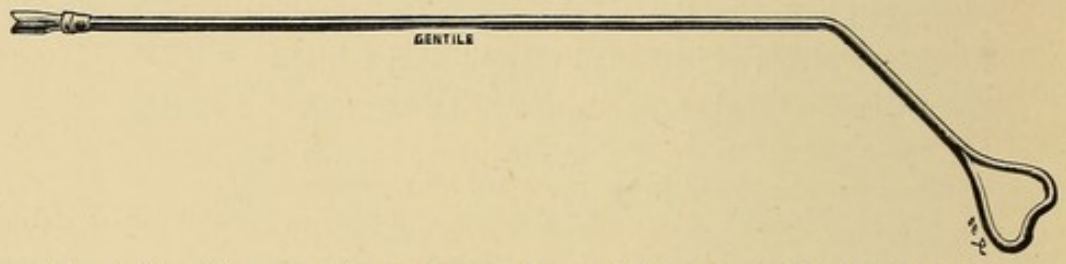


Fig. 175.—Caustic-Holder for Intra-Urethral Cauterization.

At the most, a few irrigations with hot boric lotions may be given in the interval.

Substances used.—The chief and most frequently employed drug is silver nitrate. Its action is well known; it is potent and efficient. I have indicated a little mould for making small sticks which can be mounted on special holders (*vide* Fig. 175).

Silver nitrate is not always used in the solid form; a strong solution is often of great service. Thus, a 10 per cent. solution applied correctly to

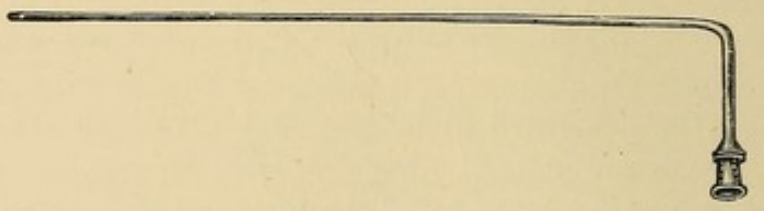


Fig. 176.—Kollmann's Special Cannula for injecting Drugs into the Glandular Ducts of the Urethral Mucous Membrane.

the diseased areas often gives excellent results; it does not diffuse, and causes no pain.

Pure tincture of iodine is another excellent drug. Its use is chiefly indicated when the urethral mucous membrane is covered with a desquamating epithelium of a greyish-white colour which reminds one of a layer of dust, similar to the aspect in urethral leucoplasia.

Crystals of sulphate of copper can also be used in alternation with silver nitrate, and good results can be obtained from their use.

Resorcin in a concentrated solution containing glycerine is of value in

certain cases. Janet advocated its use at the Urological Congress in 1904 for the destruction of certain vegetations and polypi.[1]

Occasionally it is necessary to introduce these topics into little cavities—for instance, into the lacunæ of Morgagni or some other diverticulum of the mucous membrane. Professor Kollmann has devised a small syringe on which a long cannula is mounted for these injections.

The cases in which direct applications of silver nitrate are most successful, are those in which the urethroscopic examination has revealed the presence of characteristic soft infiltrative lesions, and those which show the granulations which commonly mark the beginning of a hard infiltration.

Excellent results are obtained when the mucous membrane forms bulging or oozing masses which protrude into the lumen of the urethroscope and imitate hemorrhoids (*vide* Coloured Plate II., Fig. 1). They disappear very quickly under a thorough application of silver nitrate.

One can also be certain that there will be no recurrence if one cauterizes the implantation basis of little polypi with silver nitrate or with the galvanic cautery after having avulsed them.

Contra-Indications.—The contra-indications of this method are those which apply to urethroscopy (*vide* Chapter VIII.).

This method is only applicable when there is no acute or recent inflammation and after previous urethroscopic examinations.

As to the question if the use of such strong active remedies could not be followed by serious injuries to the urethral mucous membrane, we are in the position to say that these fears are not justified. Many patients and medical men believe that the application of pure silver nitrate may lead to the subsequent formation of strictures. Such calamities are only possible if the cauterization has been done in a brutal and careless manner, and if one has omitted the necessary intervals. A useful precaution is the following: One should never cauterize the whole circumference at a given spot with silver nitrate. One should dab the caustic on in places, leaving parts untouched between the treated ones.

If one follows accurately the technique which we have outlined, no untoward results or accidents can arise. On the contrary, one will be agreeably surprised in many cases at the astonishing rapidity with which definite curative effects are obtained without giving the patient any suffering.

This is well shown by the following remarkable case which I have treated:

Blood-stained Ejaculations treated by Injections of Silver Nitrate into the Prostatic Utriculus.

A young man of twenty-four acquired gonorrhea in 1902, in the course of which a right epididymo-orchitis developed. Since then he suffered from a slight discharge, which was most marked in the morning. In May, 1904, when I saw him, the micro-

[1] Janet, *C. R. de l'Ass. Franç. d'Urologie*, 1904, p. 535.

scopic examination of his discharge revealed nothing except leucocytes and cells. The urine was uniformly turbid in a marked degree after it had been passed into four glasses. The right lobe of the prostate was definitely tender and painful. An olivary bougie No. 20 detected the presence of a constriction in the perineal portion of the urethra.

The patient was thereupon treated with prostatic massage and the passing of curved metal sounds until No. 54 G was reached.

This therapy brought about a great improvement; the discharge ceased and the urine became clear and free from filaments.

On May 24, 1904, urethroscopy was resorted to. The condition of the urethra was found to be satisfactory, but on the verumontanum a little orifice was found at the right part of the utriculus, from which some whitish matter oozed.

I did not pay much attention to this finding at the time, and as the condition of the urine was perfect, and as there was no discharge, I interrupted the treatment.

In December, 1904—*i.e.*, seven months later—the patient returned with a new complaint. He was still free from discharge, and his urine was perfectly clear; but his ejaculations had been tinged with blood during the last six or seven weeks. This definite symptom induced me to urethroscope him again, and I found the verumontanum to be definitely enlarged and to be deviated to the left side. On its right lateral aspect I could see the utriculus, and found it to be inflamed and gaping. I cauterized it with a mounted stick of silver nitrate and examined *per rectum*. The prostate was normal, but the right seminal vesicle was tender, although no enlargement or induration could be felt.

On January 30, 1905, a urethroscopic tube No. 26 was passed. The verumontanum was completely examined, and a few drops of a 5 per cent. solution of silver nitrate were injected into the utriculus through a long platinum cannula. It was easy to see that the injection had reached the spot, as the verumontanum, which so far had been flat, became turgid.

On February 7 the patient stated that this injection had been followed by a slight pain in the testicle, but that his ejaculations were less red. A similar injection was therefore given.

On February 13 the patient again stated to have noticed a further improvement, and thus a third injection was given.

On February 22 he returned. There was no longer any blood mixed with his sperma, and his ejaculations had become normal.

2. **The Urethroscopic Treatment of Inflamed Lacunæ and Follicles.**—One has only to inspect the urethral mucous membrane (*vide* Fig. 15 and Coloured Plate III.) in order to realize that the lacunæ of Morgagni and the glands of Littre are eminently favourable recesses in which the gonococci and other organisms can develop and thrive almost indefinitely.

These urethral diverticula require to be treated by the ordinary measures to begin with—*i.e.*, by irrigations, and especially by methodical dilatation. But there are cases—and they are by no means rare—in which the urethroscope reveals the presence of markedly inflamed lacunæ and glands even after far-pushed dilatation. These lesions are characterized by red, everted edges, and the gland cavity often gives issue to a secretion which can be seen to ooze from it. This condition calls for a direct local therapy, and methods of this kind have become a recognized form

of treatment through the important writings of Oberländer, Kollmann, and of Janet.[1]

Indication.—This method is really only indicated in cases in which far-pushed dilatations have reached the limit of their action. It gives good results only under that condition.

The treatment of choice is one of the following: (1) Direct electrolysis with Kollmann's electrolytic needle, or (2) cauterization with the galvanic cautery.

1. *The Technique of Glandular Electrolysis.*—One generally uses Kollmann's electrolytic needle for this operation. One connects it with the negative pole of a suitable battery, and places a pad, which is composed of a sheet of metal surrounded by leather saturated with saline, on the thigh of the patient. This is the positive electrode.

After the urethroscope has been introduced in the usual way, one locates carefully the inflamed lacunar orifices, and passes into each of them the point

FIG. 177.—KOLLMANN'S ELECTROLYTIC NEEDLE.

of the needle as far as possible, using a current of 4 to 6 milliampères at the outside. When the point of the electrolytic needle is in contact with a diseased point of the mucous membrane, a characteristic mucous froth is formed within a few seconds.

The application lasts in most cases three to four minutes, and is not disagreeable; it never gives rise to any marked pain.

This electrolysis under the control of the urethroscope should not be reserved exclusively for the treatment of inflamed lacunæ and follicles; it is also useful as a treatment of other pathological conditions met with in the urethra, such as angiomata.

A remarkable case of this kind is the following, which demonstrates the diagnostic and therapeutic value of the urethroscope. We owe it to Professor Forgue and to Dr. Jeanbrau, both of Montpellier.

[1] Janet, *C. R. de l'Ass. Franç. d'Urologie*, 1903, p. 419.

SEVERE REPEATED HEMORRHAGE FROM THE URETHRA IN A BOY OF FOURTEEN, CAUSED BY AN ANGIOMA WHICH WAS DIAGNOSED BY MEANS OF LUYS'S URETHROSCOPE; ELECTROLYTIC TREATMENT UNDER THE CONTROL OF THE URETHROSCOPE; CURE.

This case, which was brought before the Association Française d'Urologie in 1906 by Forgue and Jeanbrau, refers to a boy of fourteen who developed in November, 1905, *spontaneous*, profuse hemorrhages from his urethra. The usual hemostatic measures proved useless, and the patient continued to bleed day and night drop by drop. The lad thus became very feeble, and Professor Forgue was consulted, who suggested the possibility of an angioma being present in the urethra. The meatus was slit open by means of the electric cautery in order to permit the passage of a urethroscopic tube No. 48 G, and Forgue and Jeanbrau urethroscoped the patient with Luys's instrument. As the tube which had been inserted into the neck of the bladder was gradually withdrawn, they found the urethra to be normal as far as the middle of the penis. Here,

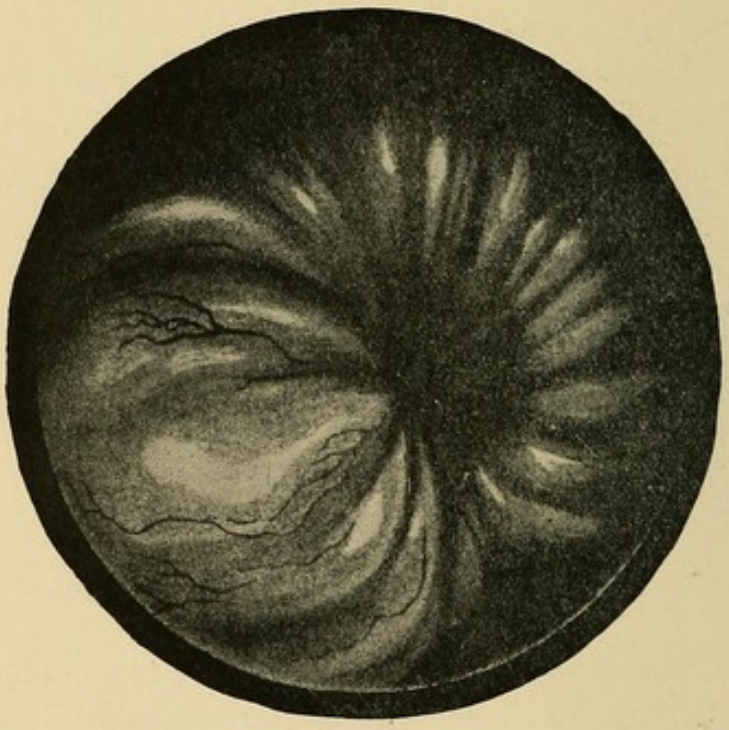


FIG. 178.—URETHROSCOPIC VIEW OF AN ANGIOMA OF THE URETHRA WHERE IT OCCUPIES ONLY A PART OF THE CIRCUMFERENCE OF THE PASSAGE.

in the anterior third of the spongy urethra, a bluish lumpy swelling was discovered, which presented the greatest analogy with the angiomata which are found in connection with thin mucous surfaces, such as the floor of the mouth. In places this swelling occupied the entire circumference of the urethra and obstructed the lumen; in others only a part of the mucosa was involved. The figure above shows a part of the tumour where it only occupies a third of the circumference. Several little orifices resembling pin-pricks were spread over its surface, and from them blood was seen to ooze. The source of the hemorrhage which had weakened the child for more than a month was thus found.

The provisional diagnosis of "angioma of the urethral mucous membrane" was thus confirmed. After having considered the difficulty and the drawbacks of attempting to resect 3 centimetres of the urethra—this was roughly the length of the tumour—Forgue and Jeanbrau decided to try interstitial electrolysis under the control of the urethroscope. They operated in the following way: After having passed Luys's tube

No. 48 G, of 4 centimetres length, they plunged a platinum needle, which had been carefully isolated and been connected with the positive pole, into the substance of the angioma. The negative pole was attached to a sheet of tin, surrounded by moistened cotton-wool, which was placed on the thigh of the patient. A current of 5 to 10 milli ampères was passed, and a little eschar could be seen to form at the level of the needle. Fourteen applications, spread over a period of three months, were made, and led to the complete disappearance of the angioma. The hemorrhage of the urethra ceased completely after the eighth electrolytic intervention.

Several months later the patient was again urethroscoped, and one was able to ascertain that a cure had been effected. The urethra was supple; there was no induration or rigidity. The site of the angioma was of a pinkish-white colour traversed by bands of whitish cicatricial tissue, as shown in Fig. 179. The mucous membrane had, however, retained its elasticity. It gave way when one pushed the tube onwards,

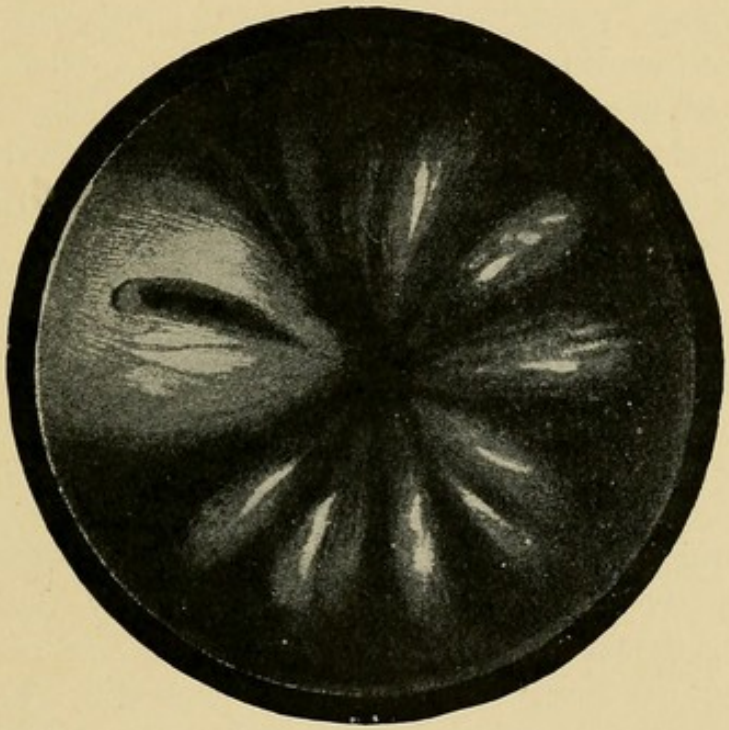


FIG. 179.—ASPECT OF THE URETHRA AFTER IT HAD BEEN CURED BY MEANS OF INTERSTITIAL ELECTROLYSIS.

and came together on its withdrawal with equal ease in the healthy and in the treated parts. The cicatrices around the positive pole are soft and do not retract; there is no reason to fear the development of a stricture.

MM. Forgue and Jeanbrau have been unable to find a similar case in the literature. They remark that they would have been unable to diagnose and to treat this angioma without the urethroscope. In the ordinary way they would have been compelled to open the urethra and to resect a part of it. Given the age of the patient—fourteen years—a deformity (incurvation) of the penis or a tight stricture would have probably resulted. Thanks to the urethroscope, this angioma could be treated with the same absence of risk and with the same accuracy as if it had been on the skin.

2. *The Technique of the Cauterization Treatment of Inflamed Lacunæ.*—As the use of the galvano-cautery in the treatment of urethral affections will be described at length in a special paragraph, we will here only point

out those facts which have a direct bearing on the destruction of the inflamed lacunæ and glands by means of the electric cautery.

It is best to use fine cautery points made of platinum. The urethroscopic tube is firmly held in position with the left hand, and its end within the urethra should be in close proximity to the lacunæ which one desires to burn. One brings the latter into the lumen of the tube, and maintains them in position with one or two fingers of the left hand. The right hand seizes the cautery and passes it into the tube. One applies the point whilst it is cold to the lacuna, and pushes it as far as possible into its hollow. One then switches on the current, and subsequently withdraws the cautery.

This little operation is delicate, and requires a certain amount of skill. If one has a heavy hand, the cautery may become fixed in the mucous membrane, and then it becomes necessary to pass a stronger current to free it again. In this way one produces an unnecessary amount of damage.

When properly applied, this treatment does not give rise to any accidents. There is never the slightest trace of hemorrhage; at the most, a little serous discharge may be noted for one or two days. As a rule, this secretion has the colour of barley-sugar, and disappears after seven to eight days.

The difficult point in this treatment is to reach all the inflamed glands and lacunæ. Very often the diseased glands are found in groups, and some of them escape at the first application, as necessarily the largest ones attract one's attention most. It is therefore advisable to devote several visits to this treatment, allowing an interval of ten to twelve days to elapse between them.

Another inconvenience is the production of smoke, which is inevitable when one burns tissues with the cautery.

By means of two precautions this smoke nuisance can be obviated.

As soon as one has finished burning, one should withdraw the cautery rapidly, and complete the destruction of the material which adheres to it by burning it outside the urethra. Secondly, one should swab immediately with a few dry swabs. In this way a draught is made which disperses the fumes.

Both electrolysis and cauterization with the galvanic cautery give excellent results, which can be controlled by inspecting the mucous membrane after two to four weeks with the urethroscope. When all the inflammation set up by the treatment has subsided, one can see that the lacunæ and glands which have been destroyed have completely changed: instead of red and inflamed orifices one sees inactive little white spots, not unlike extinct volcanoes.

3. The Treatment of Chronic Urethritis by Means of the Galvanic Cautery.—The destruction of all the foci, which keep up a urethral discharge indefinitely, by burning them is a most fascinating method which should

be received with unanimous approval, as it guarantees, by its definition alone, a radical cure.

The advantages of this treatment are considerable. It substitutes for a localized chronic inflammation, by destroying it, a white scar on which all recurrence is impossible.

It thus produces a complete, absolute, certain, and definite cure of the chronic urethritis.

There are, however, a few weak points in connection with this method. Unless one is well acquainted with urethroscopic work, and has had sufficient experience, one does not obtain good results. Moreover, skill and a light touch are required, otherwise one might produce damage and accidents which are worse than the evil which one attempted to combat.

Indications.—Endo-urethral cauterization with the galvanic cautery is chiefly indicated for all papillomatous proliferations which develop on the urethral mucous membrane.

For lesions of this type destruction by burning them is the treatment of choice. It is infinitely preferable to the other measures which have been proposed, such as avulsion and excision. It is the only one from which a permanent and lasting cure can be expected. It allows one to approach directly the basis of the polypus or of the papilloma, and to destroy it completely under the control of one's eye.

We need not here dwell upon the frequency with which papillomata develop within the urethra, especially in the region of the verumontanum. Without the aid of the urethroscope they can neither be diagnosed nor treated.

But before applying these cauterizations one has to make certain that one is really dealing with papillomata, and not with swellings of the mucous membrane resulting from soft infiltration. Cauterization is just as harmful in the latter case—in which they are often followed by disagreeable hemorrhage—as they are beneficial in the treatment of papillomata.

Apart from these tumours, endo-urethral cauterization is of the utmost value for destroying inflamed follicles and lacunæ. They rank with the electrolytic treatment, and are an alternative measure.

When Professors Oberländer and Kollmann advocated the electrolytic treatment of the inflamed lacunæ of Morgagni and Littre's glands, they achieved an enormous progress in the therapy of chronic urethritis, and there is no doubt that this treatment will always be found useful when the chronic lesions cover a small area. It may also be claimed that it is less apt to do harm and less difficult to apply, and that it can be repeated very frequently. The use of the galvanic cautery, on the other hand, is simpler and of a more certain and rapid action.

Contra-Indications.—The chief contra-indications to endo-urethral cauterizations are those which apply to urethroscopy in general. It is out

of the question when the urethra is in a state of acute inflammation, and it should only be used after gradual and methodical dilatation of a high degree has rendered the mucous membrane smooth and has soothed the inflammatory areas.

It is therefore advisable in most cases to carry out a far-pushed dilatation

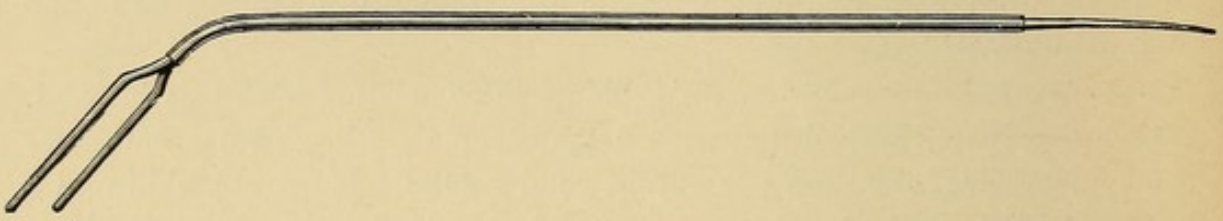


Fig. 180.—Long Cautery Burner with a Fine Point for the Posterior Urethra.

treatment before one resorts to the use of the cautery. Without this precaution, considerable hemorrhage may supervene, which prevents one from seeing distinctly and from cauterizing the right place.

Technique—Instrumental Outfit.—In the first place, a urethroscope, such as Luys's, is required (*vide* Chapter VIII.).

Fig. 181.—Cautery Blade for the Anterior Urethra.

One should have quite an arsenal of cautery blades and points at one's disposal, as different conditions require different instruments. The long and very pointed burners are chiefly used for dealing with Morgagni's lacunæ, Littre's glands, and other recesses in the urethral mucous mem-

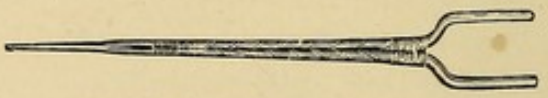


Fig. 182.—Burner with a Fine Point for the Anterior Urethra.

brane. The broad and thick blades are destined for the destruction of polypi which spring from the walls of the passage.

Lastly, there are patterns of the shape of a spiral which are mainly used for papillomata of a certain size. They are especially intended for

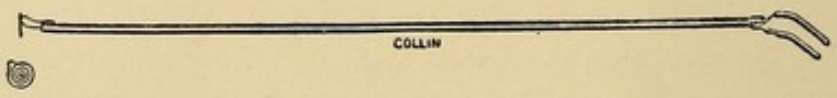


Fig. 183.—Special Spiral-shaped Burner for Large Papillomatous Surfaces.

the destruction of the large papillomata which one finds in the posterior urethra and at the level of the bulb.

Operative Technique.—It is well to have an assistant, although this is not absolutely necessary. His chief occupation consists in supporting the

wires of the cautery in order to relieve the hand of the operator and insure the lightness of his touch.

After the urethroscope has been introduced and the light has been switched on, one dries the urethral mucous membrane very thoroughly. It is absolutely necessary that one should be able to see very clearly and to find the diseased areas with accuracy. If there should be any hemorrhage, which interferes with vision, one swabs until it has ceased, or one applies a few drops of adrenalin to the bleeding spot. When all hemorrhage has been subdued, one places the lamp diametrically opposite the focus which one wishes to destroy. If the latter be on the upper wall, the lamp and handle of the instrument should be below, and *vice versa*. In this way one's manipu-

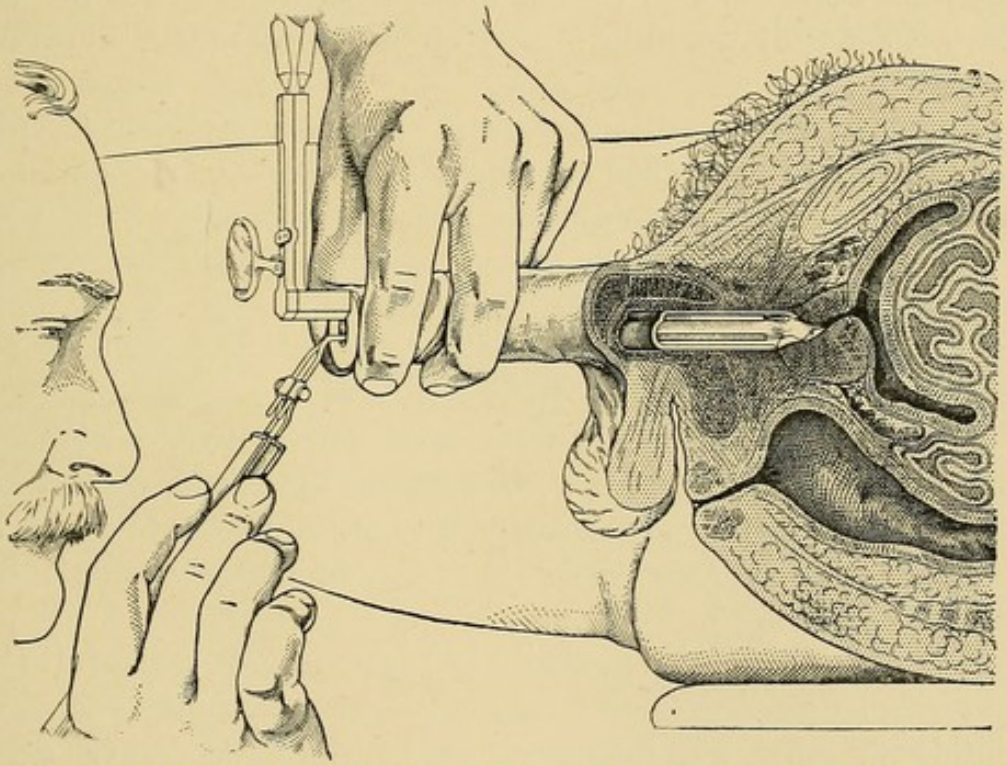


FIG. 184.—DESTRUCTION OF A POLYPUS ON THE VERUMONTANUM BY MEANS OF ENDO-URETHRAL CAUTERIZATION WITH THE GALVANIC CAUTERY.

lations are never interfered with by the presence of the lamp. Nothing is then easier than to slide the cautery along the tube whilst it is cold and to approach the polypus or granulations. When the point of the burner has reached the lesions, one turns on the current and destroys the diseased surface completely.

The delicate point consists in knowing whether one has burnt too much or too little. In order to obtain the right effect, one should proceed very gently and slowly, swab after every application of the cautery, and inspect the surface treated.

The cauterization with the electric cautery should be *efficacious and not dangerous*.

In order that it should fulfil its purpose, one has to destroy the entire

diseased area. One should therefore persevere, and apply the burner again if any pathological condition is left, and in the case of a polypus one should make certain to annihilate its implantation basis.

In order to be free from danger, the application of the cautery should not be followed by any bleeding. This result is only obtained by the formation of a black eschar, and one should aim at producing it.

If one merely touches the surface of the papilloma with the red-hot cautery, immediate hemorrhage is the rule. In order to check it, the burner should be applied again to the same spot, but without marked pressure. It is essential not to push the burner into the substance of the tumour. This practice would lead to their becoming adherent. Under the influence of the heat, the cautery would become firmly attached, and any attempt to withdraw it suddenly would be followed by hemorrhage. A light touch is thus essential.

Operative and Post-Operative Accidents.—The little misadventures noticed in connection with this method are readily avoidable if one takes the necessary precautions. One has to consider the occurrence of—

1. Smoke.
2. Hemorrhage.
3. Subsequent infection.

1. *Smoke.*—When one allows the electric current to pass through the platinum loop of the cautery after it is applied to the papilloma, fumes and smoke are invariably formed. They tend to obscure the field of vision and to render the interior of the urethra too foggy to allow a successful second application.

In order to obviate this drawback, two measures are indicated: (1) One should never burn any fragments of the tumour which may adhere to the loop inside the tube. The cautery should be withdrawn and the débris be burnt in the open air of the room. (2) The fumes and smoke within the tube should be allowed to escape, and this is best done by moving a mounted swab quickly to and fro inside the urethroscope. The fumes are driven away in this manner, and the visual field becomes clear again.

2. *Hemorrhage.*—It is certain that after every application of the galvanic cautery a few drops of blood come away for a few hours or days towards the end of micturition. But, as a rule, this bleeding is hardly worth mentioning, providing one takes the precautions recommended above. When a black eschar is formed there is never any serious hemorrhage. If, however, there is a little more bleeding than one should wish for—this has happened to me on two occasions—one can easily check it by giving a urethro-vesical irrigation with very hot boric lotion, no catheter being used.

Amongst several hundred cases which I have treated in this manner, I

have never met with any serious hemorrhage. In one instance only I found it necessary to put the patient into a nursing-home for twenty-four hours.

3. *Secondary Infection.*—In order to obviate a secondary infection of the urethral wall, a urethro-vesical irrigation with a 1 : 4,000 solution of oxycyanide of mercury can be given with advantage immediately after the cauterization is terminated. These irrigations may be repeated on the following days if required. A little urotropin internally is also often useful.

Results.—The results yielded by intra-urethral applications of the electric cautery in chronic urethritis are excellent. If one takes care not to intervene too often and after too short intervals, and if one gives the urethral mucous membrane at least eight to ten days' rest between two burnings, then one can rely upon obtaining brilliant results.

When one inspects after two to three weeks the places with the urethroscope which one has burnt, one finds that all papillomatous tissue has disappeared. Instead of the vegetating surfaces present before the treatment was instituted, one finds a white scar which could not possibly become the seat of a recurrence. The galvano-caustic treatment is a sovereign and supreme remedy if properly applied.

One should, however, be warned against possible recurrences of the polypi which bud on the verumontanum. It is not rare to find a recurrence if one urethroscopes several months after one had destroyed a polypus on the verumontanum, and satisfied oneself at the time by direct inspection of the completeness of the operation. This finding seems to contradict what we have said so far, but it only does so apparently.

It is to be explained as follows:

On the verumontanum open the ejaculatory ducts, which start in the seminal vesicles. If one confines oneself to treating the termination of the sperm channel only, without attending to its origin, one obtains no curative effect. The seminal vesicle remains infected, and its pathological secretions continue to irritate the verumontanum, which reacts always in the same way, as the pathogenic factor remains the same. Hence constant recurrences of the same character result. It is necessary to ascertain the soundness of the seminal vesicles before one treats papillomata arising on the verumontanum. A cure can only be obtained if the seminal vesicles are free from all inflammation.

As we have already mentioned in previous chapters, the relation of the verumontanum towards the seminal vesicles is absolutely comparable to that of the ureteric orifices towards the kidneys. Ureteric meatoscopy enables one to foresee and to diagnose renal lesions, as Professor Hurry Fenwick has pointed out. In the same way the aspect of the verumontanum allows us to tell whether the seminal vesicles are in a state of chronic inflammation or not. The verumontanum is the " mirror of the seminal vesicles."

Dr. Jorge de Gouvea, of Rio de Janeiro, has published[1] an interesting case of sexual neurasthenia which he cured by means of the galvano-cautery.

His patient, a military man of forty, consulted him for the first time on July 30, 1910. He had acquired his first attack of gonorrhea eight years previously, and had treated himself with injections of silver nitrate and of zinc.

He had a morning drop ever since, which he could check by means of permanganate irrigations, but after every excess a discharge supervened.

When seen by Gouvea, he had to make water very frequently, passing a small quantity only on each occasion. Micturition was uncomfortable, and a sensation of heat spread along his perineum and his urethra. At the end of the act a violent erection followed. Pollutions were frequent, and during coitus the ejaculations were premature and painful.

He had lost a considerable amount of flesh lately, and was very nervous and depressed. He complained of constant pains in the loins, loss of appetite, and lack of interest in life.

The urine passed into three glasses was clear, but contained filaments.

After having filled his bladder with a solution of oxycyanide of mercury, Gouvea examined his urethra. An olivary bougie No. 12 revealed the presence of a stricture at the end of the penile portion. As the instrument reached the posterior urethra, the patient complained of acute pain.

Palpation of the kidneys showed nothing abnormal. Cowper's glands were also healthy, but there was chronic prostatitis and the seminal vesicles were tender.

During a fortnight irrigations with permanganate and oxycyanide of mercury were given.

The stricture was then divided with Kollmann's urethrotome. No permanent catheter was used, and after four days dilatation of the anterior urethra with straight metal sounds was resorted to, until No. 50 G was reached. No. 51 G was then tried; it passed along the anterior part easily, but as it reached the posterior urethra it gave rise to considerable pain and to slight bleeding.

A couple of days later the dilatations were continued, preceded on each occasion by an instillation of adrenalin and novocain. Very slowly No. 55 G was reached, and then Luys's urethroscopic tube was passed, after the same local anesthetic had been applied.

The urethroscopic examination showed that the condition of the verumontanum was the cause of the malady. It was puffy and covered with a great number of small raspberry-like vegetations, which were destroyed with a fine cautery loop. The verumontanum was painted with tincture of iodine.

In a week's time this intervention was repeated.

[1] Jorge de Gouvea, *La Clinique*, 1912.

For a month or so the prostate was massaged on several occasions, and instillations of silver nitrate were given.

This therapy led to a considerable improvement, and after it had been continued for three months the patient was able to pass water without any difficulty. All the discomfort complained of had disappeared. The urethroscope showed that there were no lesions left. There was no trace of any discharge, and the urine was normal.

When seen again, after six months, the patient was perfectly well. A permanent cure had been obtained.

4. **Endoscopic Surgical Incisions of the Urethral Mucous Membrane.**—Incision of the urethral mucous membrane is advisable in certain cases. Its two chief indications are collections of pus which one wishes to empty through the passage, and very hard fibrous strictures which fail to yield to dilatation, and which one desires to divide under the control of the eye.

The intra-urethral opening of a small abscess is often of great value—

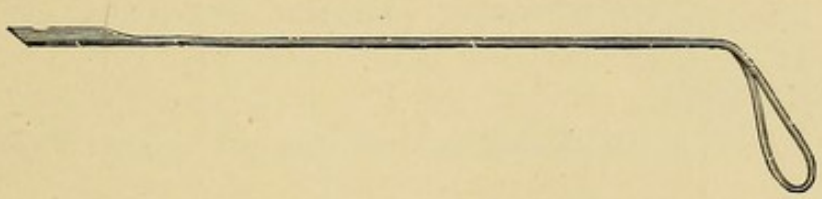


FIG. 185.—KOLLMANN'S SMALL KNIFE FOR INTRA-URETHRAL INCISIONS.

for instance, when there is a tendency to spontaneous bursting through the skin.

A cutaneous opening gives rise to a troublesome fistula, which often requires a very long time to heal, and therefore the endo-urethral operation should be carried out whenever possible (*vide* Chapters VIII. and IX.).

Professor Kollmann also advocates the slitting up of inflamed lacunæ of Morgagni by means of a special knife as a curative measure.

The division of the fibrous portions of certain strictures which resist dilatation can be accomplished by means of a small cutting blade which one passes into the urethroscopic tube. As Menahem Hodara[1] has pointed out, hard infiltrations, running in a longitudinal direction, which do not constrict the urethral lumen, but hamper the action of dilators, are sometimes met with. Internal or external urethrotomy is not suitable for these cases, as there is no narrowing of the urethra. They can be well treated by means of Oberländer's urethrotome, which enables one to scarify these hard infiltrations, guided by sight, in any manner one may wish.

[1] Menahem Hodara, "Traitement de la Blennorragie Chronique," *Ann. Génito-Urin.*, August, 1895, p. 721.

"Oberländer's urethrotome is really a urethroscope which carries a groove on its lower wall, in which a small special knife can be easily moved in all directions. One examines the part which one wishes to incise with the urethroscope, passes the knife, and cuts in sight as desired. The little

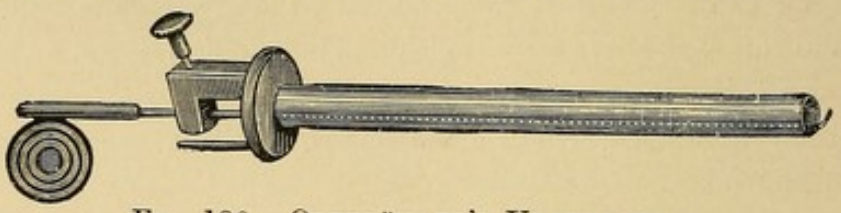


Fig. 186.—Oberländer's Urethrotome.

knives are of different shapes; some are triangular, others are very thin and pointed. The former are used for deep surgical incisions, the latter for superficial scarifications."[1]

Oberländer lays special stress on this method. He also recommends the

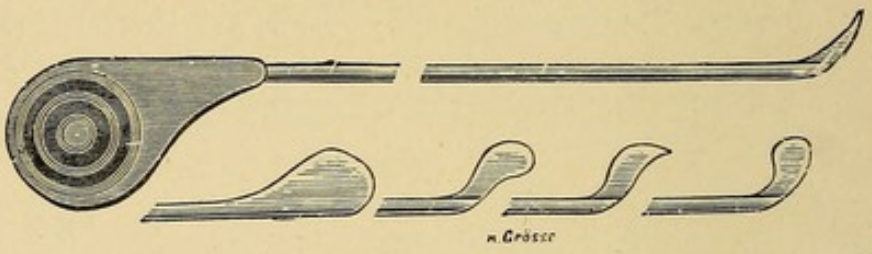


Fig. 187.—Different Blades used in Connection with Oberländer's Urethrotome.

application of a few electrolytic punctures to these rebellious constricting fibrous patches in order to bring about their retraction. At each visit ten to twelve different places can be submitted to electrolysis. In each instance

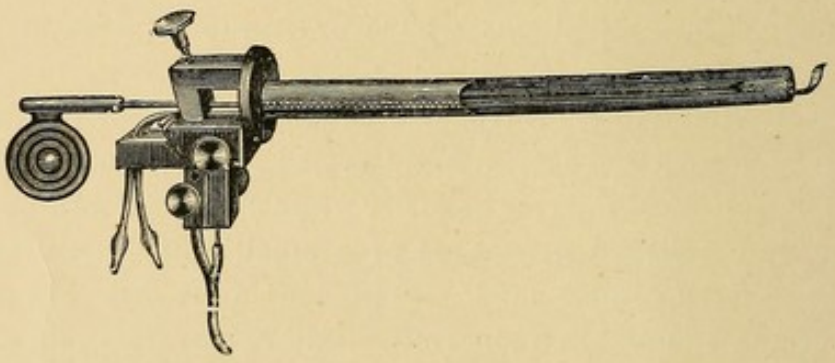


Fig. 188.—Oberländer's Urethrotome fully mounted.

the action of the current diffuses, and affects the parts within a circle of 0·5 centimetre radius around the prick of the needle. In this way all these hard infiltrations can be destroyed and be made to disappear.

[1] Menahem Hodara, "Traitement de la Blennorragie Chronique," *Ann. Génito-Urin.*, September, 1895, p. 787.

These interventions can also be carried out by means of certain special instruments—small curettes—which are shown in the figures below.

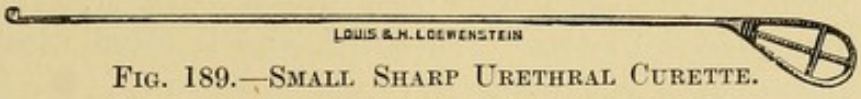


Fig. 189.—Small Sharp Urethral Curette.

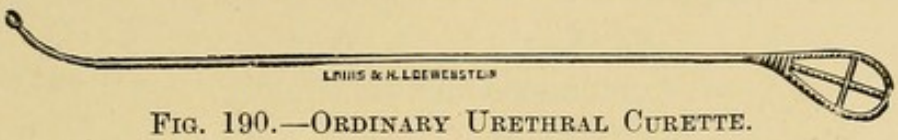


Fig. 190.—Ordinary Urethral Curette.

The Treatment of Urethral Stricture by Curetting.—Dr. Paul Asch, of Strassburg, has devised a special method for treating strictures of the urethra, which consists in scraping the fibrous tissue away with a sharp curette under the control of the urethroscope.[1]

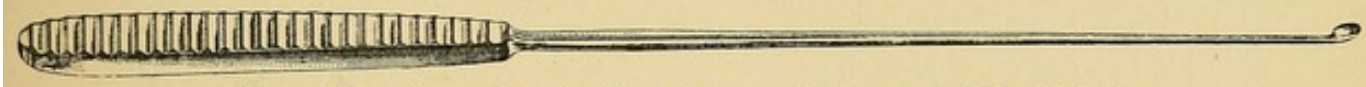


Fig. 191.—Paul Asch's Curette for Urethral Strictures.

He claims to have obtained constantly rapid and good results with this interesting process, which should be reserved for those cases in which the cicatricial tissue defies dilatation treatment. When very tight strictures

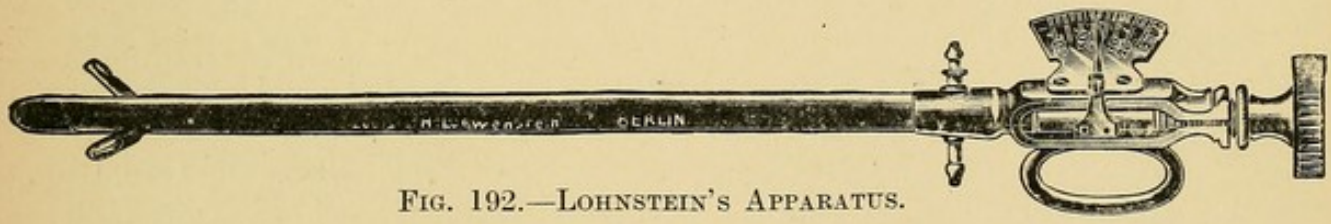


Fig. 192.—Lohnstein's Apparatus.

are present, he begins with an internal urethrotomy. He then practices slow and methodical dilatation, and if the latter is found to be inadequate, he removes the cicatricial formations with his curette. He thus prevents a recurrence of the stricture.[2]

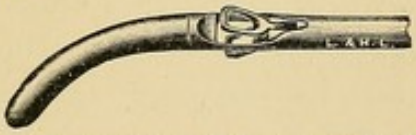


Fig. 193.—Terminal Portion of Lohnstein's Apparatus for the Posterior Urethra.

It would seem as if this method, which has given Asch excellent results, were frequently indicated.

Dr. Lohnstein of Berlin has also invented a special urethral curette.

[1] Paul Asch, *Urethroskopische Beiträge zur Diagnose, Therapie und Prognose des Trippers und seiner Folgen*, Berlin, 1907.

[2] *Vide* also Roucayrol, "Traitement des Rétrécissments de l'Urètre par le Curetage," *La Clinique*, August 9, 1907, p. 506.

His instrument has two blades, which can be placed in different positions by turning the terminal screw on the handle. It is totally different from Asch's curette, and resembles in its construction a dilator. It cannot be used in conjunction with the urethroscope, and is fitted with a double channel for continuous irrigation. In certain cases its use may be of great value.

7. Instillations into the Urethra.

The method of urethral instillations was devised by Guyon in 1867,[1] and has as its object the application of a few drops of a concentrated caustic solution to certain definite points of the urethral mucous membrane.

Indications.—Silver nitrate instillations are certainly indicated in cases of chronic urethritis with localized lesions in which the exploratory bougie fails to reveal any induration, and in which the urine is clear apart from a few filaments in the first glass.

This type of condition is very common towards the decline of an attack of gonorrhea after the gonococci have disappeared. Heavy filaments are still found in the first glass. They are indicative, as Verhoogen of Brussels has shown, of superficial diffuse epithelial lesions which are associated with embryonic infiltration and granulations. The latter, which have been studied by Thierry and Désormeaux, are the result of the epithelial desquamation and the exposure of the chorion. In cases of this type a cure can be obtained by the action of astringents and caustics, and instillations of silver nitrate are especially suitable for this purpose.

There was a time when these instillations were fashionable, and it cannot be denied that a great number of patients derived considerable benefit from them. They are, however, not free from drawbacks, as we have already mentioned.

The chief one is the impossiblity of applying the medicated solution accurately and exclusively to the diseased surface. However skilful the operator may be, and however delicate his touch, the drops instilled into the urethra spread forwards and backwards, and overstep the limits proposed. They are thus apt to lead to disagreeable effects; for instance, intense vesical tenesmus and imperative desire to make water are likely to supervene when one gives an instillation into the posterior urethra. Although the silver nitrate solution was only destined for the last portion of the urethra, it inevitably spreads to the neck of the bladder and irritates it.

This untoward effect is impossible with urethroscopic methods in which the topics are applied exclusively to the diseased area and cannot diffuse. All patients without exception, who have had experience with both methods of treatment, give preference to the endoscopic interventions.

[1] Guyon, *Bull. d. Soc. de Chirurgie*, 1867, 2nd series, vol. viii., p. 432.

Instruments.—The instruments required consist of a drop syringe, holding 4 c.c., and an exploratory bougie, which is hollow and is perforated at the tip of its olive.

The piston of the syringe carries an arrangement which prevents it from moving unless one turns the handle. In this way the liquid is expelled drop by drop. If one does not make use of this device, the instillation becomes an injection. The silver nitrate solution passes through the bougie, and emerges at the tip of the olive, which is perforated. A single opening is better than a series of little holes, because it locates the fluid better. The olive forms a marked heel in order to give the hand a definite sensation when the sphincter is being passed.

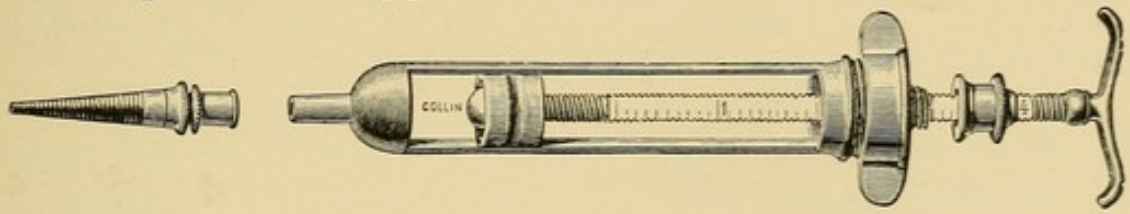


Fig. 194.—Guyon's Syringe for Instillations.

Technique.—One fills the syringe with the instillation fluid, and affixes its cannula and its bougie. One then presses on the piston until the whole instrument is filled with silver nitrate and free from air. The movable screw on the piston is now fastened. Every half-turn of the handle then expels a drop of the solution from the tip of the olive.

In order to free the urethra from any secretions which may be present in greater or less amount, the patient should make water. Sometimes this procedure is sufficient; in other cases it will be advisable to give a urethro-vesical irrigation with a solution of boric acid before instilling.

Fig. 195.—Olivary Bougie for Instillations with Guyon's Syringe.

If one wishes to give an instillation into both urethræ, it is necessary to begin with the posterior. "The olivary bougie is inserted at once beyond the membranous portion. In order to bring it into its correct position, one should withdraw it after it has reached the posterior urethra until one feels that the olive rests on the sphincter. It is then in its proper place. . . . One begins to count the drops as one turns the handle. Their number varies according to the indications. Generally speaking, instillations intended for the posterior urethra should be generous; 20, 30, and sometimes 40 drops will be required. A marked topic action can only be obtained in this region if the contact with the drug is repeated. . . . The bougie is then made to lie in front of the sphincter, resting on its muscular ring. The

instrument is then again in position. One turns the handle again as many times as necessary. In the region of the bulb and in the anterior urethra a smaller number of drops is sufficient to bring all the parts into contact with the drug.

"Even if a very small number of drops has been instilled into the cul-de-sac of the bulb, one can see the liquid oozing out of the meatus. Ten to fifteen drops are quite sufficient for an instillation into the anterior urethra" (Guyon).[1]

Silver nitrate is used for these instillations in doses varying from 1 to 5 per cent. It is best to begin with the weaker solutions until one is acquainted with the susceptibility of the urethra one is treating. The strengths used have to be graduated according to the reactions set up by the various instillations.

We may here mention an important point to which Trekaki has drawn attention. An instillation with silver nitrate is only effective if it produces a reaction which is characterized by a copious whitish flow for a few hours after the intervention. One should therefore aim at setting up this reaction, and herein lies the art. One should increase the strength of the silver nitrate as required, but one should not go too far, and great care must be taken not to set up hemorrhage from the urethra. One should keep within the proper limits, which vary in each case. If no reaction is obtained, it is useless to continue; the treatment is unsuitable for the case on which it is being tried.

The usual strength employed, which is free from risk and yet effective, is 2 per cent. It is by no means immaterial if one destroys the urethral epithelium with silver nitrate. A well-given instillation, which has been properly applied to the diseased area, eradicates the affected tissues, but it can diffuse to the healthy parts and injure normal epithelium. The destruction of the normal cylindrical epithelium of the urethra is aways a calamity, as it fulfils an important rôle. It protects the passage against the ordinary adventitious organisms, and once it is destroyed it is replaced by flat cells of the pavement type, which lack this defensive power. The cylindrical epithelium is never regenerated once it has undergone destruction.

The conclusion to be drawn from this is the following: The more normal and healthy epithelium one can preserve and save, the better. We do not hesitate to insist most especially upon the superiority of direct cauterization with caustic under the control of the urethroscope. These endo-urethral interventions, carried out with a mounted stick of silver nitrate, are infinitely preferable. They enable one to destroy exclusively the diseased areas, and do no harm to the healthy parts.

[1] Guyon, *Leçons Cliniques sur les Maladies des Voies Urinaires*, 4th ed., vol. iii., p. 448; Paris (Baillière), 1903.

Although silver nitrate is most generally used, other drugs, such as picric acid and sulphate of copper, may be substituted.

Dr. Frank of Berlin has advocated instillations of copper sulphate in glycerine. It would appear as if these solutions were more effective than aqueous ones of the same strength.

8. On the Application of Heat to the Urethral Mucous Membrane.

We have pointed out in the third chapter (p. 34) that the gonococcus is very susceptible to changes in the temperature, and that temperatures of 40° and 42° C. have a detrimental effect upon it. It dies within a few hours at this degree. Moreover, clinical experience has shown that the discharge ceases immediately in patients suffering from a gonorrheal discharge if they develop high fever (40° C. or more). It was thus natural that one should have attempted to make use of this observation therapeutically, and that one should have considered it possible to cure an attack of gonorrhea rapidly if one could maintain the urethra at a temperature of 42° C.

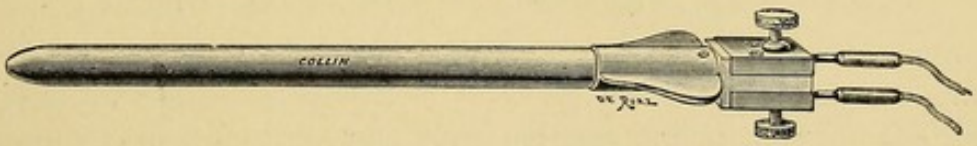


Fig. 196.—Thermo-Electric Bougie.

for a number of hours. I invented some *thermo-electric bougies* for this purpose, which I showed at the Association Française d'Urologie in 1905.[1]

My bougies were made of metal and hollow inside. They carried within them a resistance by means of which they were heated as the electric current passed through them. A rheostat was interposed between the sound and the main, for graduating the current and maintaining the heat of the bougies at the exact temperature. No accident was possible with method, and there could be no question of burning the urethra. I had straight sounds made for the anterior urethra, and others with a béniqué curve for the posterior.

I applied these thermo-electric bougies on many occasions, and I regret to have to state that the therapeutic results obtained were far below my expectations. The chief cause of this failure appears to me to be the following: Although one can heat the urethra in many cases up to 60° C. without producing any pain, the mucous surfaces do not reach this temperature by any means. If one measures the temperature inside the bougie the thermometer indicates 60°, but if one measures its surface a much lower temperature is recorded. The outside of the bougie is in direct

[1] Luys, *C. R. de l'Ass. Franç. d'Urol.*, 1905, p. 298.

contact with the mucous membrane, and through it with the blood-stream. As the latter is constantly renewed, it constantly cools the parts and the bougie, and lowers the temperature. One is thus confronted by two alternatives: One has either to increase the heat, in which case the patient immediately complains of pain and discomfort; or one uses a bearable temperature, in which case the heat produced is not high enough and the therapeutic effect is nil.

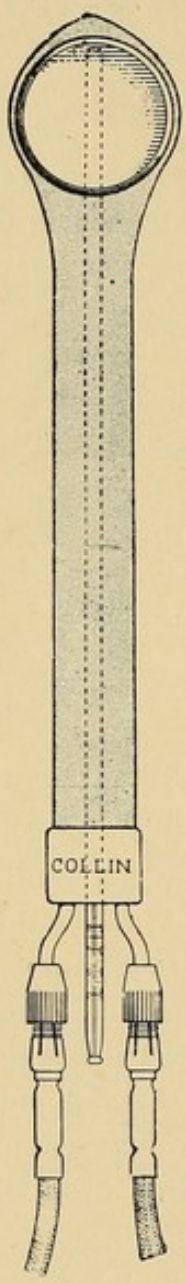


Fig. 197.—Luys's "Calefactor" for applying Heat to the Prostate.

In certain patients who were exceptionally resistant I managed to experiment further, and I made the interesting discovery that applications of great heat for any length of time were followed by profuse sweating. In these cases the bougie had obviously heated the blood, and immediately the heat-regulating apparatus of the body responded to counteract the effect.

This treatment, which appeared so enticing from a theoretical point of view, was thus of no practical value, and led me to discard it altogether.

The Application of Heat to the Prostate.—In certain inflammatory conditions of the prostate a counter-irritant action on the gland is of great value, and the best means of carrying out this treatment appears to be the application of heat *per rectum*. The problem to be solved is how to apply an equal temperature for a considerable time. Hot rectal irrigations have but a temporary action of short duration. As to the other instruments which have been proposed for this purpose, they are either impractical, or they are very expensive and complicated, or they are inconvenient and require constant attention.

M. Collin has made, according to my instructions, an instrument which can be manipulated with ease. I showed it for the first time at the Medical Congress in Madrid (1903).[1]

The essential part consists of a small resistance which is connected with the mains through a rheostat. It is covered by a metal disc, and is isolated in its other parts by means of an insulating mass. The action of the heat produced is thus only manifest at the level of the metal disc.

Before applying the instrument, one graduates the heat to the degree required, which one controls by inserting a thermometer into the hollow of the instrument.

[1] Luys, Fourteenth International Congress, held in Madrid, 1903, Urological Section, p. 127.

The patient then lies down, and one passes the "calefactor" into the rectum, seeing that the metal disc is lying up against the prostate. This organ is heated as the current passes. One regulates its intensity according to the thermometer, which is left in the instrument.

In this fashion one can obtain a constant temperature for an indefinite period. Its decongesting effects are remarkable.

9. The Ionization Treatment of the Urethral Mucous Membrane.

The localizations of chronic urethritis which keep up pathological secretions are deeply situated under the mucous surface, as we have shown in Chapter V. A method which would allow one to introduce active drugs deeply into the tissues would thus be welcome.

As it happens, nearly all therapeutic agents which are placed on the urethral mucous membrane fail to enter its deep parts, were it only for the fact that they nearly all coagulate albumin, and thus form a kind of varnish or armour which protects the tissues against their action.

It would appear that the experiments of Professor Stéphane Leduc, of Nantes, were calculated to fill us with fresh hopes, and to lead us to new therapeutic achievements.

In a series of papers Stéphane Leduc has shown that the electric current has the property of driving certain drugs into living tissue.

If one runs an electric current through a solution of a salt which is a good conductor of electricity, the latter is decomposed into an acid radical which moves to the positive pole, and a basic radical at the negative pole.

The human body is, owing to the sodium chloride which it contains, a very good conductor, and thus it is easily understood that it should be possible to drive some metal into the tissues by using metal electrodes connected with the positive pole.[1]

Numerous essays of this kind have already been carried out, in gynecology especially. In 1890 Prowodnik used a copper electrode. Propyalkowsky applied zinc electrodes, Regnier iron, Debédat aluminium, and Boisseau du Rocher silver.

I have attempted to do to the urethral mucous membrane what had been done to the uterus, and I have applied this ionization in cases of chronic urethritis with success.

I have used silver and zinc, but the former metal seemed to me infinitely better. The reaction set up by the zinc is very marked, and the therapeutic effect small; in the case of silver the results were much more satisfactory.

The best technique to adopt is the following: The urethra and the

[1] *Vide* Desfossés and Martinet, *Presse Médicale*, No. 1, 1907; Zimmern, *Rev. d. Gynecol. et de Chirurgie Abdom.*, No. 3, October, 1906.

bladder are washed by means of a urethro-vesical irrigation with boric lotion, no catheter being used. One then passes a silver sound into the urethra, a straight one for the anterior, and a curved one for the posterior. The end of this sound is connected by means of a wire with the positive pole. The negative one is attached to a sheet of lead, surrounded by absorbent wool, which is placed on the patient's thigh. One then allows the current to pass. One graduates it by means of an ampèremeter, and works it slowly up to 10 to 15 milliamperes. After a quarter of an hour one interrupts the current. The sound in the urethra will then be found to be intimately adherent to its walls, as if it were soldered in. It is impossible to withdraw it, and any traction on it merely gives rise to intense pain and frightens the patient out of his wits. There is a very simple and easy way of freeing it. One has only to reverse the current—*i.e.*, to connect the negative pole with the sound, and the positive with the pad on the thigh, and pass a current of 3 or 4 milliampères. After a few minutes the béniqué becomes movable and can be withdrawn easily.

One notices, once it is outside the urethra, that it is blackened wherever it was in contact with the mucous membrane; the electric current oxidized it and brought about the formation of silver oxide.

In two cases suffering from rebellious discharges which had resisted far-pushed dilatation, I obtained a complete cure. In both the lesions were situated in the penile urethra, and two or three applications had the desired effect.[1]

Dr. Suquet of Nîmes[2] is in favour of applying ionization as soon as the acute stage of gonorrhea has passed off. He uses zinc ions. Once the glans and the prepuce have been cleansed and the urethra has been washed with a 5 : 1,000 solution of zinc sulphate, a zinc sound No. 40 G is passed. The negative pole is connected with the abdomen, and the wire of the positive pole is attached to the sound. One runs a current of 8 to 10 milliampères through the sound for eight to ten minutes. The current is then reversed, and one completes the treatment by applying 15 milliampères for five minutes. After a few hours the discharge increases to a marked degree. If the reaction is too violent, Dr. Suquet resorts to high frequency on the same evening and on the following days.

Within two to four days after the ionization the discharge disappears; it, however, comes on again if one does not repeat the treatment.

Four to five applications, given once a week, are required for a cure.

[1] Luys, "De l'Introduction par l'Électricité de Substances Médicamenteuses dans la Muqueuse Urétale," *La Clinique*, January 25, 1907, p. 53.

[2] "Traitement de la Blennorragie et de ses Complications par l'Électricité," *Électricité Médicale*, December, 1907, and *Rev. Prat. des Mal. d. Organes Génito-Urin.*, No. 24, January 1, 1908, p. 456.

10. Salves and Urethral Suppositories.

The treatment with salves and urethral suppositories is a method which is justifiable in certain cases.

Janet[1] recommends it for chronic urethritis of the mucous and desquamative type.

Urethral Salves.—The advantage of these salves lies in their great penetrating power. They enter the folds of the mucous membrane and the lacunæ fairly well, but they do not reach the interior of the mucosa. The fat which they contain adheres to the surface of the urethra, and moulds itself on its folds. These salves thus enter into a more intimate contact with the mucous discharges from the lacunæ.

Then, again, the fact that they adhere prolongs the action of the antiseptic which they contain, and protects the walls of the urethra against the irritant action of the urine.

Tommasoli, Casper and Unna used silver nitrate, creolin, and sulphate of copper, incorporated in a mixture of lanoline and olive-oil. Casper introduced these ointments into the urethra on grooved sounds. These grooves were destined to prevent the bulk of the salve from sticking to the meatus. Janet uses the same method for applying an ointment which has the following composition:

Lanoline	17·5 grammes.
Glycerine	7·6 ,,
Sodium borate	0·5 gramme.
Zinc oxide	2·0 grammes.

To this base he adds an active substance, either 2 or 5 per cent. protargol, or silver nitrate 1 to 2 per cent., or salicylic acid 1 per cent.

He boils his grooved sound, waits till it is cool and dry, and fills the grooves on it with the salve by means of a sterilized spatula. The sound is then passed into the urethra, and left there for two to five minutes.

Karo[2] uses a paint tube with a conical end, which he calls "tubogonal." It contains the salve. Karo advocates ointments containing 2 to 5 per cent. of protargol or albargin.

The treatment is carried out by the patient, who holds his glans with the left hand and applies the end of the tube to the meatus. As he squeezes the latter, the salve enters the urethra and fills it. The meatus is then closed by pressing it together with two fingers, whilst the other hand massages the urethra for three minutes or so. This method is very simple and easy. The consistency of the fat basis insures a prolonged contact of the active

[1] Janet, *C. R. de l'Ass. Franç. d'Urologie*, 1898, p. 201.

[2] Karo, *Amer. Journ. of Urology*, vol. vii., No. 6, June, 1912, p. 202.

drug in a more effectual manner than solutions would, and the salve is introduced in such a gentle way that all complications involving the posterior urethra are excluded.

Urethral Suppositories (Medicated Bougies).—Ultzmann was one of the first to utilize medicated bougies in the treatment of gonorrhea. They consisted of small cylinders, made of cocoa-butter, in which drugs (alum, tannin, zinc sulphate, silver nitrate, etc.) were incorporated. These medicated bougies were introduced through a hollow tube which was fitted with a stilette ("Dittel's ointment-introducer").

Janet has also invented urethral suppositories. His bougies have the shape of a thin pencil, and are rounded off at one end, whilst the other one is hollow. Their base consists of—

Sodium borate	0·10 gramme.
Zinc oxide	0·30 ,,
Cocoa-butter	3·00 grammes.

For six bougies.

The patient can be entrusted with these suppositories as long as they are inserted into the anterior urethra only. This is easily done by pushing them into the passage with a stilette. When it is desired to introduce these bougies into the posterior urethra, the medical man should attend to their insertion.

An interesting method for passing these suppositories into the urethra has been contrived by Escat of Marseilles.[1]

He uses a catheter with a cut-off end, to which he affixes the medicated bougie. By passing the instrument into the urethra, he is able to deposit the bougie in any part of the passage, even in the prostatic region.

11. Electrolysis of the Urethral Mucous Membrane.

Electrolysis can be resorted to with success in certain cases. One is occasionally enabled to put an end to a rebellious urethritis by its use. Dr. Roucayrol[2] has lately dwelt upon the value of this treatment, which renders good service.

Indications.—Electrolytic treatment should only be used after a high degree of dilatation has been reached. It is most especially indicated when, after dilatation with curved sounds up to No. 60 G, Kollmann's dilator has been applied to the penile urethra up to No. 40, and no further progress can be made. One often finds that the branches of the instrument

[1] Escat, *C. R. de l'Ass. Franç. d'Urologie*, 1898, p. 208.

[2] Roucayrol, "Détersion Électrolytique des Glandes Uréthrales Malades," abstract from *Rev. Prat. des Mal. des Org. Génito-Urin.*, September 1, 1910.

will not separate farther after this high degree of dilatation has been reached, not even if one uses a certain amount of force. One is then disarmed, as there are still filaments in the urine, unless one resorts to another method, such as electrolysis.

Technique.—The patient makes water to begin with. One fills his bladder with a solution of boric acid by means of a urethro-vesical irrigation. One then takes an ordinary metal sound, a straight one if the lesions are in the penile urethra, and a curved one for those of the posterior. One

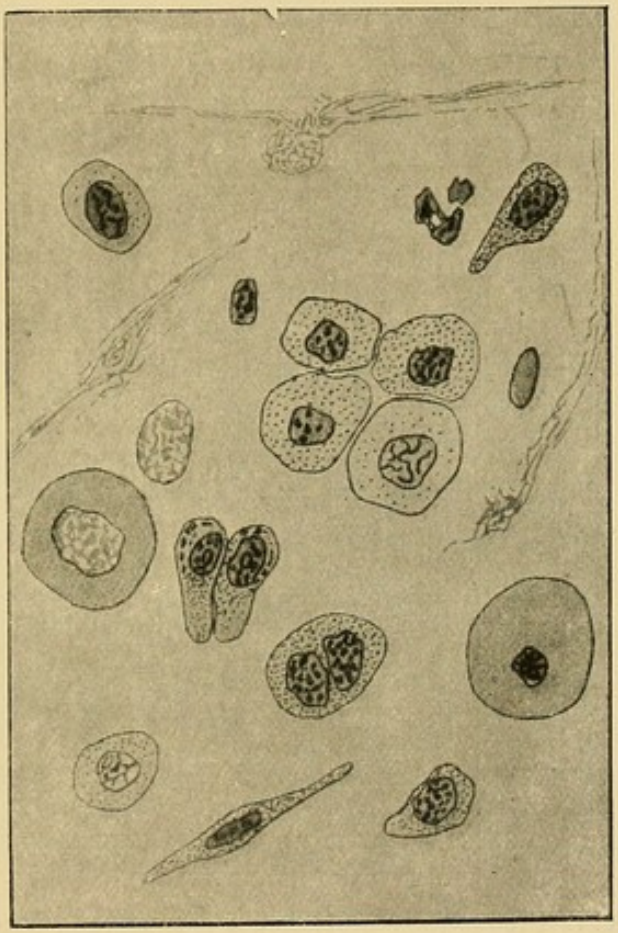


FIG. 198.—DISCHARGE OBTAINED IMMEDIATELY AFTER THE ELECTROLYTIC CLEANSING: DESQUAMATED EPITHELIAL CELLS. (Roucayrol.)

selects the largest size which passed so far, and inserts it into the urethra. One then attaches to it by means of a pair of forceps a wire leading to the negative pole of the battery, and places another electrode on the thigh, connecting it with the positive pole. The current is then passed; 15 to 18 milliampères, according to the size of the sound, for four to five minutes are sufficient. One then removes the sound, and asks the patient to make water into several glasses. The boric lotion passed into the first glass is then found to contain filaments which are similar to those which he passed before he was treated.

It would appear as if this were a special and selective action of the electrolysis on the diseased parts of the mucous membrane, and that they alone were affected by the beneficial action of the electrolysis.

At all events, this therapy yields towards the last stage of the treatment of chronic urethritis good results which deserve to be pointed out.

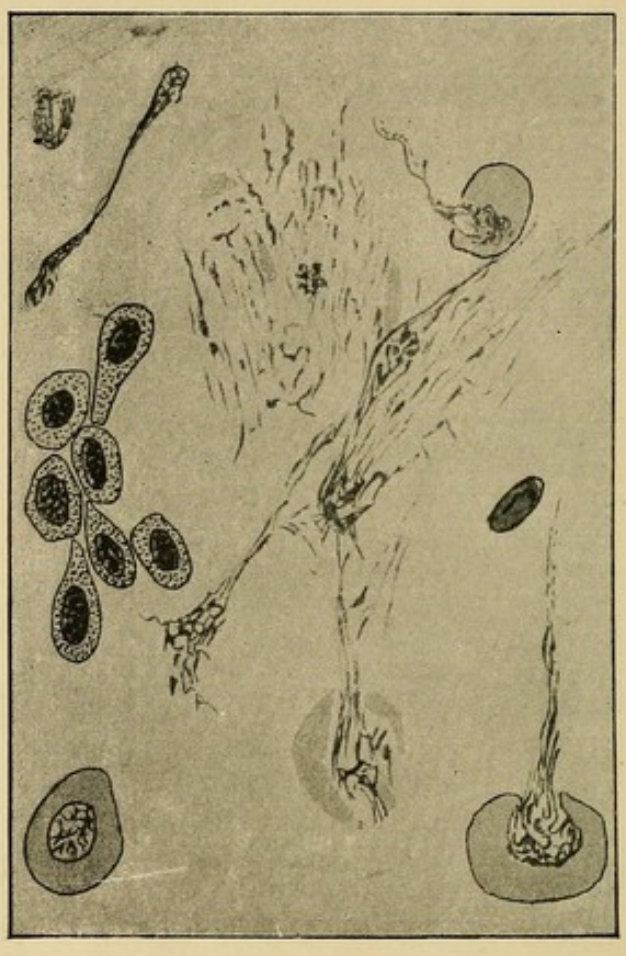


FIG. 199.—DISCHARGE OBTAINED IMMEDIATELY AFTER THE ELECTROLYTIC CLEANSING (Roucayrol.)

The nuclei of the cells are undergoing filamentous degeneration.

Résumé of the General Line of Treatment in Chronic Urethritis.

Such is the general plan of treatment which should be adopted for curing chronic urethritis.

The therapy of chronic urethritis should always be based on the same general plan. In the beginning, *urethro-vesical irrigations* diminish the intensity of the inflammation. As soon as possible one combines them with *massage* of the glands connected with the urethra (prostate, seminal vesicles, Cowper's glands). When all acute inflammatory symptoms have disappeared, slow, methodical, and far-pushed *dilatation* of the urethral mucous membrane is indicated. Once it has reached a certain degree, *urethroscopy*

can be applied without difficulty. It enables one to tell if there are any diseased patches left which require special treatment (dilatation of the highest degree). Once the latter has done its duty, a new urethroscopic examination is necessary, and on the findings which it yields will depend the choice of further treatment (intra-urethral application of the galvanic cautery, electrolysis, etc.).

This therapy undoubtedly requires a long time for its application, but

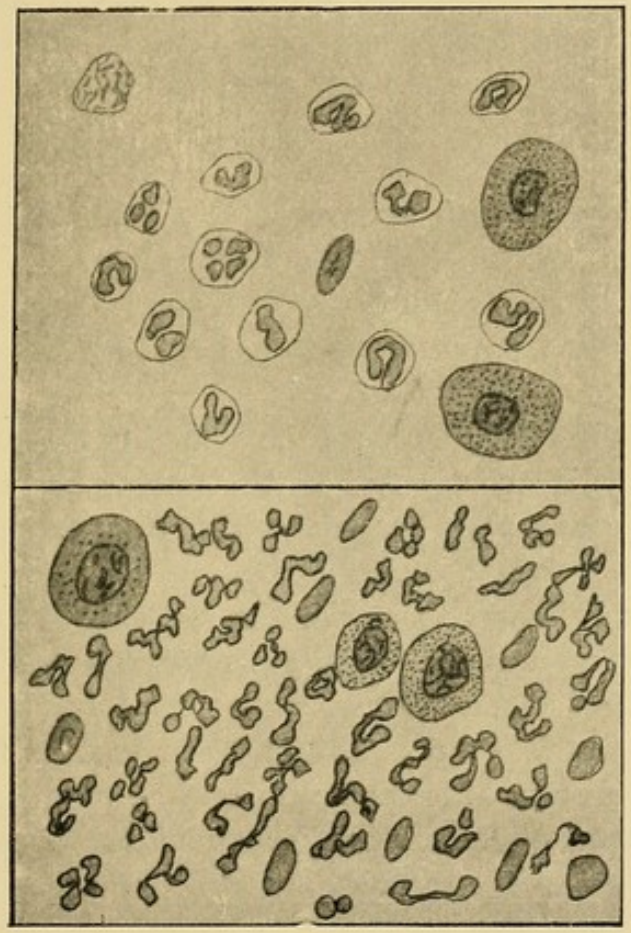


FIG. 200.—DISCHARGE OBTAINED ONE HOUR AND SIX HOURS RESPECTIVELY AFTER THE ELECTROLYTIC CLEANSING. (Roucayrol.)

Marked leucocytic reaction.

this is the only grievance which one could have against it. For one may say that it leads to a certain and lasting cure.

One should familiarize oneself with this line of conduct and follow it rigorously. One should never allow oneself to deviate from it, not even when the patients protest against it, and this is not infrequently the case. The lamentations and complaints of the patients are often bitter and eager. Ricord knew them well when he said: "If I should go to hell some day, I know what I will be in for. I will be surrounded by people suffering from gonorrhea who worry me incessantly with their complaints and implore me to cure them."

On the other hand, one should also know when to stop treatment—*i.e.*, when the oozing from the urethral mucous membrane is absolutely clear and when the urine contains no longer any filaments.

One meets not infrequently with patients, usually neurasthenics, who have acquired a mania of squeezing and mauling their penis incessantly. Even when there is not the slightest lesion in their urethra, they manage to irritate the glands of the passage to such an extent that the slightest contact produces a secretion, which may even be pretty free. These people constantly bother their medical man; they absolutely refuse to believe that they are cured. They run from one specialist to another, and threaten always to commit suicide if one does not comply with their wishes and does not cure them.

Certain American urologists have contrived an excellent method of dealing with them. They apply enormous blisters to the penis, which produce a painful wound requiring a dressing. They thus prevent the patient from mauling his organ and from irritating his glands incessantly by squeezing them.

This often acts like magic. Once the wound caused by the blister has healed, the patients frequently find that all oozing has ceased. They are enthusiastic, and thank their surgeon, whom they had cursed whilst the blister was working wonders.

One should never resort to one of the methods mentioned above exclusively, and rely on it alone. Very generally one should *combine several of them*, and use them simultaneously.

One seldom meets with a case with only one diseased focus. As a rule, the lesions of chronic urethritis are multiple.

Amongst the most often employed combinations we may mention dilatation and irrigation, dilatation and injection, dilatation with massage of one or several inflamed glands.

One of the most important rules which Oberländer has so well pointed out, demands that one should occasionally interrupt all local treatment and give the patients a complete rest for a time. Moreover, one should understand to use the different methods alternately. As Professor Oberländer rightly says, there are cases of urethritis which fail to respond to irrigations and are relieved by dilatation, and there are others which are refractory to dilatation and improve with simple irrigation treatment.

Lastly, one should not confine oneself to local therapy. The general health of the patient also deserves consideration.

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