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Contributors

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Royal College of Surgeons of England

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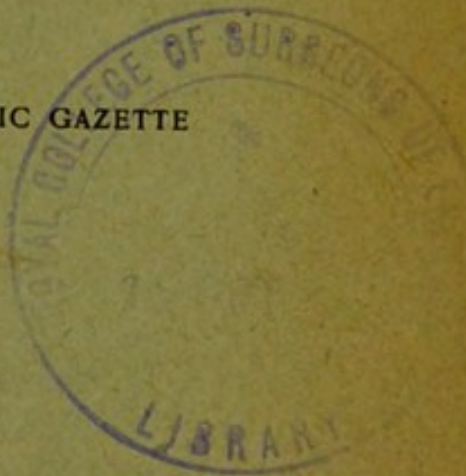
BY
ELLICE McDONALD, M.D.

NEW YORK

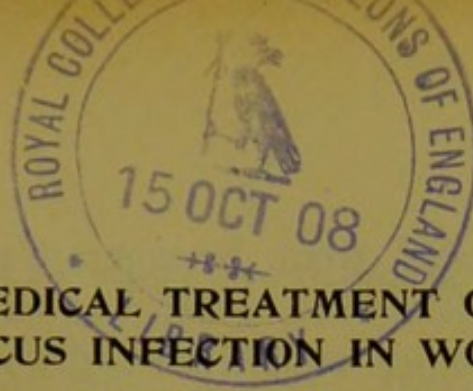
Instructor in Obstetrics, College of Physicians and Surgeons; Clinical Assistant in
Obstetrics, Vanderbilt Clinic; Instructor in Obstetrics, New York
Post-Graduate Medical School and Hospital

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THE MEDICAL TREATMENT OF GONOCOCCUS INFECTION IN WOMEN.

BY ELLICE McDONALD, M.D., NEW YORK.

The medical treatment of gonococcus infection in women is a subject which has been neglected by obstetricians and gynecologists, and left to be developed by the general practitioner. These two classes of specialists seldom see women with gonococcus infection, when the medical treatment can be of avail. The obstetrician sees gonococcus infection in the puerperium, but the further extension and continuance of the disease is usually overlooked or considered to be due to the minor disturbances of the convalescence from childbed. It is uncommon for a woman suffering from this affection to be referred to the gynecologist until the infection has extended beyond the confines of the uterus, causes decided pelvic symptoms, and is not suitable for medical treatment.

However, the great prevalence of the infection, its tendency to extend to the Fallopian tubes, to cause salpingitis and pelvic peritonitis, and the possibility of its cure in the early stages of a vulvar and cervical invasion, should encourage investigation in regard to the prevention of its extension and cure in the early stages of the disease.

Interest in the cause and extension of the

disease dates from Noeggerath's¹ classic monograph in 1872, which was based upon his own clinical experience and was written before the discovery of the microörganism. He stated that 80 per cent of married men had gonorrhea, that 90 per cent of these had never been cured, and that of every five married women three had gonorrhea. These deductions seemed to be extravagant, but were finally more or less accepted by the profession after their partial confirmation by Zweifel and Sanger,² who claimed that 18 per cent of married women had gonorrhea. However, recent statistics have been adduced by Erb³ which give a much smaller percentage of marital infection as the result of a previous gonorrhea in the male. Erb in his first paper collected the records of 2000 male patients, and concluded that about 49 per cent of men had gonorrhea before marriage and that 45 per cent recovered, so that no traces of the disease were left. He concludes that not more than 4.5 per cent of married women are seriously infected with gonorrhea. In a later paper⁴ he continues his study and adds 400 cases of male patients, stating that the proportion of wives suffering from the consequences of gonococcus infection is even less than the 4.5 per cent of his former statistics.

These statistics were attacked by Blaschko⁵ and Vorner, who called attention to the fact that the statistics refer to a limited

class and that they are based on the statements of patients.

It is probable, however, that the truth lies nearer Erb's statements than the sweeping ones of Noeggerath. Erb's percentage of infection of married women may be low, but even at that percentage it means that a considerable proportion of the community is infected by the gonococcus. When the infection in unmarried women is added to Erb's percentage, which may be taken as a fair and low estimate of the amount of infection in married women, it means that more than one woman in every twenty is infected by the gonococcus. Such prevalence surely warrants investigation and study of the cause and cure of the disease.

Many investigators of this infection believe that it is incurable, but more recent observations show that it not only may be but often is cured. Leipmann⁶ believes that the affection is often cured, and that in one-half of the cases the infection does not rise above the internal os. There is no doubt that vulvar and cervical gonococcus infection may be cured without its extension to the uterus and tubes, and if it is not directly cured, its extension upward may be prevented by appropriate treatment.

The infection in women is seldom acquired by other means than sexual intercourse, although in little girls it is quite common for extra-sexual infection to occur,

and numerous epidemics of gonococcus vulvovaginitis have been reported from children's hospitals.

The first site of the infection may vary considerably, but the organism is more commonly found in the urethra. Laser⁷ in 353 cases of gonococcus infection found the organism in the urethra 111 times, 7 times in the vagina in 180 cases, and 21 times in the cervical canal in 67 cases. In four-fifths of the 111 cases of urethral infection there was no macroscopic evidence of a urethritis. The organism may be frequently demonstrated in the urethra, when there is no visible secretion.

The tendency of the organism to attack the non-stratified epithelium accounts for its distribution in the genito-urinary tract. The small glands of the vulva and urethra are peculiarly susceptible. Infection of Skene's glands of the urethra and Bartholin's glands is most common. In the infection of Bartholin's glands it is not usual for the entire gland to be infected, but only the duct. If deep infection of the gland results, it is more commonly from a mixed infection. The red orifice of Bartholin's glands may be frequently seen in this infection. Vulvovaginal abscess is a comparatively uncommon complication. It happens quite commonly that when this gland becomes infected the duct and opening become patulous and may admit a probe.

This is most common in the exacerbation of the disease which occurs in the puerperium.

The vagina offers a large surface for infection to the gonococcus, but is seldom attacked on account of its protective stratified epithelial covering. The infection passes this obvious location to the more common sites of inflammation—the urethra, the glands of Bartholin and Skene, and the glands of the cervix. The cervical glands are most commonly attacked; infection may cause obstruction of their secretion and persist in them for a long time. The cervix is usually swollen, enlarged, and congested, the cervical glands are often felt as small cysts from obstruction of their ducts, and a profuse discharge usually accompanies the endocervicitis. The microörganisms may even penetrate the cervical canal to involve the uterine glands and mucosa. The line of separation of uterine and cervical mucosa is not usually exact, but, as has been shown by Ashoff,⁸ the cervical endometrium with the glands extends usually about two-thirds of the way up the cervical canal, while the upper third of the canal is commonly lined by endometrium like the uterus, save that the mucosa forms deeper and less regular indentations in the musculature. This is at the level of the circular vein.

The infection thus may involve both sur-

faces of the cervix and infect the cervical glands both within and without the cervical canal.

The endocervicitis caused by gonococcus infection may follow upon or precede a urethritis or an inflammation of the glands of Bartholin; but the cervical inflammation is usually the most resistant to treatment and may persist for years.

An inflammation of the trigone of the bladder is a frequent accompaniment of endocervicitis and gonococcus infection generally, as has been shown by a report of a number of cases of bladder inflammation, studied cystoscopically by the author.⁹

Bladder inflammation is the rule in gonococcus infection of the cervix, but may either precede or follow the cervical involvement. The close attachment and association of the uterus and bladder explains this phenomenon. The enlarged hypertrophied cervix with its congested vessels causes an extension of the inflammation and congestion to the trigone of the bladder. A history of frequency of urination is one of the most reliable symptoms of past gonococcus infection, and is particularly significant when this frequency is associated with purulent vaginal discharge. The estimation of frequency of urination is best obtained by asking the patient if she has had to arise at night to urinate. The number of times of urination at night is usually a

fair estimate of the severity of the bladder condition, and in this way a history of the onset of infection may usually be obtained.

The essential lesions of a gonococcus infection of the lower genitalia are inflammation of the urethra, glands of Bartholin and Skene, and of the cervix of the uterus.

The inflammation may be noted in the vulvovaginal glands by the red orifices of the inflamed ducts, the "macula gonorrheica" of Sanger. These orifices are, in acute inflammation, often open and patulous, exuding a creamy pus: this condition is most common in the puerperium, when the softened tissue affords little resistance to the inflammation. The infection of these ducts may be caused by other organisms, as the staphylococcus, but in the great majority of cases the cause is the gonococcus, although secondary infection with other pus-forming organisms frequently follows.

Gonococcus infection usually involves the whole length of the short female urethra and commonly spreads to the trigone and base of the bladder. Skene's glands, once involved, form a nidus of infection for the urethra. The organisms are often found when no pus is present. The urethritis is usually easily relieved, but the infection of the trigone of the bladder is very resistant to treatment.

Gonococcus vaginitis is a term which is frequently misapplied and which is com-

monly used to refer to gonococcus endocervicitis. True gonococcus vaginitis occurs infrequently, but it is sometimes seen in infection of the softened, bruised tissues of the puerperium, in young children, and in exacerbations of a chronic gonococcus infection which may occur at the menopause. This lesion is not usually resistant to treatment by douches.

The most common lesion of gonococcus infection, however, is an endocervicitis. This is usually noted as a hypertrophied, inflamed, and patulous cervix, causing a purulent discharge. Small eminences of obstructed cervical glands or cysts may be frequently seen and felt; there may be so-called erosions or excoriations upon the cervical lips.

The accurate diagnosis of gonococcus infection, of course, depends upon the microscopical recognition of the specific double biscuit-shaped organism. This is best done by taking smears from the urethra and cervix. Gonococci can be recovered from the urethra even when no macroscopic evidences of pus are present. Smears taken from within the cervical canal, as a rule, give the best results, as has been shown by a study by Stone and the writer¹⁰ of gonococcus infection in the puerperium.

The smears should be stained by Gram's stain or by the more convenient Jennen's blood stain, which is very useful for this

purpose. The organism lies within the leucocytes and pus cells, but may be extra-cellular, and it is stated by Wynn¹¹ that the more active the lesion the more commonly are the cocci found extra-cellularly.

The organism is difficult to cultivate, but upon special media this may be overcome. Media containing blood or blood serum give the best results. Serum glucose-agar, upon which a drop of freshly drawn blood is spread, gives good results. Blood serum and ascitic fluid are also useful. Jellyed blood serum in connection with glycerin-agar is also of value in its growth. Kiefer's special medium for cultivation of the gonococcus is perhaps the most satisfactory. It consists of 3.5 per cent agar, 5 per cent peptone, 2 per cent glycerin, 0.5 per cent sodium chloride, and one-third by volume of sterile ascitic fluid. Meyer¹² used this medium in 90 cases and obtained positive results by culture in 87 cases, while the organisms were found microscopically in 58 cases. The writer has found this the most satisfactory of the various media. The colonies usually show in twenty-four hours as minute grayish translucent spots, and after forty-eight hours are well developed. They are circular and translucent with sharply defined margins and are brownish, denser, and granular toward the center. No growth will occur upon ordinary agar, or broth. Bruschetti and

Ansaldo¹³ also use media containing blood and white and yolk of egg, with which they report very good results in the cultivation of the organism.

While these bacteriological methods are of use in the diagnosis of the condition, microscopic examination of the cellular elements of the discharge is also of value. For this purpose vaginal discharges may be divided into simple leucorrhea and discharge of infections. Simple vaginal leucorrhea shows macroscopically many flat vaginal cells which stain well with many similar degenerated cells which do not stain as well. There are disintegrated cellules with proliferating nuclei, lymphocytes, and numerous cocci and bacteria, amongst which Doederlein's bacillus is common.

The secretion of gonococcus infection, on the contrary, shows microscopically but few normal flat vaginal cells or columnar cells from the cervix, and numerous degenerated vaginal or cervical epithelial cells; there are many polymorphonuclear leucocytes, indicating the suppurative process, and few lymphocytes. The bacteria are few in number, but the gonococcus is frequently present.

The cause of the disease may be traced, as has been shown by Harmsen,¹⁴ by the different cellular elements. At the onset the polynuclear leucocytes are usually found before the gonococci may be recog-

nized microscopically, and, with the abatement of the affection, the leucocytes and gonococci are replaced by epithelial cells and the microörganisms normally present. Siredey and Bigart¹⁵ also show that the microscope is of some value in following the course of the disease and in distinguishing between acute and chronic processes. Long bacilli streptococci are found oftenest in normal secretions, while short cocci are often found in infected discharges. The reappearance of the ordinary forms is thus an evidence of improvement.

The gonococci may be best recovered from the vaginal secretions after some irritation or congestion. The best results are obtained from smears taken after menstruation and after the sixth day of the puerperium, when the lochia of infected patients shows many pus cells. Often, however, when an infection is very chronic, it is difficult to recover the organism, unless the smears and cultures can be taken at propitious moments, as after menstruation.

In making a diagnosis in these cases the history is often of value. A history of leucorrhea or purulent vaginal discharge and frequency of micturition following upon the first menstruation after marriage or coitus is often due to a specific infection. There may be sometimes obtained a definite history of burning and scalding of urine caused by a urethritis. But the usual his-

tory is one of leucorrhea which is worse after each menstruation, and of frequency of urination at night which is caused by a trigonitis, and which becomes worse, as a rule, after chilling or taking cold. Hence the expression is common amongst women of having "taken cold in the bladder." These symptoms are not, as a rule, sufficient to cause much disturbance on the part of the patient, but are often the result of gonococcus infection of the genitalia.

The course of the disease is affected by a number of influences. The youth of the patient is a direct factor in its virulence: the soft tissues of the young girl offer a good nidus and little resistance to the organism. This is shown by the virulence of the epidemics reported in children's hospitals and clinics.

In the adult, however, the four factors which influence the course of the disease are: (a) menstruation, (b) coitus, (c) pregnancy, and (d) curettage.

Menstruation and any congestion have apparently a direct effect upon the disease. In an infected woman the evidences of the disease do not show, as a rule, until after the first menstruation has passed. This is well shown in infection in the newly married, where the leucorrhea begins after the first menstruation. There is usually in the acute stages an exacerbation of the discharge after each menstruation. The mi-

croörganism may be more readily discovered in the vaginal discharge immediately after the menstruation.

Coitus should be restricted, if not completely abolished. Of course, care should be taken to see that the husband is completely cured of the disease, for the additional injury of repeated fresh infections gives no hope for a cure of the disease in the woman. But in addition to this, coitus itself, and particularly excessive coitus, has an evil effect upon the disease. The congestion and traumatism prevent the progress to a cure.

Pregnancy has a distinctly bad effect upon gonococcus infection. This is not particularly noted during the pregnancy itself, but after childbirth the disease, which was before latent, usually lights up and very commonly spreads to the uterus and Fallopian tubes. The influence of labor upon a preëxistent gonococcus infection is most marked. The softened tissues, the bruised vagina, and large raw surface of the puerperal uterus offer a splendid culture ground for the organism. It usually extends by the mucous membrane, but may penetrate the softened uterine muscle. Extension to the tubes is a common result, and late disturbances are the rule. This is well shown by 17 cases of puerperal gonococcus infection reported by Stone and the author,¹⁶ amongst which 12 had rises of tem-

perature to about 100° F., and the average duration of the fever was 4.1 days. The fever in all cases was very irregular and followed no definite curve.

The gonococcus was best found in the lochia after the fifth day of the puerperium, when pus cells appeared. The lochia was usually finally replaced by a purulent discharge. The organisms were most frequently found in smears from the interior of the cervix. In 9 out of the 17 cases there were clinical symptoms of pain and abdominal rigidity, indicating extension of the disease to the Fallopian tubes and pelvis. Operation was done for pyosalpinx in 3 of the 17 cases—in 2 one year after the puerperium, and in 1 for ruptured pus tube eight days after delivery. These 3 cases were known to the author, but no definite effort was made to trace the other cases, so that it is not known whether there were more than three cases with resultant pyosalpinx or purulent salpingitis.

The gravity of puerperal infection with the gonococcus has only recently been studied, and the different views may be reconciled by the fact that the gonococcus is difficult of cultivation and can but rarely be demonstrated in the lochia before the fourth or fifth day, when pus cells are numerous. Cultures and smears are usually taken earlier in the puerperium and are often obscured by blood. Special gono-

coccus media are seldom, but should always be, used in every study of puerperal infection, as the organism does not grow on the ordinary media. These findings have been confirmed by Mayer¹⁷ and by Little.¹⁸

The gravity of this condition exists not so much in its prime infection and immediate constitutional results, as in the more remote results of extension of the disease to the tubes and pelvis some time after the puerperium. It is well known that the streptococcus infection results in slight anatomic alterations of the pelvic organs after recovery from the infection; but the reverse is true of gonococcus infection, where marked alteration of tissue is the rule and spontaneous recovery from pelvic disease from this cause the exception. This is well shown by the series above quoted, where three cases were operated upon and six other cases showed slight pelvic symptoms in the puerperium, while the other eight cases were not traced after that time. Pelvic and tubal disease is often ascribed to puerperal infection and miscarriage, when the etiological factor is often gonococcus infection which may be lighted up after the delivery, and which may be the cause of the miscarriage, as three of the 17 cases had miscarriages ascribed to this infection.

An ill-advised curettage is often the direct cause of extension of a gonococcus infection about the cervix and to the tubes.

The gonococcus infection may cause dysmenorrhea and profuse menstruation. The dysmenorrhea may result from the involvement and alteration of the cervical tissue, which causes a condition analogous to the elongation and stenosis of the cervix. An increase in the amount of menstruation, however, is more commonly a result of infection of the uterine cavity and a true gonococcus endometritis. This usually continues, to become an atrophic endometritis with lessened menstruation. The danger of curettage in these conditions may be seen in six cases reported by Holden¹⁹ in a study of dysmenorrhea. In these cases at the time of curettage the pelvic organs were noted as "apparently normal," while months afterward the patients returned with pelvic inflammatory disease and were operated upon and their Fallopian tubes excised. Two cases of tubal disease have been operated upon by the author during the last six months, in which the extension of the disease dated from such curettage; in both cases the tubes were markedly diseased.

Thus it may be seen that surgical means have no place in the treatment of gonorrheal disease until it has first extended to the Fallopian tubes, save when evacuation of a vulvovaginal abscess is necessary. Curettage by baring a raw surface in the uterus and by causing congestion and exu-

dation offers a direct means for the extension of the infectious disease to the pelvic organs.

The chief indications in the treatment of gonococcus infection of the lower genitalia are rest and cleanliness. Rest of the parts may be obtained by not permitting pregnancy or coitus, and as the menstruation has a direct effect upon the course of the disease the patient should be urged to rest during this time, particularly in the more acute stage of the disease.

Cleanliness is best obtained by the use of alkaline douches. The common bichloride douche is irritative and inefficient, as it has been shown that bichloride of mercury is of no use as an antiseptic in the presence of albuminous material, such as pus or leucorrheal discharge. It is also only efficient as an antiseptic in strongly acid solutions, and very little albuminous material will neutralize a large amount of the antiseptic. The process of douching is one which requires a solvent of purulent matter, as the liquid is not retained long enough to have any decided antiseptic action, unless in such strength as to work harm to the tissues in which the gonococci lurk. The otologists have proved in the treatment of suppurative otitis media that bicarbonate and sulphate of sodium solutions give the best results as solvents of mucus and pus. These may be used in the

treatment of gonococcus infection in the proportion of sodium bicarbonate $\mathfrak{Zij}$ and sodium sulphate $\mathfrak{Zj}$ to the quart. If pus predominates in the discharge, the sodium sulphate should be increased to $\mathfrak{Zij}$, as it is a better solvent of purulent material than is the bicarbonate. The douche should be at least two quarts and given upon a douche pan.

Hot sitz baths are also of use, especially where the vulva and skin of the thighs are excoriated and irritated by the vaginal discharge.

For purposes of cleansing the cervix, vagina, and vulva, crude pyroligneous acid may be used on a cotton swab to cleanse the parts before other applications are made. This substance is most efficient for the purpose and is not irritating.

The treatment of the inflammation of the vulvovaginal gland and of excoriations upon the cervix is best done by applications of tincture of iodine or a solution of iodine 1:100 in water and potassium iodide. This substance is one of the most efficient tissue antiseptics and has a very good effect upon infected surfaces. The patulous orifices of the vulvovaginal gland will often permit injection of the iodine. The applications should be made directly to the diseased part, and then the excess should be wiped off, as the substance is too irritating and spreads on the surface too easily

to remain in excess. This treatment should not be repeated more often than once in three or four days.

There is often associated with the irritating discharge a pruritus or irritation of the vulva. This usually extends some little way within the vagina, and this should be kept in mind during its treatment. After the alkaline vaginal douche is used, the parts should be wiped dry with cotton-wool (absorbent cotton should not be used), and strips of cotton-wool soaked in carbolic acid solution 1:40 should be laid over the irritated areas, one inch of one strip passed into the vagina, and the whole kept in place over night by a T-bandage. In the morning an ointment may be applied containing adrenalin chloride 1:1000, or, as the condition improves somewhat, an ointment of carbonate of bismuth made up with lanolin and with glycerin added to diminish the thickness. Ointments are better than washes in this condition, as they protect the parts from the scalding discharges. If the condition is very severe, pilocarpine in one-eighth to one-quarter grain doses is often effectual in allaying the itching. It should be remembered that treatment must be made within the vagina, as the irritation and congestion often extend some distance up. The alkaline sitz baths, with half a pound of sodium bicarbonate to the usual size of sitz bath, are often of use, when the condition is extensive.

The treatment of the inflamed cervix must be directed to the infected cervical glands. The only successful procedure in these cases is to destroy the glands, because their inaccessibility makes destruction of the cocci impossible without destruction of the cervical glands themselves. This may be done by the injection into the infected glands and beneath the mucous membrane of lactic acid by means of a hypodermic syringe, as has been advised by Chandler.²⁰ The vagina is cleansed and the cervix exposed. An ordinary hypodermic syringe loaded with pure lactic acid is inserted into any of the infected glands which show prominently from their encysted contents causing bulging, and the acid is also injected in a number of places on all sides of the cervix. This may be done at one sitting, but had better be spread over several treatments. If there are a number of encysted nodular glands containing pus and a glairy mucus, they may be punctured and cauterized by means of a small thermocautery, or better, a small electro-thermocautery point. This effectually destroys the gland and gives it proper drainage. The patient should be warned that the discharge will increase for a short time after the cautery treatment until the necrotic tissue is cast off. The cauterization should not be deep nor extensive, and it should be directed toward the particular

infected glands which appear as cysts. The cervix may be cocainized, but if the cautery point is small and sharp, this is seldom required.

The cervical inflammation usually persists after the other vaginal and vulvar parts are cured; an irritating vaginal discharge is usually the result, and many douches and painting of the cervix are not effectual or give only temporary relief.

An inflammation of the trigone of the bladder is often coincident with the enlargement and hypertrophic inflammation of the cervix. This should be treated by means of alkaline or quinine injections and direct applications to the bladder; the treatment may be controlled cystoscopically as is directed in a series of 45 cases reported by the author.²¹

The use of alkalies by mouth, as sodium bicarbonate combined with tinc. hyoscyamus, is indicated for the control of the bladder spasm and its effect in rendering the urine bland and unirritating.

The medical treatment of gonococcus infection is only suitable to infection of the lower genitalia and below the internal os of the uterus. When the uterus itself is infected, we should not attempt to make topical applications to it. When the tubes are infected, the best treatment of them is absolute rest in bed with the application of heat by douches. Treatment of tubal dis-

ease by means of applications of irritants, etc., to the vault of the vagina is as irrational as the treatment of appendicitis by poultices or counter-irritation to the skin. These applications to the vault of the vagina are liable to increase the amount of tubal inflammation and cause exacerbations of it as does curettage. The treatment of gonococcus salpingitis is rest or eradication of the diseased organs; intermediate measures and vaginal tinkering can only do harm. However, in these cases the treatment of the vulvar and cervical inflammation should not be forgotten, but should be the more carefully done.

The use of medicated tampons has given but little result in my hands, save when it is required in cases of retroversion or other congestive conditions. In these cases the tampons should be medicated with a bland substance, as boroglycerin; ichthyol solutions have caused too much irritation to be advised.

The medical treatment of gonococcus infection of the lower genitalia may be then summarized into two phases: First, the prophylactic treatment and prevention of the extension of the disease by care at menstruation, prevention of pregnancy, restraint of coitus, and elimination of trauma and of irritation of the uterus by applications or surgical measures; secondly, the direct treatment of the disease by rest, cleanliness, and

measures directed to the lesions themselves, as treatment of the vulvar and cervical inflammation and inflammation of the adjacent parts. In this way a large percentage of these infections may be cured and their extension to the uterus and Fallopian tubes prevented.

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