

**Surgery : complete volume / C. R. Whittaker.**

**Contributors**

Whittaker, C. R.

**Publication/Creation**

Edinburgh : E. & S. Livingstone, [1896]

**Persistent URL**

<https://wellcomecollection.org/works/xntqzprs>

**License and attribution**

This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection  
183 Euston Road  
London NW1 2BE UK  
T +44 (0)20 7611 8722  
E [library@wellcomecollection.org](mailto:library@wellcomecollection.org)  
<https://wellcomecollection.org>



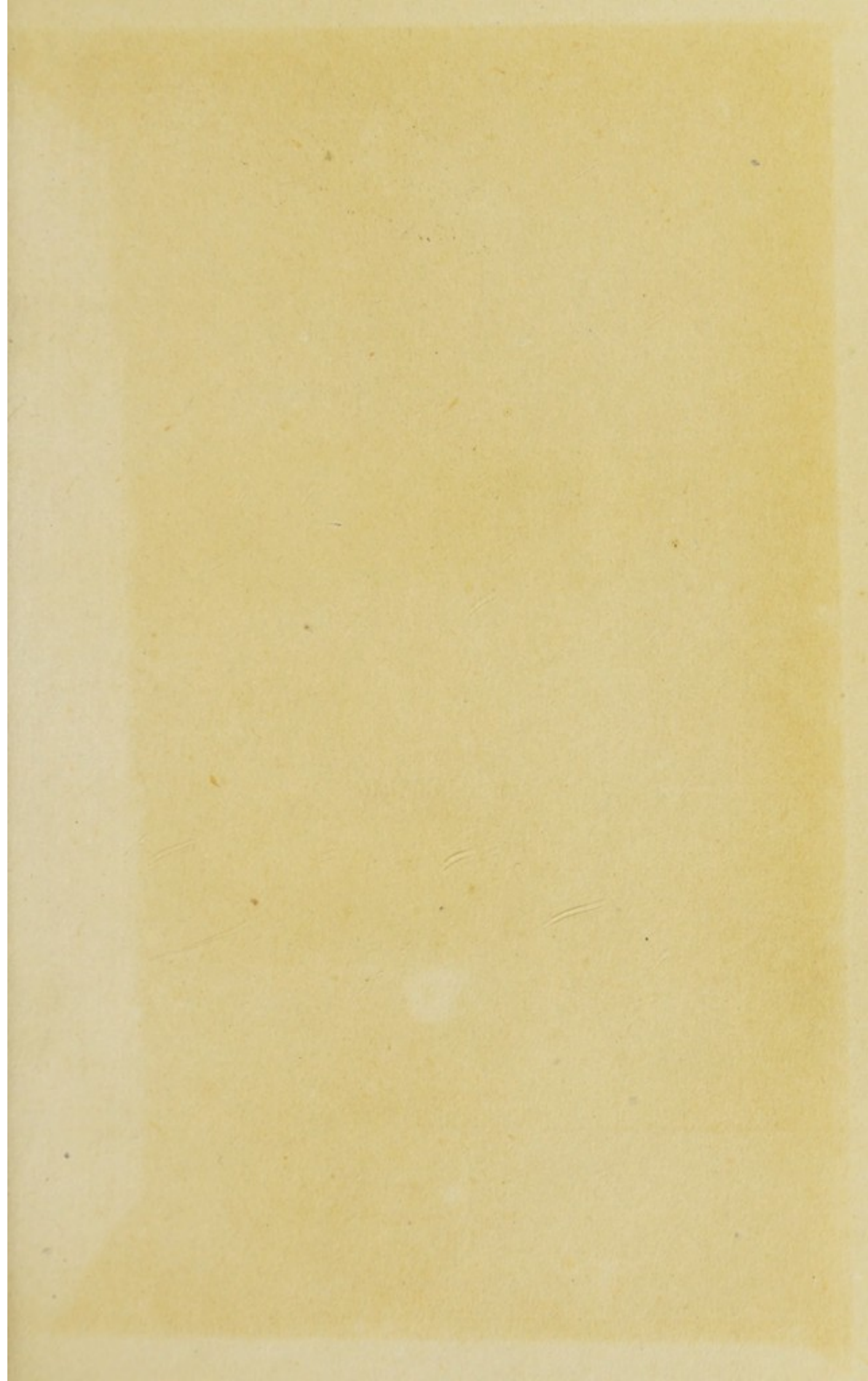
# SURGERY

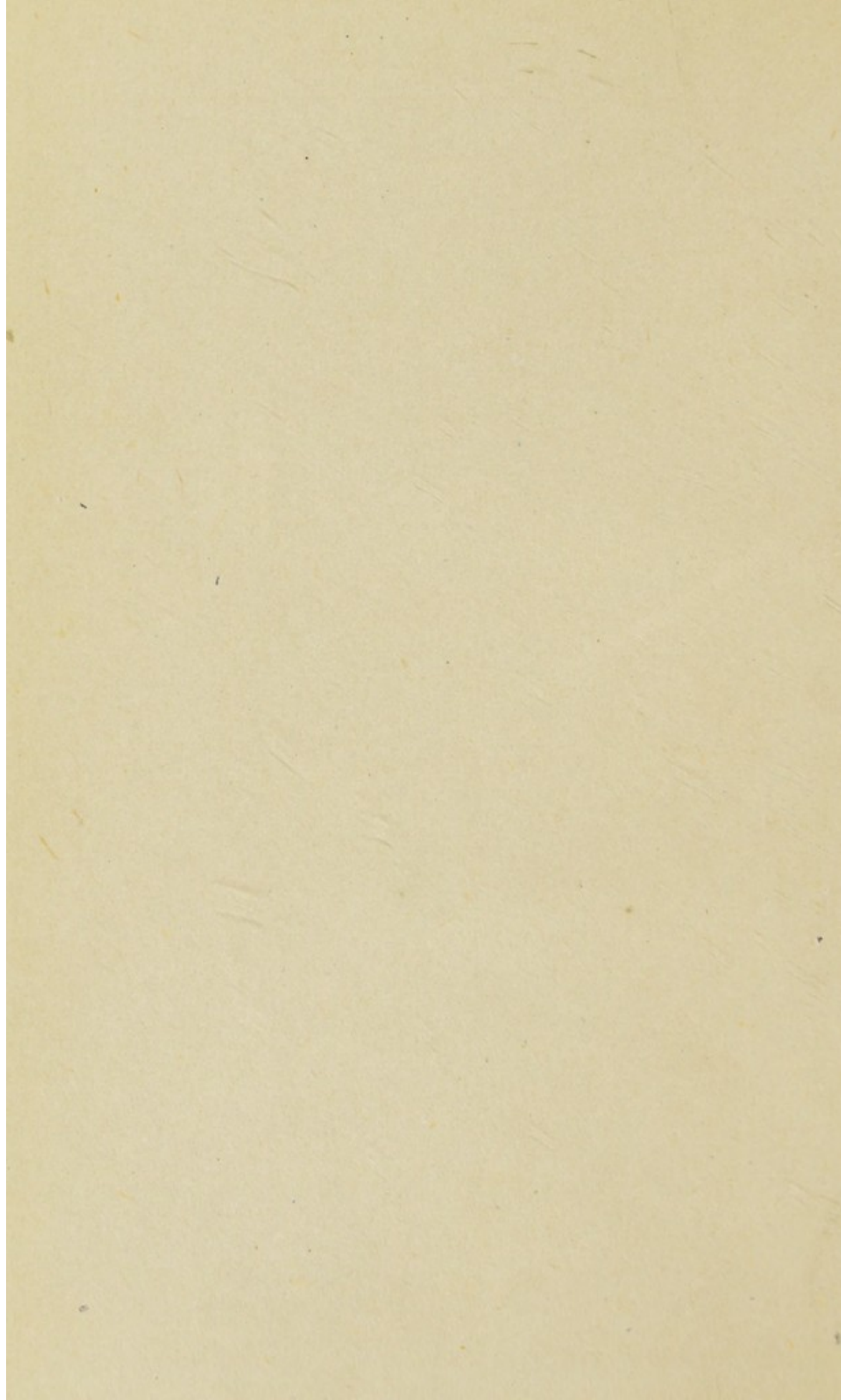




22102159383









CATECHISM SERIES

# SURGERY

COMPLETE VOLUME

By

CAPTAIN C. R. WHITTAKER, R.A.M.C.,  
F.R.C.S.(Ed.), F.R.S.E. Etc.

THIRD EDITION.



EDINBURGH  
E. & S. LIVINGSTONE  
17 TEVIOT PLACE

---

ALL RIGHTS RESERVED

# WORKS

BY

CHAS. R. WHITTAKER, F.R.C.S.E., F.R.S.E.  
(Late Captain R.A.M.C.)

Senior Demonstrator of Anatomy, Surgeons' Hall, Edinburgh ;  
Lecturer on Biology, New School of Medicine, Edinburgh ;  
Examiner in Biology, Royal College of Surgeons, Edinburgh.

## A Manual of Surgical Anatomy

Second Edition. Crown 8vo. 336 pp. Cloth. Illustrated.  
7s. 6d. net. Inland Postage, 6d.

*In Preparation.*

## A Handbook of Surgery (Civil)

Crown 8vo. About 500 pp. Well Illustrated

*Revised by the same Author.*

## Nerves of the Human Body

Demy 8vo. Cloth. Illustrated with 12 Plates.  
3s. 6d. net. Postage 4d.

## CATECHISM SERIES

Anatomy, Parts II. to V. Operative Surgery, 3 Parts.

Botany, 2 Parts. Surgery, 5 Parts.

|                               |          |
|-------------------------------|----------|
| WELLCOME INSTITUTE<br>LIBRARY |          |
| Coll.                         | welMomec |
| Call                          |          |
| No.                           | W0       |
|                               | K54451   |
|                               |          |
|                               |          |



# CONTENTS

---

|                                            | PAGE |
|--------------------------------------------|------|
| SUPPURATION . . . . .                      | 1    |
| ULCERATION . . . . .                       | 4    |
| GANGRENE . . . . .                         | 7    |
| WOUNDS . . . . .                           | 12   |
| BURNS . . . . .                            | 14   |
| BACTERIAL DISEASES . . . . .               | 16   |
| TUMOURS . . . . .                          | 22   |
| NERVE DISEASES . . . . .                   | 32   |
| BLOOD VESSELS . . . . .                    | 35   |
| DEFORMITIES OF THE LIMBS . . . . .         | 43   |
| DISEASES OF JOINTS . . . . .               | 53   |
| VENEREAL DISEASES . . . . .                | 64   |
| INJURIES OF BONES . . . . .                | 73   |
| FRACTURES AND DISLOCATIONS . . . . .       | 77   |
| DISEASES OF BONE . . . . .                 | 128  |
| THORAX . . . . .                           | 141  |
| SCALP . . . . .                            | 153  |
| CRANIUM . . . . .                          | 154  |
| PYOGENIC DISEASES OF THE BRAIN . . . . .   | 162  |
| VERTEBRAL COLUMN AND SPINAL CORD . . . . . | 169  |
| FACE . . . . .                             | 183  |
| PHARYNX . . . . .                          | 199  |
| NECK . . . . .                             | 202  |
| ŒSOPHAGUS . . . . .                        | 208  |
| LARYNX AND TRACHEA . . . . .               | 213  |
| EAR DISEASES . . . . .                     | 219  |
| EYE DISEASES . . . . .                     | 223  |
| ABDOMINAL WALL AND PERITONEUM . . . . .    | 233  |
| GENITO-URINARY SYSTEM . . . . .            | 241  |
| LIVER . . . . .                            | 292  |
| GALL BLADDER AND BILE DUCTS . . . . .      | 296  |
| PANCREAS . . . . .                         | 301  |
| SPLEEN . . . . .                           | 306  |
| DISEASES OF MUSCLES . . . . .              | 309  |
| RECTUM AND ANAL CANAL . . . . .            | 312  |
| HERNIA . . . . .                           | 330  |
| STOMACH AND DUODENUM . . . . .             | 352  |
| INTESTINES . . . . .                       | 368  |
| VERMIFORM APPENDIX . . . . .               | 377  |
| INDEX . . . . .                            | 381  |



Digitized by the Internet Archive  
in 2016 with funding from  
Wellcome Library



# SURGERY.

## PART I.

---

### SUPPURATION.

#### *Describe Pus.*

Pus is a yellowish fluid, of the consistency of cream. It is composed of pus serum, pus corpuscles, and broken-down tissue elements. The specific gravity is about 1030; it is alkaline in reaction. The main pyogenic bacteria producing it are the staphylococcus pyogenes aureus et albus, streptococci, gonococci, pneumococci, and the bacillus coli communis. Three varieties of pus are described, (a) typical, (b) sanious or blood-stained, and (c) ichorous or watery. A circumscribed collection of pus in the tissues is termed an *abscess*. Two forms of abscess are met with, acute and chronic. The symptoms of the former are those of an acute inflammation.

#### *What are the Features of a Chronic Abscess?*

A chronic or *cold* abscess does not present the usual signs of inflammation. Pathologically its wall is dense, rigid, and membranous ("pyogenic membrane"), and is not lined by granulation tissue. In treatment it is not only necessary to evacuate the pus, but, in addition, the pyogenic membrane must be removed.

#### *When should an Abscess be opened immediately?*

An abscess should be opened at once—

1. If it is near a joint, lest it open into the joint.
2. When it is near hollow cavities, such as the rectum.
3. When in the sheath of a tendon, or under strong fascia or when sub-periosteal and giving rise to great suffering.
4. When near large vessels.
5. When near serous cavities.



6. When there is much loose areolar tissue, and the pus is likely to burrow instead of coming to the surface.

7. Where the pressure it causes is likely to be dangerous, or if it cause direct obstruction to some passage.

8. Where a spontaneous opening would cause deformity—*e.g.* in the neck.

### *What is Hilton's Method of opening Abscesses?*

Make an incision through the skin and deep fascia; then lay aside the knife and push a director into the abscess cavity. Now, pass a pair of dressing forceps (closed) along the director into the abscess; remove director, then open the forceps to allow the pus to escape. This method is used when the abscess lies deeply in regions which are rich in large blood-vessels and nerves—*e.g.*, the posterior triangle, or other parts of the neck, the breast, etc.

### *Define the Terms "Sinus" and "Fistula."*

**A fistula** is an abnormal, long, and narrow canal which affords means of exit to a normal secretion, or connects together two surfaces of the body, as skin with a mucous cavity—*e.g.* gastric, biliary, salivary, or anal fistulæ; or two mucous cavities—*e.g.* vesico-vaginal fistula. A fistula, has, therefore, *two* openings.

**A sinus** is a long, narrow, suppurating canal *in the tissues*; it does not communicate with a mucous cavity. It has, accordingly, only *one* opening.

Sinuses and fistulæ tend to persist because of:—

(a) **Great length**, so that the drainage is bad, and discharges cannot pass easily.

(b) Presence of **dead bone, diseased glands**, or a **foreign body** at the bottom.

(c) **Movement of the parts**—*e.g.* in the leg, abdominal wall, axilla, or ischio-rectal fossa.

(d) **Passage of secretions or excretions** along the fistula—*e.g.*, urine in *fistula in perineo*; mucus or thin fæces in *fistula in ano*.

(e) The **epithelial lining** of the walls.



*What are the Principles of Treatment ?*

1. To remove the persistent cause.
2. To scrape away the epithelial lining with a sharp spoon, and then pack with iodoform gauze, and thus encourage healing from the bottom of the sinus.

*Describe a Whitlow.*

A whitlow is an acute septic inflammation of a finger or a toe. Five varieties are found—(a) purulent blister or subcuticular; (b) around the nail sulcus; (c) subcutaneous; (d) involving the tendon sheath (“thecal”); and (e) sub-periosteal. The affected part becomes red, painful, and throbbing. Superficial lymphangitis is usually present with some tenderness of the axillary glands. With the exception of the subcuticular form, constitutional reaction generally occurs, such as insomnia and a slightly elevated temperature.

*Give the Treatment of Whitlow.*

Induce passive hyperæmia by means of Bier’s bandage, or Klapp’s suction-bell. Bier’s bandage is applied round the limb well above the seat of the injury, the constriction being maintained for about twenty hours daily. Care must be taken not to apply the bandage too tightly or gangrene may result. Klapp’s bell is used as follows:—Smear the edge of the bell with vaseline, and lower the pressure in the bell by means of a suction pump. Keep the bell on for about ten minutes, then remove for ten minutes, and so on for about three-quarters of an hour.

In addition to passive hyperæmia note:—

(1) If the nail be affected, remove a portion under local anæsthesia to facilitate drainage.

(2) In the subcutaneous variety incise the area of finger involved, but do NOT open the tendon sheath, and do NOT APPLY CARBOLIC ACID or gangrene may follow.

(3) The thecal form is especially dangerous when it occurs in the thumb or little finger owing to their communication with the forearm. A small incision should be made in the affected sheath, avoiding the digital vessels and nerves, and passive hyperæmia employed.



## ULCERATION.

### *Describe Ulceration.*

Ulceration is the **molecular** death of a part. Ulcers are classified.

- |                                   |   |                                                                                          |
|-----------------------------------|---|------------------------------------------------------------------------------------------|
| A.—According to their origin.     | { | (a) Traumatic.<br>(b) Trophic.<br>(c) Constitutional.<br>(d) Varicose.<br>(e) Malignant. |
| B.—According to their appearance. | { | (a) Healing.<br>(b) Spreading.<br>(c) Callous.                                           |

*What Points must be specially noticed when examining an Ulcer?*

1. Its floor or base.
2. The character of the edges.
3. The nature of the discharge.
4. The condition of the surrounding parts.
5. The presence or absence of pain.
6. The presence or absence of cicatrization.

### *Describe a Healing Ulcer.*

1. Its base is smooth, and is occupied by pink, firm granulations.
2. Its edges shelve gradually to its base.
3. The discharge consists of clear serum.
4. The surrounding parts are firm and healthy, and somewhat more vascular than normal.
5. Pain is absent.
6. Cicatrization is taking place all round the edges.

### *Describe Varicose Ulcers.*

These are usually situated on the inner surface of the lower third of the leg, because, according to Hilton, the anastomosis between the deep or muscular veins, and the superficial or saphena veins is very slight in this area, and



hence the latter veins tend to become over-distended, thus lowering the vitality of the superficial tissues. Varicose ulcers may arise (*a*) from suppuration over a thickened varix, or (*b*) from eczematous dermatitis and abrasions. Varicose ulcers tend to become callous; the base also is often adherent to the underlying periosteum, leading to hyperostosis and the formation of stalactite-like processes of bone.

*Give the Main Features of a Perforating Ulcer.*

Perforating ulcers are generally found beneath the head of the first metatarsal bone or under the heels. They usually follow either peripheral neuritis, tabes dorsalis, general paralysis of the insane, or diabetes; in children, they are found in association with spina bifida. In appearance perforating ulcers are somewhat circular with a sinus leading from the centre, the sinus being filled with sodden offensive epidermis. The ulcer may burrow to the metatarsal bones or penetrate the metatarso-phalangeal joints. Remember that the sinus leading from a perforating ulcer is quite insensitive. The local treatment of a perforating ulcer consists in thoroughly scraping away the epithelial lining, and removing the decomposing epidermis. After this the cavity should be packed with iodoform gauze. Cases due to peripheral neuritis are often benefited by stretching the plantar nerves behind the internal malleolus (Chipault's operation).

*Describe a Syphilitic Ulcer.*

Syphilitic ulcers may occur either in the secondary or tertiary states. When secondary they are superficial, but when of tertiary origin they usually result from the breaking down of a gumma. In all ulcers above the middle of the leg, especially if about the knee-joint and multiple, suspect syphilis. The edges are hard and thick and have a punched out appearance, while the outline is serpiginous. The surrounding parts are congested and are of a dark brown colour. The surface is covered with a "wash-leather" like slough. Note the character of the discharge. It is thick and evil-smelling, consisting of broken-down gummatous *débris*. The ulcer is healing at one part, but spreading at another.



*What is the Treatment of a Syphilitic Ulcer?*

When very extensive, scrape with a sharp spoon, then dress with some black wash. The constitutional treatment for the disease is salvarsan or mercury, and iodide of potassium should be carried out in addition.

*Describe a Tubercular Ulcer.*

Tubercular ulcers generally follow the course of a tubercular abscess. The base is pale and covered with weak granulations which readily bleed. There is no induration around the edges which are purplish in appearance and undermined. Small tags of thin skin often bridge over the surface. The discharge is thin, watery, and curdy.

*Give the Treatment of a Tubercular Ulcer.*

In addition to fresh air and tuberculin, local measures must be employed. When small and in an exposed part, scraping or excision should be practised. Large ulcers and those found on the limbs are treated by Bier's bandage. X-rays are often useful, especially when associated with constitutional treatment.

*Contrast Syphilitic and Tubercular Scars.*

SYPHILITIC scars are bluish-white with a pigmented area around. They are multiple, moveable, round, smooth, and thin, without "puckerings."

TUBERCULAR scars have usually no pigmentation around them. They are marked by ridges, tags, and puckered.

*Describe Bazin's Disease.*

This condition is generally found in the legs of young females suffering from some form of tuberculosis. Dark, hard nodules, often painful, form on the surface of the limbs, which subsequently break down, leaving small ulcers with undermined margins. The ulcers themselves are painless. It is very difficult to demonstrate the tubercle bacillus in this affection. The disease is very chronic, and is best treated by excision and subsequent skin-graftings.



*Describe Thiersch's Method of Skin-grafting.*

Carefully sterilise the skin on the inner surface of the thigh or the upper arm; dip the razor in warm saline solution, and cut uniform strips as long as convenient, the section passing through the tips of the papillæ. Use the razor with a sawing movement.

Apply the strips to the prepared surface, taking great care that the strips overlap each other, and also overlap the margins of the wound. Lastly, provide a dressing of gauze. If the wound be granulating, a piece of perforated green protective must be provided. Change the dressing every fourth day until the grafts firmly adhere, then replace with a dressing of weak boracic ointment.

## GANGRENE.

*Classify the Causes leading to Gangrene.*

- |                                                |   |                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a) From interference with the vascular supply | { | <ol style="list-style-type: none"> <li>1. Ligation of arteries.</li> <li>2. Pressure of splints, tight bandages, etc.</li> <li>3. Diseases of the arterial walls, <i>e.g.</i> arterio-sclerosis and endarteritis obliterans.</li> <li>4. Changes in the composition of the blood, <i>e.g.</i> in diabetes.</li> <li>5. Embolism.</li> <li>6. Raynaud's disease.</li> </ol> |
| (b) Thermal . . . . .                          | { | <ol style="list-style-type: none"> <li>1. Burns.</li> <li>2. Frost-bite.</li> </ol>                                                                                                                                                                                                                                                                                        |
| (c) Chemical . . . . .                         | { | <ol style="list-style-type: none"> <li>1. Caustics.</li> <li>2. Carbolic acid.</li> <li>3. Ergot, causing constriction of the arterioles.</li> </ol>                                                                                                                                                                                                                       |
| (d) Bacterial . . . . .                        | { | Bacillus of malignant œdema, and bacillus ærogenes capsulatus.                                                                                                                                                                                                                                                                                                             |
| (e) Mechanical . . . . .                       |   | Trauma.                                                                                                                                                                                                                                                                                                                                                                    |



*Mention the Cardinal Signs of Gangrene.*

(1) A change in the colour of the part, becoming black in dry gangrene, and reddish-purple or greenish in moist gangrene.

(2) Coldness.

(3) Anæsthesia.

(4) Absence of pulsation.

*Describe Raynaud's Disease.*

It is a nervous affection; there is first vaso-motor spasm so that the part is pale and bloodless. Intense pain and coldness accompany the spasm. This stage is called "**local syncope**" or the "dead-finger" stage. It is followed after a longer or shorter period by excessive dilation of the blood-vessels so that the part becomes dark in appearance. It is probably the second, or congestive, stage that kills the part. The disease mainly affects the fingers, toes, and lobules of the ears.

*Give the Main Features of Senile Gangrene.*

Senile gangrene is predisposed to by arterio-sclerosis of the arterioles; the exciting factor is usually some trauma, often of the most trivial nature. It most commonly begins on the foot, especially on the big toe. The premonitory symptoms are (a) cold feet, (b) tingling and insensitiveness, the patient feeling as though he were walking on feathers or cotton wool. The condition spreads very slowly over the foot and then up the leg, affecting the anterior more than the posterior aspect. A line of demarcation tends to form in the vicinity of a joint, owing to the free vascularity present. The dead part is first pale, then of a yellowish waxy tint, and lastly black. In the early stages the foot is greasy to the touch owing to the disintegration of the fat cells. In addition to the cardinal signs of gangrene previously mentioned, the patient suffers from severe neuralgic pains, which by preventing sleep, seriously impair his general health. It is well to remember that glycosuria is often present in cases of senile gangrene.



*Give the Treatment of Dry Gangrene.*

Carefully cleanse the part, avoiding strong antiseptics and too great friction, Next dehydrate with alcohol and wrap up in a plentiful supply of cotton wool. Slightly elevate the limb on a pillow. Support the patient's strength. Morphia will be necessary to insure sleep and freedom from pain.

In feeble individuals don't wait for the formation of a line of demarcation, but amputate early through the knee-joint (Miller) or immediately above it (Gritti-Stokes). When cutting the flaps see if the superficial tissues bleed readily; if they merely ooze, amputate at a higher level.

*Describe Pre-senile Gangrene.*

This form of dry gangrene usually occurs before the age of forty. A common predisposing cause is syphilis. The condition commences as an endarteritis, affecting the smaller arteries, and gradually extending up to the larger trunks. The legs are involved more commonly than the arms. The premonitory symptoms are slowing of the arterial stream, muscular cramps, and cyanosis of the parts after exertion, the symptoms disappearing when the limb is rested. The term "intermittent claudication" is often applied to this phenomenon. Before the actual onset of gangrene, reversing of the circulation at the apex of Scarpa's triangle should be tried.

*What are the Features of Carbolic Acid Gangrene?*

Weak solutions of carbolic acid when applied to the fingers and toes of women and children are very apt to cause dry gangrene. The carbolic acid destroys the blood corpuscles (hæmolysis), thrombosis follows, and thus the blood supply is cut off from the part. Carbolic acid is an anæsthetic, hence the onset is painless. The dead part gradually assumes a dark leathery appearance.



## EMBOLIC GANGRENE.

*What are the Characters of Embolic Gangrene?*

The condition occurs suddenly, with great pain at the place where the embolus has been arrested. The limb is pale, and hence the name "white gangrene." Subsequently it takes on the appearance of dry or moist gangrene, according as to whether or not the part remains aseptic.

*Mention the Chief Points in connection with Diabetic Gangrene.*

1. It usually commences after fifty years of age.
2. It begins fairly slowly.
3. Œdema, purple appearance, great pain, and the dead part remains warm for a considerable time.
4. Very offensive odour.
5. A great tendency to become moist.
6. The deeper tissues are affected more than the skin.
7. The prognosis is very grave as diabetic coma often follows operation.

*What are the Bacterial Varieties of Gangrene?*

- (a) Acute infective gangrene.
- (b) Malignant œdema.
- (c) "Gas" gangrene.
- (d) Cancrum oris.

*Describe Acute Infective Gangrene.*

Acute infective gangrene may follow either a trivial injury such as a scratch, or a severe trauma. The gangrene is brought about by the action of toxins produced by the virulent pyogenic bacteria which have entered the wound. The part rapidly becomes swollen, dark purple in colour, offensive in odour, and often bullæ containing putrefactive gases form on the surface. Superficial lymphangitis extends up the limb from the infected area and the part "crackles" when handled. Constitutional symptoms are always present; the temperature may be either elevated or sub-normal, and the pulse is rapid and feeble. The only treatment is high amputation.



*Give the Features of Malignant Œdema.*

This is a very virulent variety of acute gangrene caused by infection with the bacillus of malignant œdema. The specific organisms are found in dung, soil, etc., and are anaerobic in character. The superficial parts of the limb are chiefly affected. They are marbled, swollen, and contain gas. The skin is covered with bullæ, and the whole part has a very "heavy" odour. Marked constitutional reaction quickly occurs. The prognosis is extremely grave. High amputation should be performed as early as possible.

*Describe "Gas" Gangrene.*

"Gas" gangrene is a form of acute emphysematous gangrene of great importance in military surgery. The slightest wound, especially shrapnel ones, contaminated by the earth from cultivated fields, is liable to be followed by this great scourge. The specific organism is usually the bacillus aerogenes capsulatus. The superficial tissues are mainly affected, and the signs closely resemble those of malignant œdema.

*What is the Treatment of "Gas" Gangrene?*

With scissors clip away all necrosed tissues, and remove any foreign bodies present in the wound. Open the wound freely and forcibly infiltrate the tissues on the proximal side with hydrogen peroxide, potassium permanganate, or "hypochlorite" solution. Establish free drainage. If the gangrene continues to spread, amputation will be necessary.

*Describe "Trench Feet."*

This is a condition often occurring in soldiers who have been exposed to a combination of cold and wet. The wearing of tight puttees, by interfering with the circulation, strongly predisposes to the disease. Men who are susceptible to chilblains are specially liable to develop "trench feet." In mild cases, one or both feet become swollen on the dorsal aspect; the toes are congested and blisters appear. In more severe cases ulceration occurs, the feet are cold, pulsation in



the dorsalis pedis artery is very difficult to detect, and the skin is insensitive. At this stage gangrene often supervenes. The condition is extremely painful. The treatment consists in wrapping the affected feet in cotton-wool and elevating them upon a pillow. Sleep is ensured by means of morphia.

## WOUNDS.

*What are the Varieties of Contusion ?*

1. The skin only affected—ordinary bruise.
2. Extravasation into the areolar tissue.
3. Subcutaneous laceration of the soft parts, as muscles, vessels, nerves, and tendons.

*What are its Causes ?*

1. Direct pressure.
2. A direct blow.
3. An indirect blow—*e.g.* a bruise of the hip-joint, from a fall on the feet.

*What are the Signs of Contusion ?*

The leading signs are—shock, pain, and swelling, with discoloration. Pain depends on the amount of nerve injury. Swelling may arise from rapid serous effusion, from extravasation of blood, or from inflammation.

*Describe the Progress of Contusion.*

The repair of a bruise is generally complete, the blood-clot becoming organised or re-absorbed, the blood pigment passing through various colour changes, bluish-black, greenish, and yellow. The repair may be incomplete from the formation of a blood cyst, or from the occurrence of inflammation.

*Name the Possible After-Consequences.*

Blood-cyst, inflammation and abscess, contraction of the parts,—*e.g.* of the ear after hæmatoma, long continued pain and tenderness, paralysis of nerve or muscle, and various painful conditions.



### *What is the Treatment?*

Rest, and the avoidance of inflammatory causes in recent cases. In the case of "blood-cyst" it may be necessary to puncture with a trocar, and in some cases a free incision may be necessary.

### *What are the chief Varieties of Wounds?*

1. **Incised**, characterised by the length being greater than the breadth, pain, bleeding, and gaping.

2. **Lacerated** or contused, characterised by irregularity of the surface and edges, and the comparative absence of bleeding; there is, however, a tendency towards sloughing, and risks from shock, tetanus, and infective gangrene.

3. **Punctured**: the depth is greater than the length or breadth; it passes *through different layers of tissues*, so that it may bleed into the tissues, or internally into some cavity.

### *Why are Punctured Wounds especially Dangerous?*

1. Organisms are carried deeply into the tissues.
2. Large blood-vessels may be incompletely divided.
3. Viscera may be perforated.

### *What are the Indications for Treatment?*

1. Stop the bleeding by ligature, etc.—*i.e.*, artificial arrest.
2. Remove foreign bodies.
3. Bring the **edges** and **surfaces** into apposition by sutures and elastic pressure, *but avoid tension*.
4. Drain well to remove serous or other discharges.
5. Keep the muscles at rest by splints or position—usually flexion with elevation.
6. Keep the part aseptic.

### *What are "Stitches of Coaptation"?*

Stitches, either continuous or interrupted, which are used to approximate the skin edges of a wound. They should be removed in 10 to 14 days. Michel's clips are a mechanical substitute for these stitches.

*What are "Relaxation Stitches"?*

Interrupted stitches, which are sometimes introduced to take the strain off the coaptation stitches. They are withdrawn about the 5th day.

## BURNS.

*Name the Six Degrees.*

- 1, Redness or erythema.
2. Blistering or vesication.
- 3, Partial destruction of the true skin,
4. Complete destruction of the true skin.
- 5, Destruction of fasciæ and muscles,
- 6, Charring of bones.

Note that the **Third Degree** is very painful. It usually heals rapidly, leaving a visible cicatrix, but with great contraction or deformity.

*Why is this?*

Because the epithelial cells of the true skin are only **partially** destroyed, so that very soon islets of epithelium spring up in all directions, and rapidly spread over the surface. The great pain is due to the sensory nerves of the skin being **irritated**, but not destroyed.

*How does the Fourth Degree differ?*

There is less pain, as the sensory nerve-endings are destroyed, but in healing there is usually great deformity and contraction, as the epithelium is entirely destroyed.

*What are the Causes of Burns?*

1. Dry heat = a BURN.
2. Moist heat = a SCALD.

*Give the Prognosis in the case of Burns and Scalds.*

This depends—

1. On age; it is bad in the young or old.
2. The amount of surface involved and the depth of the burn.



3. The situation of the burn ; it is bad over large cavities, as the abdomen or thorax, and is very dangerous on the neck as œdema of the glottis may ensue.

*What are the Constitutional Symptoms ?*

*First Stage*—This stage lasts about two days. There is an absence of pain and the features are those of shock.

*Second Stage*—This is the stage of reaction and inflammation and occupies from five to twelve days. The features are :—

- (a) Fever—a temperature of 102°-104° F.
- (b) Inflammation of internal organs, especially the brain, lungs, and abdominal viscera.
- (c) Albuminuria in severe burns.
- (d) Perforating ulcer of the second part of the duodenum sometimes occurs.

*Third Stage*—This is the stage in which sloughs separate and healing commences. No definite time limit can be assigned to this period. During this stage hectic fever, erysipelas, pyæmia, or waxy disease may occur in addition to the visceral lesions found in the second stage.

*What Post-mortem Lesions are found in Deaths from Burns ?*

- 1. Congestion of the thoracic and abdominal organs.
- 2. Degeneration of the cells of the solar plexus.
- 3. Small hæmatomata in the tissues.
- 4. Enlargement of the spleen.

*Give the Treatment of Burns.*

**I. Constitutionally—**

*First Stage*—Stimulants (cautiously) ; warmth.

*Second Stage*—Stop stimulants ; aid excretions and open bowels.

*Third Stage*—Feed generously ; watch for and treat complications as they arise.

**II. Locally—**

Wash affected parts with boracic lotion (warmed to blood heat) ; snip away the raised epithelium from the blisters.

Apply dressings of lint wrung out in watery solution of picric acid. Support with splints, etc. The third stage is treated as a healing ulcer. Skin grafting is often necessary to prevent extensive cicatricial contraction.

*Give a Formula for Picric Acid Applications.*

Thomson and Miles recommend the following—

|                  |   |   |   |   |   |        |
|------------------|---|---|---|---|---|--------|
| Picric acid      | - | - | - | - | - | 3ifs.  |
| Absolute alcohol | - | - | - | - | - | 3 iii. |
| Distilled water  | - | - | - | - | - | 3 40.  |

## BACTERIAL DISEASES.

*Enumerate the Important Surgical Bacterial Diseases which affect Wounds, also give their Incubation Periods.*

|             |                                          |
|-------------|------------------------------------------|
| Erysipelas  | . 15-60 hours.                           |
| Diphtheria  | . 2-7 days.                              |
| Anthrax     | . 12 hours-4 days.                       |
| Glanders    | . 3-5 days.                              |
| Tetanus     | . 4 days, but may extend to 21 days.     |
| Hydrophobia | 14 days-8 months, average about 40 days. |

*Give the Chief Varieties of Erysipelas and its Clinical Features.*

The usual initial symptoms are headache, vomiting, and pain in the loins. A feeling of chilliness is noticed, or a definite rigor may occur. Delirium is often present, and a mild leucocytosis.

Temperature, 103° F.

Pulse, 98.

Respiration, heavy.

Gastro-intestinal disturbances, constipation, want of appetite, dirty tongue, etc.

### Locally.

The affected area is florid in appearance, slightly raised above the surface, smooth, and presents scattered bullæ filled with clear serum. It is hot and tender on palpation.



Just external to the florid area is a zone which is extremely sensitive.

Superficial lymphangitis occurs in the lymphatics leading from the spot.

The clinical varieties of erysipelas are :—(a) facial ; (b) neonatorum and (c) puerperal.

*What Complications may occur ?*

1. Meningitis and sinus thrombosis.
2. Œdema glottidis.
3. General toxæmia.
4. Diffuse cellulitis.

*How would you Diagnose “Erythema” from Erysipelas ?*

Its symptoms, both local and general, are less severe, and it never leads to deep-seated suppuration or the formation of sloughs. It is very often symmetrical, and there is a marked tendency to slight cutaneous hæmorrhage—*e g.*

**Erythema Nodosum.**

*Give the Appropriate Treatment of Erysipelas ?*

**Local.**—Paint several coats of linimentum iodi in a ring-like manner just in front of the most tender area. For the pain apply lead and opium fomentations or 15% ichthyol ointment.

**General.**—Attend to the bowels, kidneys, and skin. Quinine in two grain doses every four hours is a useful drug. The patient should be kept on a fluid diet.

*Describe Actinomycosis.*

This is a chronic condition caused by a fungus, the streptothrix (ray fungus). The disease is probably conveyed by the husks of barley, and is most common during the harvesting season. The inferior maxilla and the floor of the mouth are usually first affected, and later on, if the disease is not checked, the lungs, stomach, and cæcum.

*Describe its Clinical Features and Diagnosis.*

A painless swelling occurs in connection with the jaw ; the surrounding tissues suppurate ; the pus works its way to the surface, forming sinuses which discharge greenish pus containing groups of fungi resembling sulphur grains. Three or four weeks elapse before the characteristic discharge appears.

The disease has to be distinguished from—(a) a periosteal sarcoma ; (b) a gumma ; and (c) tubercular disease of the lower jaw. The lymphatic glands are not involved.

*How would you treat Actinomycosis ?*

Scrape the affected part with a sharp spoon ; then cauterise and fill the cavity with iodoform gauze. Give iodide of potassium in large doses internally.

A vaccine should be given, and small doses of copper sulphate are very beneficial.

X-rays may be tried.

*Briefly describe Glanders and its Treatment.*

This is a disease caused by the bacillus mallei. It is common in equine animals, but rare in man. Two varieties occur, acute and chronic, the latter being also known as farcy. The chief symptoms are :—

- (a) Abscesses in the lymphatic glands and subcutaneous tissues.
- (b) Pustular eruptions.
- (c) Ulceration and purulent discharge of the nasal air passages.

The treatment consists of excising, if possible, the affected areas, and administering arsenic, strychnine, potassium iodide, and a suitable vaccine.

*What are the Features of Hydrophobia ?*

This disease is caused by an organism communicated by the bite of an animal affected by it—generally a dog. After



a long incubation period the scar shows signs of irritation, and certain definite symptoms ensue. These are :

- (a) Spasmodic affections of the muscles of respiration and deglutition.
- (b) Extreme sensibility of the special senses.
- (c) Excessive mental agitation and terror.
- (d) Fever.

Spasm of the diaphragm causes the "catch" in the breath, and the loud hiccough like a bark. The saliva is very viscid. In MAN, death usually occurs by asphyxia : in the DOG, from exhaustion and paralysis.

Either cauterise the wound or apply pure carbolic acid. Follow this by the Pasteur treatment.

### *Describe Diphtheria.*

The disease is due to the presence of the Klebs-Löffler bacillus. It is spread by contact with affected individuals, and by milk, cats and fowls. Locally a false membrane forms on the fauces, soft palate, and tonsil. From there it may spread :—

- (a) Down the respiratory tract.
- (b) Along the Eustachian tube into the tympanum.
- (c) Through the posterior nares into the nose.
- (d) Up the nasal duct and affect the conjunctiva.

The membrane is composed of epithelial debris, fibrin, blood corpuscles, and organisms ; it has the appearance of a dirty white kid glove.

The organisms do not circulate in the blood, but remain localised. The toxins are conveyed by the blood stream to the spleen where they are converted into tox-albumins. The latter may cause paralysis of the soft palate or hyaline degeneration of the cardiac musculature.

### *Give the Chief Clinical Features of Diphtheria.*

1. Hyperæmia, and swelling of pharyngeal and palatal mucosa.
2. Formation of the false membrane.



3. Enlargement of the upper deep cervical lymphatic glands.
4. Difficulty in deglutition.
5. Asthenia.
6. Fever.
7. Leucocytosis.
8. Dyspnœa, when the larynx is affected.

*How would you obtain Material for Bacteriological Examination in a Suspected Case?*

Three things are required ; a supply of aseptic cotton wool, a test-tube, and a pair of forceps. Sterilise the test-tube and forceps. With a piece of cotton wool, held in the forceps, swab the region of the tonsil endeavouring to secure a fragment of the membrane. Place the soiled swab in the test-tube, and plug it with a fresh piece of wool. Either cultures or microscopical preparations can be made from the swab.

*What is the Treatment for Diphtheria?*

1. Spray the pharynx with peroxide of hydrogen or Condy's fluid.
2. Give anti-diphtheritic serum, the first dose being 3000-4000 units ; half this dose should be given twelve hours later.
3. Liquid stimulating foods, beef-tea, etc.
4. Keep patient isolated.
5. If dysphagia is present it will be necessary to feed the patient through a stomach tube or to employ nutrient enemata.
6. Dyspnœa may call for intubation or even for tracheotomy.

*Describe Anthrax.*

This disease is brought about by the *B. anthracis* or its spores, and occurs in two varieties in man:—(a) as wool-sorters' disease caused by the spores, and (b) as a malignant pustule caused by the bacilli. Only the latter is of surgical importance. Malignant pustule follows a scratch or abrasion



on the arms, face, or neck in workers amongst hides of infected cattle. At the seat of infection a small reddish papule appears; this quickly becomes vesicular, the blister usually containing a sanious fluid. The vesicle ruptures and is replaced by a black scab. Surrounding the scab is a zone of hyperæmia, which later develops new blisters, the latter subsequently forming a scab. Accordingly, a typical malignant pustule when fully developed presents three areas:—(a) scab, (b) vesicles, and (c) hyperæmia and œdema. Malignant pustule is especially dangerous when occurring on the neck or face, as in the former situation, œdema of the glottis commonly follows, and on the face intracranial complications may result from infection *via* the emissary veins.

*Give the Treatment.*

1. Cauterise the wound or paint it with pure carbolic acid.
2. Give Sclavo's serum in 40cc. doses.
3. Attend to the bowels, support the patient's strength, and stimulate.

*Describe Tetanus and its Varieties.*

A disease caused by the tetanus or "drum-stick" bacillus. This organism has its *habitat* in soil, garden refuse, and stable dirt. It is an anærobic organism. The varieties are:—

- (a) Acute or fulminating.
- (b) Chronic.
- (c) Trismus.
- (d) Cephalic.
- (e) Neonatorum.

The clinical features are due to the action of the toxins on the spinal nerve centres.

*What are the Chief Signs and Symptoms?*

1. Trismus, *i.e.* a difficulty in opening the mouth ("lock-jaw").
2. The angles of the mouth are drawn backwards, the *risus sardonicus*.
3. Rigidity of the body, coming on usually in the following order—jaw, neck, anterior abdominal wall,



dorsum of trunk, thorax, and extremities. Patient often assumes an attitude.

**Opisthotonos**—arched backwards; resting on heels and occiput.

**Pleurosthotonos**—curved laterally.

**Emprosthotonos**—arched forwards; chin and knees approximated.

**Orthotonos**—body rigid; statue appearance.

4. Attacks of clonic spasms.
5. Temperature often raised.
6. Mind quite clear.
7. Profuse perspiration.
8. Retention of urine.
9. Obstinate constipation.

#### *What is the Treatment ?*

1. Scrape the wound, and paint with pure carbolic acid.
2. Stimulate the kidneys and open the bowels.
3. Inject 60-80 cc. of anti-tetanic serum into the main nerves leading from the infected area. Repeated smaller doses are given.
4. Chloral and bromides.
5. Chloroform and morphia to relieve the spasms.
6. Injections of weak aqueous solution of carbolic acid hypodermically.
7. Injections of half a drachm of sterilised 25 per cent. aqueous solution of magnesium sulphate into the cerebro-spinal fluid, *via* lumbar puncture, twice daily.
8. Chloretone dissolved in olive oil *per rectum*.
9. Nutrient enemata or feed with a stomach tube.
10. Introduce a catheter early.

## TUMOURS.

### *Define a Tumour.*

A tumour or neoplasm is a new growth which has no physiological function, which grows independently of the rate of the body, and which is neither inflammatory nor of the nature of a hypertrophy.



*What are the Chief Benign Tumours?*

| TISSUE.           | TUMOUR.      |
|-------------------|--------------|
| Osseous           | Osteoma      |
| Dental            | Odontoma     |
| Fibrous           | Fibroma      |
| Mucous            | Myxoma       |
| Fatty             | Lipoma       |
| Cartilaginous     | Chondroma    |
| Neuroglia         | Glioma       |
| Nerve             | Neuroma      |
| Epithelial        | Papilloma    |
| Glandular         | Adenoma      |
| Muscle            | Myoma        |
| Blood vessels     | Angioma      |
| Lymphatic vessels | Lymphangioma |
| Endothelium       | Endothelioma |

*Contrast Benign and Malignant Tumours.*

| BENIGN.                                          | MALIGNANT.                                                                                  |
|--------------------------------------------------|---------------------------------------------------------------------------------------------|
| Usually grow slowly                              | Usually grow rapidly<br>[ <i>N.B.</i> Exceptions—Rodent<br>ulcers and atrophic<br>scirrhus] |
| Encapsulated<br>[ <i>N.B.</i> Exception—Glioma.] | No capsule                                                                                  |
| No metastasis                                    | Tendency towards metas-<br>tasis                                                            |
| No constitutional disturb-<br>ance—cachexia      | Often cachexia                                                                              |
| No recurrence after com-<br>plete removal        | Tend to recur                                                                               |
| No pain                                          | Painful                                                                                     |
| Grow by pushing neigh-<br>bouring tissues aside. | Grow by infiltrating tissues                                                                |

*How would you define the Situation of a Tumour?*

1. It may be attached to the skin.
2. In the subcutaneous tissues.
3. Attached to the deep fascia, or under it.
4. It may be glandular, attached to muscles, nerves, or blood-vessels.

*How could you find out these Points?*

To see if it is fixed to the skin, try to pinch up the skin OVER it—*e.g.* a *sebaceous cyst* is attached at *one point*; a *fatty tumour* is attached by little tags in *radiating lines*; a *scirrhus* is attached in a *flat mass*.

If it lies in the subcutaneous tissues, the skin will move over it, and it will move over the deeper structures.

If attached to the deep fascia, make the fascia tense and try to move the tumour. If under the deep fascia, it will probably be painful when the deep fascia is made tense.

Glandular growths may be recognised by the region where found, and by their shape.

If a part of, or attached to, a **muscle**, throw the muscle into action and feel its edge, and note the relation to and the effect on the tumour.

If attached to vessels and nerves, observe the **position**; presence or absence of pulsation; it will move easily in the transverse direction, but not in the longitudinal. If attached to periosteum and bone, it will not move except with the bone, to which it may also be traced.

## CYSTS.

*Classify Cysts.*

- |                                |   |                                |
|--------------------------------|---|--------------------------------|
| 1. From pre-existing cavities. | { | (a) Retention.                 |
|                                |   | (b) Extravasation.             |
|                                |   | (c) Exudation.                 |
| 2. Of new formation.           | { | (a) Enclosing foreign bodies.  |
|                                |   | (b) Enclosing parasites.       |
| 3. Congenital.                 | { | Dermoids, thyreo-glossal, etc. |



*How would you Diagnose a Cyst?*

By its strict limitation, the absence of lobules, its rounded shape, fluctuation, but without the rim or hard edge of an abscess; if it be a hæmatoma there will be some sign or history of an injury.

*What are the Signs of a Cyst?*

Cysts are known by their spherical or globular shape, smoothness, strict limitation, fluctuation, and slow growth; by the absence of inflammation, and by their locality.

*Describe a Ganglion and its Treatment.*

A ganglion is a cystic growth consisting of a fibrous wall filled with a clear colloid-like fluid. The wall is devoid of an epithelial lining. Ganglia occur in the vicinity of joints, the common sites being the dorsum of the carpus, the dorsum of the tarsus, and the outer aspect of the knee. The clinical features are those of a smooth painless swelling not adherent to the superficial structures, and becoming tense on movement. The condition is most commonly found in washer-women and in athletes.

The best treatment is excision; failing this, transfix the cyst with a piece of silkworm gut, then clip off the ends of the thread, and keep aseptic until the tumour is obliterated.

**LIPOMATA—FATTY TUMOURS.***Give their Characters.*

They usually lie in the subcutaneous tissue, though they may at times spring from the periosteum, but in such rare cases it is likely they are at first fibrous or fibro-cellular. They are ovoid, **with lobulations**, soft and elastic; when the **edge** of the tumour is pressed on firmly, *it slips away from the finger*—this distinguishes it from a cyst. Little tags of fibrous tissue, in radiating lines (between the lobules), attach it to the skin. If a lipoma be grasped by the margins it has a solid feeling, but with the fingers on the surface it gives a distinct sensation of fluctuation. Circumscribed



lipomata most commonly occur on the posterior aspect of the body, in the region of the shoulders. They may also occur in the abdominal wall, or in the inguinal region simulating a hernia. The treatment of lipomata consists in shelling them out from their capsules. Be careful not to leave any tags behind.

*Give the Varieties of Lipomata.*

- (a) Subcutaneous.
- (b) Multiple; these are generally painful, giving rise to adiposa dolorosa (Dercum's disease).
- (c) Subsynovial—arborescent lipoma; really a lipomatosis.
- (d) Submucous.
- (e) Subserous.
- (f) Meningeal; this variety is usually associated with a spina bifida occulta.
- (g) Subperiosteal (parosteal)—a congenital tumour containing muscle fibres—a myo-lipoma.
- (h) Difuse; as in drayman's neck—a lipomatosis not a true lipoma.

## ODONTOMATA—DENTAL TUMOURS.

*Describe Odontomata.*

These are tumours, either solid or cystic, which arise from the dental elements of an imperfectly formed tooth. They generally affect the molar teeth, and are noticed between the ages of twenty-one and twenty-five. They may simulate alveolar abscesses, *i.e.* gumboils, or fibromata (epulis), or exostosis. Suppuration generally occurs in the cystic varieties.

*Classify Odontomata.*

- (a) EPITHELIAL—a multilocular cystic tumour arising from the enamel organ.
- (b) FOLLICULAR—a unilocular cyst arising from the tooth follicle.
- (c) CEMENTOMA—a solid tumour arising from the tooth follicle.
- (d) FIBROUS—arising from the tooth follicle.



- (e) **RADICULAR**—arises from the dental papilla and is connected with the fangs of the tooth.
- (f) **COMPOSITE**—contains elements derived from every part of the embryo tooth.

*How are these Tumours dealt with?*

In the cystic varieties, cut away a portion of the cyst wall, remove any tooth present, scrape out the interior of the cavity, and pack with gauze. The solid forms are excised, and the resulting cavity packed as before.

### **OSTEOMATA—BONY TUMOURS—EXOSTOSES.**

*What is an Exostosis?*

An exostosis is a bony growth *not dependent upon a preceding inflammation*. Muscles and tendons are sometimes ossified, as in “rider’s bone” and various others of the same nature, spurious exostosis. Osteophytes around joints are *dependent upon a preceeding inflamation*, and therefore cannot be called “exostoses.” An exostosis has a similar structure to normal bone, but the Haversian canals run at right angles to the bone from which the exostosis springs.

The varieties are (a) ivory, and (b) cancellous.

*Give the Characters and Position of the Ivory form.*

The ivory are very hard, and are usually found on the flat bones of the skull, sometimes arising from the inner table; they contain no blood-vessels, and are merely covered by the fibrous periosteum. They may also be found on the bones of the face, pelvis, and scapula.

*How would you Treat the Ivory form?*

As a rule they should be left alone, as they are sessile and extremely hard. When exercising injurious pressure, as in the orbit, they should be removed.

*Give the Characters and Seat of the Cancellous Variety.*

They spring from the ends of long bones, as the tibia, fibula, humerus, and femur, near the epiphyseal cartilage; and



therefore they arise during the growth of that part. In this variety the bone is covered by a *layer of hyaline cartilage*, from which the exostosis grows; and for this reason they are sometimes called "*ossifying chondromata*." Over the cartilage is a layer of fibrous tissue, and over this again a *bursa, which often communicates with the neighbouring joint*.

On section of the exostosis, we find,—

1. A layer of fibrous tissue rich in cells.
2. A layer of hyaline cartilage.
3. Osteogenetic cells.
4. Fully-formed bone.

One form is met with on the last phalanx of the great toe beneath the nail (*subungual exostosis*). Spongy exostoses are pedunculated, not sessile like the other form.

It may be necessary to remove a spongy exostosis on account of its size, or because it causes pain.

## ANGIOMATA—VASCULAR TUMOURS.

*Describe Angiomata.*

Two varieties of angiomata occur, namely capillary and cavernous; the latter are most commonly found in viscera, especially the kidneys and liver. The former variety are known as *nævi*. A *nævus* consists of dilated capillaries, arterioles, and venules united by connective tissue.

*Nævi* are classified as :—

- (a) Cutaneous or "Port wine stain."
- (b) Subcutaneous.
- (c) Mixed, that is, partly in the skin and partly in the subcutaneous tissues.

All *nævi* tend to a natural cure, and therefore, it is best to have patience. In about 50 per cent. of cases the tumours disappear of their own accord. They usually either enlarge or shrink at the first dentition, the second dentition, or at puberty.

*Mention the Various Methods of treating Nævi.*

1. Excision.
2. Nitric acid.
3. Igni-puncture, by means of a Paquelin cautery.



4. Electrolysis.
5. X-rays.
6. Radium.
7. Carbon-dioxide snow.

*Describe the Method of Electrolysis.*

- (a) Administer chloroform.
- (b) Introduce the special needles.
- (c) Work with a current of 20-80 milliamperes commencing from zero.
- (d) Keep the positive needle steady, but move the negative needle about.
- (e) Let the current flow for about 20 minutes.
- (f) Withdraw the needles while the current is flowing, but **stop** when the skin is reached.
- (g) Cover the needle punctures with collodion.
- (h) Repeat the treatment at intervals of two months until the patient is cured.

*How would you use CO<sub>2</sub> Snow?*

The snow is compressed into the form of a pencil. Touch the nævus with the snow for not more than 30 seconds; if applied for a longer period sloughing will result. Twelve hours later reaction sets in, and a blister may form. Perfect healing occurs in a few days.

## MALIGNANT TUMOURS.

*Contrast Sarcomata with Carcinomata.*

| SARCOMATA.                                         | CARCINOMATA.                                       |
|----------------------------------------------------|----------------------------------------------------|
| Derived from mesoderm.                             | Derived from ectoderm and entoderm.                |
| Occur in early adult life.                         | Usually begin in late adult life.                  |
| Spread by blood-vessels.                           | Spread by lymphatics.                              |
| Blood-vessels are inter-cellular. Highly vascular. | Blood-vessels are perivascular; slightly vascular. |

*What are the Varieties of Sarcomata?*

- |                                                                                               |   |                         |
|-----------------------------------------------------------------------------------------------|---|-------------------------|
| 1. Round-celled.                                                                              | { | Small.                  |
|                                                                                               |   | Large.                  |
| 2. Spindle-celled                                                                             | { | Small.                  |
|                                                                                               |   | Large.                  |
| 3. Giant-celled or myeloid or myeloma—really an innocent tumour growing from the bone marrow. |   |                         |
| 4. Alveolar.                                                                                  |   |                         |
| 5. Lympho-                                                                                    | } | Highly malignant forms. |
| 6. Melanotic.                                                                                 |   |                         |

Sarcomata most commonly arise from the bone marrow, periosteum, and inter-muscular septa. They have no definite capsule, but often a false capsule is formed by the condensation of the neighbouring tissues.

*What are the Various Methods of treating Sarcomata?*

- (1.) Complete and free removal when feasible; this is the best treatment.
- (2.) Injection of Coley's fluid, *i.e.* the toxins of the bacillus prodigiosus mixed with those of streptococci. The dose is one quarter of a minim. diluted with sterilised water. The immediate symptoms following an injection are rigor, a temperature of 103°F., malaise, in fact a condition of profound sapræmia. The injections are repeated daily, or thrice weekly if the patient can withstand the toxæmia.
- (3.) X-Rays.
- (4.) Subcapsular enucleation.

*How is Subcapsular Enucleation performed?*

Expose the tumour, incise the false capsule, enucleate the tumour with the fingers, and dry carefully. Then paint the interior with a mixture of pyoktanin, water, phenol, and alcohol. Pack the cavity with sterile gauze, and apply X-rays daily for three or four months.



*Give the Special Features of Melanotic Sarcoma.*

It is a pigmented form affecting the skin and choroid usually. Its *local malignancy* is very slight, but its general malignancy is very great. The cells are spindle-shaped or round, and the pigment usually lies in the cells. It has very little tendency to attack adjacent parts, and it rarely fungates or bleeds; the original growth is often small—a mere *black spot*, perhaps—and yet the whole body may be full of secondary growths. It spreads both by vessels and lymphatics. It has a great tendency to become multiple. It may arise from an irritated mole.

*Classify Carcinomata.*

- |                 |   |                                                                                                                                                                    |
|-----------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (1) SQUAMOUS.   | { | Epithelioma.<br>Rodent cancer.                                                                                                                                     |
| (2) COLUMNAR.   | { | Adeno-cancer.<br>Colloid and mucoid cancer.                                                                                                                        |
| (3) SPHEROIDAL. | { | Encephaloid—where an excess of<br>cells is found.<br>Scirrhus—where an excess of fibres<br>is found.<br>Simplex—where the cells and<br>fibres are equal in amount. |
| (4) PIGMENTARY. |   | Melanotic.                                                                                                                                                         |

*Where is an Epithelioma found?*

It chiefly affects the junction of the skin and mucous membrane, as lips, eyelids, anus, etc.; also warts on the skin, prepuce, scrotum (in workers in soot or paraffin), and tongue. It soon ulcerates; slowly affects the glands, but not internal organs. In soft vascular parts, much exposed to movement, it soon involves the glands—*e.g.* the tongue. It is a disease of advanced life. The characteristic feature microscopically is the presence of “cell-nests.”

*Describe Adeno-cancer.*

This variety of cancer is found on surfaces covered with columnar epithelium, such as the gall-bladder, bile ducts, bowel, etc. It is not highly malignant, and affects the glands at a late period.



*What are the Characters of Scirrhus Cancer ?*

A hard cancer has much stroma ; its section is greyish, with yellow spots, like an unripe pear, and *cupped*. It is extremely hard and undefined. It has all the characters of malignancy, is a disease of advanced life, usually painful, and tends to ulcerate. The usual sites are the breast, cervix uteri, rectum, head of pancreas, and prostate gland.

*What are the Characters of Encephaloid Cancer ?*

It differs from the hard form simply in the greater preponderance and smaller size of the cells, and in possessing a very small amount of stroma. It assumes a globular shape, and is occasionally mistaken for an abscess—*e.g.* in the breast. On section, it is brain-like, varied by degenerative changes and hæmorrhages of various ages. It is soft, and rapidly ulcerates. It occurs at an earlier age than scirrhus cancer.

## NERVES.

*Classify the different Fibres in the Peripheral Nerves.*

1. Those of **deep sensibility** ; they transmit pressure impulses. When motor nerves and **tendons** are severed, deep sensibility is lost.
2. Those of **protopathic** sensibility, *i.e.* the fibres conducting painful and thermal impulses.
3. Those of **epicritic** sensibility ; they conduct tactile and fine thermal impulses.

*How would you test the Sensory Phenomena following Injury or Division of a Nerve ?*

Screen the patient's eyes during the examination.

**Epicritic**—1. Stroke the skin gently with a piece of cotton wool.

2. With a pair of blunt-pointed compasses see if the patient can distinguish the two separate points.

**Protopathic**—1. *Thermal*—test-tubes containing hot or cold water.

2. *Pain*—By a sharp needle.

**Deep Sensibility**—By pressing with a lead-pencil, etc.



*Distinguish between Anæsthesia and Analgesia.*

**Anæsthesia**—Inability to feel tactile impressions,

**Analgesia**—Inability to feel thermal impressions.

*Enumerate the Phenomena following the Complete Division of a Mixed Nerve.*

- |                |   |                                                                                                             |
|----------------|---|-------------------------------------------------------------------------------------------------------------|
| A. SENSORY.    | { | (a) Absence of protopathic sensibility.                                                                     |
|                | { | (b) Absence of epicritic sensibility.                                                                       |
| B. TROPHIC.    | { | (a) Dry skin.                                                                                               |
|                | { | (b) Brittle and furrowed nails.                                                                             |
|                | { | (c) Perforating ulcers may form.                                                                            |
|                | { | (d) Club-shaped fingers.                                                                                    |
| C. VASO-MOTOR. | { | (a) At first the local temperature is elevated, but afterwards it falls, and the limb becomes cold.         |
|                | { | (b) Pallor ; bluish appearance in winter.                                                                   |
|                | { | (c) Angio-neurotic œdema may ensue.                                                                         |
| D. MOTOR.      | { | (a) Paralysis of muscles supplied by the severed nerve.                                                     |
|                | { | (b) Marked atrophy of these muscles.                                                                        |
|                | { | (c) Reaction of degeneration for a time ; later no response to electrical stimulation.                      |
|                | { | (d) Atrophied muscles may be replaced by fibrous tissue, the contraction of the latter causing deformities. |

## SCIATICA.

*What is Sciatica ?*

A neuralgic affection of the great sciatic nerve. It usually occurs in adults of a gouty or rheumatic diathesis. An acute attack may be brought on by exposure to cold or damp, or by over-indulgence in alcohol.

*Give the Leading Symptoms.*

- (a) Shooting or gnawing pain along the line of the nerve ; the pain is worse on movement, especially flexion at the hip joint.
- (b) Tenderness when the nerve is pressed upon, an especially sensitive spot being where the nerve emerges from the pelvis, *i.e.* over the great sacro-sciatic foramen.

*What Conditions simulate Sciatica ?*

1. Pelvic tumours, especially uterine and rectal.
2. Aneurysm of the internal iliac artery, or of one of its branches in the pelvis.
3. Pelvic abscesses.
4. Tubercle of the hip or of the sacro-iliac joint.
5. Arthritis deformans of the hip-joint.

*Give the Treatment.*

- |                    |   |                                                                                                                                                                                                                                                                                                 |
|--------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A. CONSTITUTIONAL. | { | <ul style="list-style-type: none"> <li>(a) Place the patient in bed.</li> <li>(b) Purgatives.</li> <li>(c) Acetyl-salicylic acid ; morphia <b>may</b> be required.</li> </ul>                                                                                                                   |
| B. LOCAL.          | { | <ul style="list-style-type: none"> <li>(a) 100 cc. of normal saline solution may be injected into the nerve-sheath or into the surrounding tissues.</li> <li>(b) A hot-water bottle may be applied over the most painful spot.</li> <li>(c) The knee should be flexed over a pillow.</li> </ul> |

*How would you deal with a Chronic Case of Sciatica ?*

- (a) Massage, passive and active movements.
- (b) Stretching of the nerve, either by operation or by flexing the hip and gradually extending the knee (under an anæsthetic).



- (c) Needling may be tried. Four to six needles are passed through the nerve down to the bone. They are left *in situ* for about twenty minutes.

## TRIGEMINAL NEURALGIA.

### *Describe Trigeminal Neuralgia.*

This condition is most probably due to degeneration occurring in the semilunar (Gasserian) ganglion. The pain is spasmodic and excruciating in character. An attack is brought on by any movement of the jaws, or even by washing the face. Accordingly the face is usually greasy, owing to the patient not daring to cleanse it. The patient is haggard, prematurely aged, and may even contemplate suicide.

### *What is the Treatment?*

1. Build up the general health by means of good food, tonics, strychnine, arsenic, etc.
2. Osmic acid or alcohol may be injected into the nerve trunks. The latter treatment has been very successful.
3. Operative measures may be necessary, even the removal of the Gasserian ganglion. Fortunately the disease is practically always unilateral.

The technique of alcohol injections and the method of removing the semilunar (Gasserian) ganglion are described in Operative Surgery Catechism, Part II.

## BLOOD VESSELS.

### *Distinguish between Arterial, Venous, and Capillary Hæmorrhage.*

1. **Arterial**—the blood is *bright red*, comes in *pulsatile jets*, and pressure on the proximal side controls it.



2. **Venous**—the blood is dark-coloured, flows in a continuous stream, and pressure on the distal side retards it (except in the case of a ruptured varicose vein of the leg).

3. **Capillary**—the blood is intermediate in colour between venous and arterial, and simply oozes slowly from the bleeding part.

*Give the Stages of the Natural Arrest of Hæmorrhage, when an Artery is completely divided.*

1. The artery contracts transversely.
2. It retracts within its sheath.
3. The sheath collapses.
4. The **external** clot forms, and this causes "temporary arrest."
5. Formation of the **internal** clot: this—
  - (a) Protects the external clot, and ultimately
  - (b) Organises, and thus leads to "permanent arrest" of the hæmorrhage.

*N.B.*—If an artery be incompletely divided, the contraction and retraction of its divided fibres only serve to *enlarge* the opening.

*Describe an Aneurysm.*

An aneurysm is a persistent dilatation on the wall of an artery. Two factors enter into its formation:—(a) disease of the vessel wall, *e.g.* syphilis and alcoholism; (b) something which raises the intravascular tension as severe and prolonged mechanical strains. Accordingly, aneurysms are more common in males than in females. The commonest site for surgical aneurysm is the popliteal artery. Four varieties of aneurysm are found—(a) diffuse; (b) fusiform; (c) saccular; and (d) dissecting. In the diffuse and fusiform varieties all the coats of the artery persist in an attenuated form and take part in the swelling, while in the saccular only the tunica adventitia remains. A dissecting aneurysm is one in which the middle coat has been split by the blood stream.



*What are the Cardinal Symptoms of an Aneurysm?*

1. A pulsatile tumour, the pulsations being expansile.
2. Delayed pulsation in the vessel beyond the aneurysm.
3. Pain.
4. Pressure symptoms.
5. A systolic bruit is heard over the sac.
6. Arrestment of pulsation by pressure on the proximal side of the artery.

*What are its Terminations?*

- (1) It may terminate in **death**—
  - (1) By hæmorrhage on the surface or into one of the cavities of the body.
  - (2) By pressure on parts essential to life—*e.g.* in aneurysm of the aorta.
2. It may terminate in **natural cure**—
  - (1) By gradual deposition of laminated clot.
  - (2) By accidental arrest of the blood current.
  - (3) By inflammatory action.

*What Conditions may be mistaken for Aneurysm?*

1. Solid tumours placed over large arteries.
2. An abscess over a large artery.
3. Cysts over arteries.
4. Pulsating tumours of bone.

*How is a Solid Tumour distinguished?*

1. It is movable **in the course of** the artery, and may be separated from the artery.
2. It neither collapses nor is compressible when the artery is commanded on the proximal side.
3. Bruit and thrill are usually absent.

*How is an Abscess or a Cyst distinguished?*

Much in the same way as a solid tumour; there will also be a history that it began as an inflammatory swelling, and that this gradually softened in the centre. **Cysts** are more sharply defined than abscesses, are of a globular shape, and are more movable than an abscess.

*Contrast Aneurysms and Pulsating Tumours of Bone.*

## ANEURYSM.

1. Is situated along the course of some large artery and is sharply defined.
2. The pulsation is felt as a wave passing through the swelling.
3. When the artery on the distal side of the tumour is compressed, the tension in the aneurysm is increased.
4. Aneurysms are movable laterally, *but not in the line of the artery.*
5. When pressure is applied on the proximal side of the aneurysm, the swelling is partly reduced, or collapses spontaneously.
6. Bruit well marked.

## PULSATING TUMOURS.

1. May not be found along the course of a large artery and is not so well defined.
2. The pulsation is simultaneous at every part.
3. Is quite unaffected by the pressure on the distal side.
4. Are immovable as they grow from the bone. There may be signs of malignant disease elsewhere.
5. The swelling remains unaffected.
6. Bruit less marked or wanting.

The X-rays afford valuable assistance in distinguishing between the two conditions.

*Mention the Chief Surgical Methods of treating an Aneurysm.*

1. Ligature of the artery.

(a) Antyllus.

(b) Hunter.

(c) Anel.

(d) Brasdor.

(e) Wardrop.

2. Needling—Macewan's Method.

3. Electrolysis.



4. The Moore-Corradi Method.
5. Introduction of Colt's cages.
6. Excision.
7. Matas' operation (Endo-aneurysmorrhaphy).
8. Injection of gelatin.

*Describe Ligature of the Artery.*

ANTYLLUS --The artery is commanded on the proximal side of the aneurysm, the sac is freely exposed and opened, the clots removed, and the artery ligated immediately above and below the sac.

HUNTER —The artery is tied on the proximal side of the aneurysm at some distance from the sac, *i.e.* at a point where the coats of the vessel are healthy. There should be no large collateral branch between the ligature and the aneurysm, otherwise a thrombus will not form.

ANEL —Dissect down to the aneurysm. Tie the vessel close to the sac *on the proximal side only*, but do not open the sac.

BRASDOR —Tie the artery on the distal side of the aneurysm, and at some distance from the sac, *e.g.* ligature of the common carotid for aneurysm in its lower part.

WARDROP —Ligature one or both of the main branches of the artery on the distal side of the aneurysm, *e.g.* the common carotid or the subclavian, or both, in innominate aneurysm.

*Describe Macewan's Method.*

This method consists in introducing into the sac long fine needles; these have a round head at one end and a sharp point at the other. The points of the needles irritate the wall of the sac at various points, and thus produce a thrombus. They are left for ten minutes at one spot, then



shifted to another spot. A week or a fortnight elapses between each sitting. A small dressing with collodion is applied during the intervals.

*Describe Electrolysis.*

The needles must be sterilised by prolonged boiling, as carbolic acid would destroy the insulating material. The positive pole is introduced into the sac, the negative pole being placed upon a large wet pad, such as a sponge, anywhere near the aneurysm. Be careful that all the exposed part of the needle is in the sac, else the skin will be burnt when the current is turned on. No anæsthetic is required. The current varies from 20-70 milliampères and is allowed to flow for twenty minutes. The treatment is repeated once weekly until the sac becomes hard. It would be futile to introduce the negative pole into the sac as the clot forming around it is frothy and does not organise.

*What is the Moore-Corradi Method?*

Penetrate the aneurysmal wall with a hollow insulated needle. Through the needle introduce about 12 feet of very fine sterilised wire (silver for preference). Attach the positive pole of a battery to the wire and place the negative pole on a broad flat moist sponge anywhere in the vicinity of the aneurysm.

*Describe the Injection of Gelatin.*

The injection of gelatin carries a risk of introducing tetanus bacilli. Gelatin is very difficult to sterilise because too high a temperature destroys its power of bringing about coagulation of the blood.

Five ounces of a 2 per cent. sterilised solution in normal saline is injected into the buttock every three or four days until pulsation ceases in the sac.

*Describe Aneurysm of the Subclavian Artery.*

This is more common in males than in females; is usually on the right side and almost always affects the third part



of the artery. Dock workers and coalheavers are especially liable to it. The chief clinical features are :—

- (a) A pulsating swelling immediately above the clavicle external to the sterno-mastoid.
- (b) Delay in the radial pulse.
- (c) Cough and hiccough from irritation of the phrenic nerve as the aneurysm progresses.
- (d) Irritation followed by pressure upon the lower trunk of the brachial plexus.
- (e) Boring pains from erosion of the clavicle or first rib.
- (f) Œdema in late stages from pressure upon the subclavian vein.

Subclavian aneurysm must be distinguished from a cervical rib growing beneath the subclavian artery.

*Contrast Subclavian Aneurysm and Cervical Rib.*

| SUBCLAVIAN ANEURYSM.                                                      | CERVICAL RIB.                                                  |
|---------------------------------------------------------------------------|----------------------------------------------------------------|
| 1. More common in males.                                                  | 1. More common in females.                                     |
| 2. Usually unilateral.                                                    | 2. Often bilateral.                                            |
| 3. Occurs after the age of forty.                                         | 3. Causes symptoms before thirty.                              |
| 4. Œdema from pressure upon the subclavian vein.                          | 4. Œdema very rare and then of the angio-neurotic type.        |
| 5. Elevation of the arm produces no effect upon the delayed radial pulse. | 5. Elevation of the arm restores the normal radial pulse rate. |

X-ray examination is also useful in distinguishing between the two conditions.

*Describe Axillary Aneurysm.*

As in the subclavian, aneurysm of the axillary artery is more common in males than in females, and usually occurs on the right side. The third part of the artery is the one generally involved first. This aneurysm differs from subclavian aneurysm by (a) growing more rapidly; (b) œdema of the arm at an early stage; (c) irritation followed by pressure on all the chief nerves of the brachial plexus; and by (d) interfering with the movements of the shoulder joints.



*Describe Aneurysm of the Common Carotid and its Symptoms.*

This is the commonest surgical aneurysm found in females. Either the origin or the termination of the artery may be affected. In the lower part of the neck the swelling appears beneath the sterno-mastoid, in the upper part, internal to that muscle. In both cases the pulse in the superficial temporal artery is delayed.

Symptoms arise from pressure upon the :—

- (a) Internal jugular vein.
- (b) Trachea or larynx.
- (c) Œsophagus (in lower carotid aneurysm).
- (d) Bodies of the cervical vertebræ.
- (e) Pneumogastric and sympathetic nerves.
- (f) Recurrent laryngeal (in lower aneurysm).
- (g) Superior laryngeal (in higher aneurysm).
- (h) Hypoglossal (in higher aneurysm).

Aneurysm of the upper part of the common carotid may be simulated by a tumour of the carotid body.

*Describe Inguinal Aneurysm.*

Inguinal aneurysm usually commences in the common femoral and extends upwards to involve the external iliac. In addition to the ordinary signs of aneurysm, there are symptoms resulting from pressure upon the companion vein, the anterior crural (femoral) nerve, and the genito-femoral nerve.

*Describe Popliteal Aneurysm.*

The popliteal artery is the commonest site for surgical aneurysm because (a) the artery is unsupported behind ; (b) it is the termination of a long arterial column ; (c) the artery forks into two equal branches ; and (d) the artery is subjected to repeated slight traumata. Popliteal aneurysm must be distinguished from a pulsating sarcoma of the lower end of the femur (see question on page 38). Symptoms arise from pressure upon the tibial and common peroneal nerves, and the accompanying vein.

*Describe Traumatic Aneurysms and their Treatment.*

These result after punctured wounds of an artery from fire-arms, pieces of glass, fractured bones, etc. There are



two main classes, (a) primary diffuse; and (b) circumscribed. The former is a diffuse hæmatoma which may or may not possess a bruit. The latter variety occurs several weeks after the wound, when the surrounding tissues have been consolidated to form a sac. It is localised, small, hard, and has a bruit.

The treatment of a primary traumatic aneurysm consists in (1) preliminary compression of the artery at some distance from the wound; (2) freely laying open the swelling; (3) searching for the wounded vessel; (4) ligature below and above the perforation; and (5) cross section of all that remains of the wounded artery. To treat the circumscribed form, the aneurysm should be dissected out like a tumour after ligating the artery above and below the injury.

## DEFORMITIES OF THE LIMBS

### *Contrast Infantile Spinal Paralysis and Spastic Cerebral Paralysis.*

|                            | INFANTILE PARALYSIS.              | SPASTIC PARALYSIS.                                     |
|----------------------------|-----------------------------------|--------------------------------------------------------|
| ETIOLOGY -                 | Anterior poliomyelitis acuta.     | Injuries to brain, or meningeal hæmorrhage.            |
| APPEARANCE OF LIMB -       | Flaccid, cold, bluish, powerless. | Rigid, often spasms, warm, normal in colour, powerful. |
| REFLEXES -                 | Lost.                             | Exaggerated.                                           |
| REACTION OF DEGENERATION - | For a time.                       | <i>Nil</i> ,                                           |
| ATROPHY -                  | Marked.                           | Slight, from disuse.                                   |
| TROPHIC CHANGES -          | Readily ulcerates.                | <i>Nil</i> .                                           |
| ATHETOSIS -                | <i>Nil</i> .                      | Often.                                                 |



## UPPER EXTREMITY.

### *Describe Dupuytren's Contraction.*

Dupuytren's contraction is due to a chronic inflammatory thickening of the palmar fascia especially the lateral portions of its digital prolongations. The fat disappears from the affected area, and the fascia becomes adherent to the skin. It is a condition of adult life and affects males more commonly than females. The disease commences as a hard knot in the palm, about the level of the transverse line of flexion, and opposite the root of the ring finger; the digit is then gradually bent into the palm. The little finger is next affected, and is often more bent than the ring finger; the remaining digits usually escape. In the affected fingers the first and second phalanges are flexed, and the terminal phalanx extended. Remember that the *tendons* are not involved in the disease.

### *What is the Treatment?*

1. Operative { Free dissection of the palmar fascia,  
Adam's operation.
2. Injection of fibrolysin.

1. In Adam's operation introduce the knife at all points where the skin is *not* closely adherent to the fascia, divide the bands and endeavour to straighten the finger. Carry out the treatment in as many places as may be necessary, until the finger can be straightened. Lastly, put up the affected fingers on a dorsal splint for four or six weeks.

2. Two or three cubic centimetres of fibrolysin are injected into the superficial fascia surrounding the affected area. This course is pursued thrice weekly for a couple of months.

### *Describe Madelung's Deformity.*

Madelung's deformity or manus valga is an occupational deformity mainly affecting laundry-maids and pianists. It usually occurs during adolescence. Pathologically, there is



a subluxation of the inferior radio-ulnar joint, and a slight dislocation of the ulna from the carpus. In rickety subjects there is, in addition, a forward curving of the lower part of the radial diaphysis. Viewed from the front, the pisiform and the flexor tendons stand out boldly, while the lower end of the ulna forms a marked prominence on the dorsum of the wrist. Marked pain is generally complained of during the early stages of the condition. The treatment consists in keeping the wrist hyperextended on a suitable splint for a month, together with massage of the extensor tendons. In severe cases osteotomy of the lower ends of both bones of the forearm should be performed.

### *Describe "Winged-Scapula."*

This deformity in the majority of cases follows injury to the nerve of Bell, or to the fifth and sixth cervical nerve roots. The rhomboidei and serratus anterior are paralysed, and therefore the vertebral border and inferior angle of the scapula are displaced backwards. Abduction at the shoulder-joint is only imperfectly performed. The treatment consists in trying galvanism, tonics, and massage. In intractable cases, the insertion of the sternal segment of the pectoralis major should be united to the serratus anterior.

### *Describe Congenital Elevation of the Scapula and its Treatment.*

Congenital elevation of the scapula (Sprengel's shoulder) is a rare deformity probably due to non-descent of the shoulder with mal-development of the embryonic shoulder-girdle. In a great many cases the upper angle of the scapula is connected to the transverse process of one of the lower cervical vertebræ by a fibrous band or even a thin strip of bone.

The following are the main clinical points to be noticed :—  
(a) high position of the scapula with the superior angle nearer to the vertebral column than normally ; (b) shortening of the clavicle on the affected side ; (c) imperfect development of the lower part of the trapezius ; (d) a certain amount of atrophy of the face, neck, and upper part of thorax on the deformed side ; (e) the range of mobility of the arm is



lessened; (*f*) shortening of the levator scapulæ and rhomboidei.

To correct the deformity make an incision in the interval between the scapula and the vertebral column, divide the shortened muscles, and remove any connecting fibrous cord or bony bridge. Keep the shoulder firmly braced backwards and downwards for two or three months.

## LOWER EXTREMITY.

*Give the Etiology of Congenital Dislocation of the Hip.*

According to Hoffa, dislocation occurs early in foetal life, and is due to a deficiency in the amount of liquor amnii.

The condition is most frequently found in females, and it may be unilateral or bilateral.

*Mention the Main Anatomical Changes.*

The acetabulum is very shallow, triangular in outline, and is almost obliterated by fibrous tissue. The femoral head is small, frequently conical, and is usually displaced backwards on the dorsum of the ilium. The angle of the femoral neck is generally lessened. The ligaments are thickened and elongated, and the capsule hour-glass shaped.

All the horizontal muscles of the buttock, *i.e.* gemelli, piriformis, and obturators are stretched, while the hamstrings and adductors are contracted. The glutei are unaffected.

*What are the chief Clinical Features?*

In the majority of cases the condition is not noticed until the child commences to walk.

| UNILATERAL CASES,                                                                           | BILATERAL CASES.                                            |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Slight degree of scoliosis, the concavity being on the dislocated side.<br>Limp on walking. | Well-marked lordosis and prominent belly,<br>Waddling gait. |



In both cases in addition note.

- (a) Great trochanter above Nélaton's line.
- (b) Gluteal folds short and deep,
- (c) Shortening of limb,
- (d) Abduction limited in amount.
- (e) No pain on walking.

*What is Trendelenburg's Test.*

Normally, if a person stand on one leg the buttocks remain on the same level. In **congenital dislocation**, if the patient stand on the affected limb, the buttock of the sound leg is lower, while in **coxa vara**, it is higher than the other limb.

*Give the Treatment of Congenital Dislocation.*

1. By manipulations—the bloodless method of Lorenz.
2. By an open operation, gouging out the acetabulum and replacing the head of the bone.
3. By forcibly pushing the head through the anterior part of the capsule until it is grasped by the rectus femoris, thus converting the previous dorsal dislocation into an anterior one.

In Lorenz's method the child is anæsthetised and placed upon a hard table with the legs hanging free. An assistant steadies the pelvis during the manipulations. Three stages may be described:—

STAGE I.—By gentle traction draw the limb down until the top of the great trochanter touches Nélaton's line.

STAGE II.—(a) Rotate and abduct the limb, kneading the adductors. (b) Flex the hip acutely to stretch the hamstrings. (c) Extend the hip as much as possible to stretch the extensors.

STAGE III.—Flex the hip to a right angle, rotate in, and gently abduct, the great trochanter meanwhile being levered over the acetabulum. The limb is put up in plaster of Paris in the



abducted and externally rotated position. The plaster case should extend from the lower costal margin to the middle of the thighs. After three months the case is removed, the angle of abduction lessened, and a new case applied for six weeks. The angle is again lessened, and a third case fitted for about three weeks. Lorenz's method is useless in bilateral cases after the age of five; in unilateral cases after the age of seven.

*Describe Coxa Vara.*

A condition in which the angle of the neck of the femur is less than normal, which is about  $130^{\circ}$ . The deformity may be either unilateral or bilateral and is chiefly met with in young boys. The commonest period for the deformity is between the ages of thirteen and seventeen. The varieties may be tabulated thus:—

|            |   |                       |   |                                       |   |                                              |
|------------|---|-----------------------|---|---------------------------------------|---|----------------------------------------------|
| COXA VARA. | { | Congenital.           | { | Static.<br>Traumatic.<br>Symptomatic. | { | of late rickets.                             |
|            |   | Infantile or rickety. |   |                                       |   | of tubercular disease.                       |
|            |   | Adolescent.           |   |                                       |   | of arthritis deformans.<br>of osteomyelitis. |

*Mention the Signs of Coxa Vara?*

1. Pain and stiffness on walking.
2. Shortening of the affected leg.
3. Marked prominence of the great trochanter.
4. Great trochanter above Nélaton's line.
5. Slight flattening of the buttock.
6. Adduction of the limb and difficulty in abduction.
7. Toes point outwards.
8. In bilateral cases the legs cross each other, scissors-leg.
9. Tredelenburg's test (see *ante*).



*How would you treat a Case?*

The patient should wear a Thomas' knee-splint or rest in bed with extension. Massage of the hip muscles is very beneficial. When locomotion is hindered a trans-trochanteric osteotomy may be performed.

*What is Genu Valgum?*

Genu valgum or "knock-knee" is a condition in which the leg joins the thigh at an angle opening outwards. It is due to the ossifying junctions of the femur and tibia growing unequally as a result of rickets.

*Give the chief Anatomical Changes.*

1. Shaft of femur is lengthened on the inner side and shortened on the outer side.
2. Patella is often dislocated outwards.
3. Slight degree of coxa vara.
4. Structures on the outer side of the knee, *i.e.*, fibular collateral ligament, biceps tendon, and ilio-tibial band are shortened, while those on the inner side are elongated.
5. Sartorius and gracilis tendons are displaced backwards.
6. Popliteal vessels are displaced outwards.
7. Capsular ligament is loosened.

*What is the Treatment?*

- (a) Treat the rickets—see diseases of bone (Part II,).
- (b) In early cases rest, massage, and douching.
- (c) When deformity exists and the bones are still soft, a light padded splint is fixed on the outer side of the limb.
- (d) When deformity is permanent, an open osteotomy should be performed.

*What are the Agents concerned in maintaining the Arch of the Foot?*

1. The long plantar ligament.
2. The short plantar ligament.
3. The inferior calcaneo-navicular or spring ligament supporting the head of the talus.



4. The plantar fascia.
5. The tendon of the tibialis posterior attached to the tuberosity of the navicular.
6. The tibialis anterior.
7. Last, but not least, the tonic contraction of the muscles of the sole.

*What Change is sometimes met with in the Great Toe in Flat Foot?*

A peculiar straight and rigid condition of the great toe at the metatarso-phalangeal articulation, known as "hallux rigidus."

*Where is Pain chiefly felt in Flat Foot?*

- (a) At the inner and inferior aspect of the foot—over the inferior calcaneo-navicular ligament.
- (b) Across the dorsum of the foot from the pressure of the talus against the navicular.
- (c) On the outer side of the foot, from the pressure of the external malleolus on the calcaneus.

*Mention the Chief Varieties of Flat Foot.*

Congenital, traumatic, paralytic, rachitic, rheumatic, gonorrhœal, and tabetic.

*What is the Treatment of Flat Foot?*

It varies with the stage.

1. In the acute and painful stage, rest till the acute symptoms have passed off. Massage and douching of the feet.

2. When the acute symptoms have subsided, and provided hallux rigidus be absent, the best treatment is the tip-toe exercises suggested by Ellis.

3. If the patient has to *stand* much during the day he should be provided with an artificial arch, such as Whitman's spring, to give him support *while he is standing*. In the evening he should remove the arch and practise foot calisthenics. The artificial arch will not *cure*.



4. In more advanced cases an anæsthetic is given, and the foot is wrenched into position. It is put up in a varus attitude, and fixed in plaster-of-Paris for a time.

5. Where the bones are greatly deformed an osteotomy is performed (Ogston or Gleich).

*Describe Talipes Equino-Varus.*

This is a deformity of the foot, congenital or acquired, in which the sole of the foot looks inwards and the heel is raised from the ground.

Acquired cases are most frequently due to infantile paralysis; the deformity may, however, follow division of the common peroneal nerve.

*Contrast the Congenital and Acquired Forms.*

|                  | CONGENITAL.                                                            | ACQUIRED.                                         |
|------------------|------------------------------------------------------------------------|---------------------------------------------------|
| History          | From birth.                                                            | Paralysis in childhood.                           |
| Feet affected    | Bilateral.                                                             | Unilateral.                                       |
| Circulation      | Normal.                                                                | Limb cold and bluish.                             |
| State of muscles | Slight wasting.                                                        | Marked wasting.                                   |
| Reaction         | Unaltered.                                                             | Reaction of degeneration for a time.              |
| Bone changes     | Structure normal, but shape altered.                                   | Osteoporosis with subsequent alteration of shape. |
| Appearance       | Transverse crease on sole. Pressure scars over the external malleolus. | No transverse crease.                             |
| Trophic changes  | <i>Nil.</i>                                                            | Frequent attacks of chilblains.                   |

*Give the Chief Anatomical Changes.*

### **Muscles.**

1. Extensor tendons displaced inwards.
2. Contraction and shortening of gastrocnemius and soleus.
3. Contraction of the two invertors, namely, the tibiales anterior and posterior.

### **Fasciæ.**

Contraction of—

1. Inferior calcaneo-navicular ligament.
2. Posterior ligament of ankle.
3. Deltoid ligament of ankle.
4. Plantar fascia.

### **Bones.**

1. Cuboid and navicular rotated inwards.
2. Tuberosity of navicular approximated to internal malleolus.
3. Inferior third of tibia rotated inwards.
4. Marked prominence of head of talus and greater process of calcaneus.

*Describe the Treatment of Talipes Equino-Varus.*

**Congenital.**—In early infancy, manipulations, massage, and bandaging the foot in the over-corrected position will suffice. In late infancy, tenotomy of the tendo Achilles and tibialis posterior may be necessary in addition. In advanced and neglected cases division of all the contracted soft parts (Phelp's operation), or cuneiform osteotomy on the outer aspect of the foot (Davies-Colley's operation), or when the equinus element is very marked a wedge may be removed from the talus (Jones' operation).

**Paralytic.**—Either transplantation of tendons, *i.e.* the tibialis anterior into the cuboid or into the fifth metatarsal, and a strip of the tendo Achilles into the outer part of the tarsus, or arthrodesis of all the joints into which the talus enters.



*Where are the Various Tendons divided in Foot Deformities ?*

| TENDON.                                         | PLACE OF DIVISION.                                                                                                            |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Tendo Achilles.                                 | About 1 inch above insertion—from inner side.                                                                                 |
| Tibialis anterior.                              | $\frac{3}{4}$ inch above insertion—from fibular side.                                                                         |
| Tibialis posterior.                             | (a) Above base of internal malleolus. Knife entered from tibial side and cut towards bone.<br>(b) At tuberosity of navicular. |
| Peronæus longus and brevis.                     | Divide together $1\frac{1}{2}$ inch above tip of external malleolus, cutting towards bone from fibular side.                  |
| Extensor proprius hallucis.                     | 1 inch below ankle joint. Don't carry knife too far.                                                                          |
| Extensor longus digitorum and peronæus tertius. | 1 inch below ankle on outer and front aspect. Knife entered from inner side and cut towards the sole.                         |

**DISEASES OF JOINTS.**

*Define the more common terms used in describing Joint Diseases.*

**SYNOVITIS.**—An inflammation of the synovial membrane ; it is generally accompanied by an effusion of fluid into the joints.

**HYDROPS.** —A chronic serous synovitis, in which the effusion of fluid is a marked feature.

**ARTHRITIS.**—This term is applied when the articular surfaces of the bones are inflamed in addition to the synovial membrane. It may or may not be accompanied by an effusion of fluid.

**EMPHYEMA.** —A term sometimes used when the joint is full of pus.

*What are the Varieties of Ankylosis?*

1. Fibrous.
2. Cartilaginous.
3. Osseous.

*Mention some Methods of Treating Ankylosis.*

1. Massage, manipulations, and exercises.
2. Injection of fibrolysin as in Dupuytren's contraction (see *ante*, page 44).
3. Arthrolysis, *i.e.* division of the fibrous bands after opening the joints.
4. Arthroplasty (Murphy's operation), *i.e.* interposing a flap of adipose tissue between the articular ends of the bones. Subsequent movements convert the tissue into a bursal sac.
5. Excision or osteotomy.

## PYOGENIC DISEASES.

*Mention the Organisms which cause Pyogenic Disease in Joints.*

Staphylococci, streptococci, typhoid bacillus, Fraenkel's pneumococcus, and the gonococcus.

*Give the Symptoms and Signs of Acute Arthritis.*

The disease frequently begins with a rigor, the temperature is raised, the pulse quickened, and the general signs of fever are present. Locally the joint is flexed, held rigid, hot and swollen. The skin over the joint is usually reddened. At a later stage fluctuation can generally be demonstrated.

*Give Examples of the Swelling in various Joints.*

In the **knee**, the bulging is highest on the inner side, and is horse-shoe-shaped, round the sides of, and above the patella, between it and the condyles of the femur.

In the **hip**, the bulging is in front.



In the **shoulder**, there is a general roundness between the deltoid.

In the **elbow**, the bulging is at the sides of the olecranon process and beneath the triceps.

At the **ankle**, at each side of the extensor tendons.

In all cases, therefore, it shows itself between bony prominences where the synovial membrane is least supported.

### *What are the Terminations of Acute Arthritis ?*

1. Resolution, with slight impairment of the function of the joint.
2. Fibrous or bony ankylosis.
3. Contracture deformity.
4. Death from septicæmia.

### *Give the Treatment of Acute Arthritis.*

1. Deal with the primary cause if possible.
2. Support and fix the affected limb.
3. Apply hyperæmia by means of Bier's method.
4. Tap or incise the joint when the latter is greatly distended.
5. Constitutional treatment, *e.g.* vaccines or serums; quinine, etc.

### *Describe Gonorrhœal Affections of Joints.*

In infants the joint affection is associated with gonorrhœal ophthalmia; in adults it follows gonorrhœal urethritis, or vulvo-vaginitis. The gonococci reach the joint *via* the blood-stream, and settle upon the synovial membrane. The commonest joints involved are the knee, elbow, ankle, and wrist. The clinical types are :—

- (a) Dry polyarthritis.
- (b) Hydrops—the most frequent manifestation.
- (c) Acute synovitis.
- (d) Suppurative arthritis.

Osseous ankylosis usually follows the suppurative variety.

*Differentiate between Articular Rheumatism and Gonorrhœal Joints.*

| ARTICULAR RHEUMATISM.                                                                                             | GONORRHŒAL JOINT.                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Polyarticular.<br>Wanders from joint to joint.<br>Great improvement with salicylates.<br>No pus threads in urine. | Generally non-articular,<br>Stationary.<br>Pain relieved by salicylates,<br>but no marked improvement.<br>Pus threads in urine. |

*Give the Treatment of Gonorrhœal Joints.*

1. Treat the gonorrhœa.
2. Active or passive hyperæmia.
3. Paint the joint with tincture of iodine.
4. Vaccines may be given at intervals of seven to ten days.
5. In hydrops the joint may be tapped, and one ounce of 1% protargol injected.
6. In the suppurative variety, incise and drain.
7. When the symptoms have subsided, then massage and exercises.

In spite of treatment, however, ankylosis of the joint may follow.

## LOOSE BODIES.

*Mention the Varieties of Loose Bodies found in Joints.*

1. Fibrinous—often known as “melon-seed” bodies.  
They are formed in two ways—(a) from the fibrin in the exuded fluid? (b) as a coagulation-necrosis of the superficial layers of the synovial membrane.
2. Fat, as in the “arborescent” lipoma.
3. Fibrous tissue.
4. Cartilage, in cases of rheumatoid-arthritis.
5. Bone, as in Charcot's disease.



*Give the Signs of Loose Bodies.*

It must be remembered that the typical signs and symptoms of loose bodies are only found in joints which are in other respects healthy. The knee and elbow are the usual sites, and the condition is most frequently met with in young adult males.

The "body" becomes impacted during some of the ordinary movements of the joint, locking it in the flexed position, with sudden sickening pain, the patient falling to the ground. This stiffness may just as suddenly pass off, and it is followed generally by an attack of synovitis. Sometimes the body may be felt moving about. If the "body" is osseous in nature, an X-ray examination may reveal its presence.

*What is the Treatment?*

Open the joint and remove the loose body.

## CHARCOT'S DISEASE.

*What is Charcot's Disease?*

A joint disease occurring in locomotor ataxia, usually in the ataxic stage. The joint affection is said to follow some trauma to the limb. The knee and the hip are the joints most frequently involved.

*Describe the Characters of the Joints.*

(a) In **mild** cases—The joint and the adjacent peri-articular tissues are swollen, painless, insensitive, and of normal colour and temperature.

(b) In **severe** cases—The swelling is greater and the articular ends of the bones become deformed. Hydrops may be present with "melon-seed" bodies. The joint is ungainly and flail-like, and in advanced cases pathological dislocation may occur. Sometimes the articular surfaces of the bones are disintegrated.

## ARTHRITIS DEFORMANS.

*Give the Etiology.*

We have no definite evidence that either gout or rheumatism has any influence in causing arthritis deformans. Many theories have been adduced to explain the disease, the chief being:—

- (a) Traumatic (Arbuthnot Lane),
- (b) Organismal,
- (c) A mild acidosis (Barr).
- (d) A mild form of tubercle (Poncet).
- (e) Auto-intoxication, the common sources being pyorrhœa, leucorrhœa, and fæcal stasis.

*Describe the Morbid Anatomy.*

The morbid changes found vary widely in individual cases. They may be classified—

### (a) CHANGES IN SYNOVIAL MEMBRANE.

These may be—

1. Degeneration into fibrous tissue causing **Arthritis Sicca**.
2. Increased vascularity, resulting in **Hydrops**.
3. Hypertrophy of the synovial villi, forming an **Arborescent Lipoma**.

### (b) CHANGES IN ARTICULAR CARTILAGE.

1. The cartilage becomes fibrillated and ultimately disappears. The extremities of the cartilage, however, grow actively, forming small elevations ("candle-droppings").

### (c) CHANGES IN BONES.

1. The cartilaginous nodules ossify, **osteophytes**.
2. Ossification round the periphery of the capsular ligaments, **lippling**.
3. Sclerosis and polishing of the articular extremities, **eburnation**.
4. Rarefaction of the bone often occurs. Ankylosis is a very rare sequel.



*What are the Clinical Signs?*

The disease usually begins in middle-life. The patient notices that the joint becomes stiff after resting, the stiffness disappearing with movement. On testing the limb, creaking will be a prominent feature. Vague pains are complained of during damp weather. Hydrops may be present; "loose bodies" may form and cause trouble.

Arthritis sicca is commonest in the knee, the vertebral column, the temporo-maxillary joint, and the metacarpal and inter-phalangeal joints. The hand presents a characteristic nodular appearance, Heberden's nodes. Owing to the rigidity of the joints, the neighbouring muscles become atrophied.

*Give the Treatment.*

1. The joint must be kept active, and warm.
2. Hot air baths (active hyperæmia), or Bier's congestion (passive hyperæmia).
3. Chloral hydrate lotions (chloral hydrate, glycerine and water), to relieve any pain.
4. Guaiacol carbonate (Luff).
5. Spas.
6. Arthroplasty, if necessary.

## GOUTY JOINTS.

*What name is applied to Gouty Joints?*

Arthritis urica. Gout is a constitutional disease, in which deposits of sodium bi-urate occur in the joints, especially in the articular cartilage. Later, ulceration of the cartilage may occur.

*Which Joints are commonly affected?*

By far the most frequent joint involved is the metatarso-phalangeal joint of the big toe. Other joints which are often attacked are the fingers, ankle, knee, and wrist.

*What are the Signs and Symptoms of an Attack?*

A sudden onset of severe pain localised to the affected joint, the latter looking red and shiny. Swelling occurs, and the superficial veins are dilated. The patient's temperature is raised, and his temper suffers.

*Give the Treatment.*

Opium and belladonna lotions; passive hyperæmia; suitable medical measures.

*Describe Pneumococcal Joint Disease.*

Pneumococcal joint disease may manifest itself as a synovitis or as an acute arthritis involving all the structures of the joint, and leading to disorganisation. Although the disease may be polyarticular, the condition usually only affects the knee-joint. Children as well as adults are liable to it. The diagnosis is confirmed by aspiration of the suspected joint. The condition is treated like any other pyogenic arthritis, recourse being had in addition to pneumococcal vaccines.

*Describe Tubercle of Joints.*

The tubercle bacilli are most commonly of the bovine type, and enter the body mainly *via* the alimentary canal. They reach the joints either by the blood-stream or from the eruption of a tubercular osteomyelitis of an adjacent bone. The disease commences either in the synovial membrane or in the bones. In adults it generally attacks the membrane first, in children, the bones. In the hip-joint, the disease most commonly affects the bones first; in the shoulder, the synovial membrane first. The following are the joints of the extremities:—

SHOULDER.—Synovial origin.

ELBOW. —Most commonly synovial; if of osseous origin, the focus usually commences either in the neck of the radius, the posterior aspect of the



metaphysis of the humerus, or immediately below the lesser sigmoid cavity of the ulna.

WRIST. —Usually synovial; if of osseous origin, the focus is generally found on the back of the lower end of the radius.

HIP. —Most commonly osseous (*see post*).

KNEE. —Either synovial or osseous; if the latter, the focus is found in the region of the trigone.

ANKLE. —Most commonly synovial; when osseous, the focus generally occurs on the upper surface of the neck of the talus (astragalus).

*Give the Main Types of the Disease.*

- (a) Diffuse thickening of the synovial membrane together with degeneration of the periarticular tissues—**White Swelling.**
- (b) Chronic synovitis — **Tubercular Hydrops.** In some cases tubercular pus may accumulate in the joint forming a **Tubercular Empyema.**
- (c) Caries of the articular surface, followed by abscesses and sinuses—**Tubercular Arthritis.**

## HIP-JOINT DISEASE.

*Describe Hip-Joint Disease.*

Tubercular disease of the hip-joint most commonly occurs before the age of ten. It generally commences in one of the articular surfaces, either the posterior aspect of the neck of the femur, or at the attachment of the ligamentum teres to the floor of the acetabulum. Subsequently absorption ensues, the head of the femur becoming markedly flattened and attenuated, while the acetabulum extends upwards and backwards ("wandering acetabulum"). The inguinal glands on the diseased side are frequently enlarged and may suppurate; the venous return may be thus interfered with and cause marbling of the skin.



*What are the Clinical Features?*

Three stages are described:—

STAGE I.—There is usually a history of injury to the joint. The patient complains of pain, and walks with a slight limp, dragging the affected limb. *Limping at first is usually intermittent.* The pain may be referred to the knee-joint.

On examination, notice slight flattening of the buttock, and perhaps a loss of the gluteal fold. Owing to the contraction of the surrounding muscles, hyperextension, abduction, and rotation are diminished. *For detecting limitation of rotation, flex the hip to a right angle.*

STAGE II.—The patient presents a characteristic attitude, the affected limb being **flexed, abducted, and everted.**

Due to the tilting of the pelvis there is apparent lengthening of the same leg.

[*N.B.*—To demonstrate the obliquity of the pelvis draw a horizontal line joining the anterior superior iliac spines, and a vertical line from the umbilicus to the symphysis pubis; the two lines will *not* meet at right angles.]

Lordosis of the spine is present. This can be tested by laying the patient flat upon a table, and on flexing the diseased hip the lordosis disappears, returning, however, when the hip is again extended. To demonstrate the degree of flexion, employ Thomas' test. Lift up the sound thigh, the lordosis disappears and flexion occurs on the affected side; the angle of flexion is the angle between the diseased thigh and the table.

STAGE III.—Starting pains at night are generally present. The patient's diseased limb is **flexed, abducted, and inverted.** Apparent or real shortening is found. Real shortening may be due to:—



- (a) A diminution in the angle of the femur with atrophy at the head and neck.
- (b) A wandering acetabulum.
- (c) Retarded growth on that side.

In this stage the patient is extremely ill and emaciated. Abscesses may form in either the second or third stages. They may point in front, reaching the skin at the anterior border of the tensor fasciæ femoris, or may gravitate backwards and appear behind the great trochanter, or along the lower edge of the glutæus maximus.

*What has Hip-joint Disease to be diagnosed from?*

- (a) Coxa vara.
- (b) Congenital dislocation of the hip.
- (c) Disease of the sacro-iliac joint.
- (d) Pott's disease with psoas abscess.
- (e) Tubercle of the great trochanter of the femur.

*Give the Treatment of Hip-joint Disease.*

Conservative measures should be tried first, and persevered with for a considerable time.

(a) The child is kept in bed, and the limb extended with a suitable weight and pulley. Remember that weight extension must be applied in the line of the deformity or pain will result. When extension fails to correct the deformity, tenotomy of the contracted adductors must be performed.

(b) Later, the patient is fitted with a Thomas' hip-splint, and a patten applied to the sound limb.

(c) Tuberculin treatment.  $\frac{1}{10000}$ th of a milligramme is injected subcutaneously every ten days. The dose is gradually increased until the patient is receiving  $\frac{1}{1000}$ th of a milligramme every ten days. Give the latter dose for about four months. Children **under** the age of ten should receive half of the above doses. (d) Open-air treatment. Where conservative measures fail then an incision should be performed, preferably by the posterior route.



## VENEREAL DISEASES.

### GONORRHŒA.

*Describe the Organism causing Gonorrhœa.*

The gonococcus is a diplococcus, the cells having a peculiar kidney-shaped appearance, with the concave surfaces in apposition. The organism is Gram-negative, but is easily stained by any aniline dye. The gonococci are mainly found in the pus cells, and in the epithelial lining of the urethra.

*Give the leading Clinical Features.*

The incubation period varies from three to seven days. Usually the first symptom is itchiness about the meatus, followed by a scalding sensation during micturition. In the course of a few hours a discharge appears, at first clear mucus, then pus. The pus is generally of a greenish colour. On examination it will be noticed that the lips of the meatus are congested and swollen. During the night the patient may suffer from chordee. After a period of ten days to a fortnight, the acute symptoms generally subside, and only the discharge remains. The latter persists for several weeks, gradually becoming more mucoid and less purulent. In certain cases the discharge does not disappear—gleet.

*Mention the Chief Complications of Gonorrhœa.*

- (1) Cystitis, prostatitis, vesiculitis, and epididymitis.
- (2) Inflammation of inguinal lymphatic glands—gonorrhœal bubo.
- (3) Arthritis and teno-synovitis.
- (4) Peri-urethral abscess and abscess of Cowper's glands.
- (5) Proctitis, most commonly in females.
- (6) Affections of the eye, central nervous system, and heart.



*Describe the Treatment of Acute Gonorrhœa.*

- A. GENERAL (1) Rest in the recumbent position.  
 (2) Support the external genitals with a pair of tightly-fitting bathing-drawers.  
 (3) Keep bowels open with salines.  
 (4) Keep patient on a milk-diet; *red meat and alcohol* are absolutely contra-indicated.  
 (5) Barley-water, or Contrexéville water should be drunk freely.  
 (6) Sandal-wood oil, copaiba, cubebs, etc., may be given.

B. LOCAL.—Either venous congestion may be employed, or urethral injections given.  
 Venous congestion is carried out by means of Klapp's suction bell.  
 The substances usually given as injections are either potassium permanganate, zinc chloride, or protargol.

*How is Protargol given as an Injection?*

After the patient has urinated,  $\text{Ziii}$  of a 1 per cent. solution of freshly-prepared protargol are injected by means of a special urethral syringe. The glans penis is tightly held for ten minutes. The patient should inject thrice daily.

If the posterior urethra becomes involved, **stop** all injections immediately.

*Describe Gleet.*

Gleet is often called chronic gonorrhœa. In the majority of cases it is due to a chronic catarrh of the prostatic follicles; it usually occurs in neurotic individuals.

The main symptoms and signs are—

- (a) Glueing of the lips of the meatus.  
 (b) A scanty muco-purulent discharge, best observed in the morning.

(c) A slight amount of pus and "threads" in the first portion of urine passed, when examined by the "two-glass" test, and

(d) Signs of neurasthenia.

It must be remembered that it is very difficult, in fact often impossible, to demonstrate gonococci in a gleet discharge.

### *What is the Treatment for Gleet?*

The course of treatment will be very prolonged. Attention must be paid to the general health, a change to the sea-side being especially beneficial. The prostate must be systematically massaged twice weekly. Instillation of the posterior urethra with  $\text{AgNO}_3$ — $\frac{1}{10.000}$  may be necessary.

## CHANCROIDS.

### *What are Chancroids?*

Chancroids or soft sores are due to the action of a small organism called Ducrey's bacillus. The incubation period varies from two to six days. In males the sores are principally found in the region of the frænum; in females on the labia minora. The sores appear as small ulcers, intensely inflamed, and possessing clean-cut edges. They are **not** indurated; are painful and are multiple. The inguinal lymphatic glands are frequently involved and often suppurate, buboes.

### *Give the Treatment of Chancroids.*

Wash with  $\text{H}_2\text{O}_2$ , and dust with a powder made up of equal parts of zinc carbonate and boracic acid. Cover up the sores with a small piece of gauze. A bubo should be treated with a Klapp's suction bell; if pus forms, open the bubo and continue passive hyperæmia.



*Contrast Chancres and Chancroids.*

|             | CHANCRES.                            | CHANCROIDS.                                       |
|-------------|--------------------------------------|---------------------------------------------------|
| Incubation. | 3-4 weeks.                           | Under 6 days.                                     |
| Number.     | Single.                              | Multiple.                                         |
| Origin.     | An erosion, papule,<br>or ulcer.     | Pustule or open<br>ulcer.                         |
| Shape.      | Irregular, sloping<br>edges.         | Round or oval with<br>sharply - defined<br>edges. |
| Depth.      | Superficial erosion.                 | Perforates the whole<br>thickness of the<br>skin. |
| Floor.      | Copper or "lean of<br>ham" coloured. | Yellow or whitish<br>grey.                        |
| Discharge.  | Scanty and sanious.                  | Abundant and puru-<br>lent.                       |
| Margins.    | Circumscribed and<br>indurated.      | Rarely indurated.                                 |
| Glands.     | See <i>ante</i> .                    | See <i>ante</i> .                                 |

**SYPHILIS.***What is Syphilis?*

An infective disease carried by an organism, the *treponema pallidum* (*spirochæte pallida*). The virus is transmitted *via* the discharge from a specific lesion. Syphilis may be *acquired* or of *congenital* origin. The organism is readily found in the primary and secondary stages, but only with great difficulty in tertiary manifestations.

Remember that in individuals suffering from syphilis, all *physiological* secretions are innocuous, but all *pathological* discharges are contagious.

*Give the Life-cycle of the Spirochæta.*

The sporozoite or infective granule is motile, and enters a mononuclear leucocyte; the sporozoite then splits into two,



one half forms an irregular coil which subdivides into shorter coils, spirochætes, the adult male element. The remaining half of the sporozoite becomes spherical and extracellular. After fertilisation, the zygote divides into sporoblasts, each of which subdivides into sporozoites which start the life-cycle again.

*What is the Prophylactic Treatment against Syphilis?*

The part which has been exposed to infection should be smeared with an ointment containing 25 per cent. of calomel (Metchnikoff). To prove effectual, this measure should be carried out within twenty hours after exposure.

*Describe the Primary Stage.*

Within three to four weeks after infection, a hard chancre appears at the site of inoculation.

The chancre consists of an indurated nodule from which the epithelium frequently disappears, leaving a small ulcer possessing firm edges and an indurated base. On palpation the nodule feels like a piece of cartilage. Usually only *one* lesion is present. [Chancroids or soft chancres are due to an organism named Ducrey's bacillus; they are generally *multiple*.]

The remaining feature of this stage is an infection of the neighbouring lymphatic glands. In a genital chancre the inguinal glands are involved. They are hard (shotty), discrete, freely movable, painless, and if sepsis is absent, do not suppurate.

*Describe the Secondary Stage.*

Unless constitutional treatment has been carried out, secondary symptoms arise in from six weeks to three months from the time at which the disease was contracted. They mainly comprise affections of the skin, lymphatic glands, and in some cases the periosteum of bones. Mild constitutional disturbances such as lassitude and anorexia sometimes occur.



1. A syphilitic rash has the following characteristics :—

- (a) Does not itch.
- (b) Usually found on the flexor aspects of the body.
- (c) Polymorphous ; roseolar, papular, pustular, and rupeal varieties occur.
- (d) At first the rash is the colour of lean of ham.

2. Condylomata. These are papular eruptions occurring in areas where two moist skin surfaces are in contact. The papules coalesce, and later are covered with white sodden epithelium.

3. Hyperæmia of the laryngeal mucous membrane leading to a huskiness of the voice.

4. Falling out of the hair, owing to hyperæmia of the hair-follicles.

5. Mucous patches on the buccal and palatal mucosa.

6. A general enlargement of the lymphatic glands.

7. An evanescent periostitis especially of the frontal bone, the sternum, and the tibiæ.

8. Ocular lesions.

### *Describe the Tertiary Stage.*

Patients who have undergone a complete course of mercurial treatment usually escape the tertiary stage.

Pathologically, two features are found in tertiary syphilis, namely, fibroid induration and gummata. The muscles, viscera, and bones are affected.

Gummata occurring in the subcutaneous tissues frequently break down, forming syphilitic ulcers.

### *Describe Inherited Syphilis.*

Inherited syphilis results if either parent at the time of conception is suffering from the disease in the primary or secondary stages. The child escapes a primary stage. The main features of inherited syphilis are :— .

A. SKIN LESIONS.—A papular eruption mainly confined to the region of the genital organs, the perineum, and the angles of the mouth.



- B. MUCOUS MEMBRANE LESIONS.*—Snuffles, leading to a “saddle-nose,” mucous patches in mouth, stomatitis, and sometimes hyperæmia of laryngeal mucosa.
- C. OSSEOUS LESIONS.*—Prominence of parietal and frontal eminences ; craniotabes ; Parrot’s nodes ; hyperostosis of the shafts of the long bones.
- D. VISCERAL LESIONS.*—Gummata ; enlargement of liver and spleen.
- E. DENTAL LESIONS.*—The child may have Hutchinson’s and Moon’s teeth. Both conditions only affect the permanent teeth. The upper central incisors are peg-shaped and have a crescentic notch in the cutting edge (Hutchinson’s teeth). The first molars are small and dome-shaped (Moon’s teeth).
- F. OCULAR LESIONS.*—Chronic interstitial keratitis ; iritis ; choroiditis, and retinitis. Eye lesions usually develop between the sixth and sixteenth years.

*What is Colles’ Law ?*

An infant suffering from inherited syphilis cannot infect its mother, but may infect a healthy wet-nurse.

*Describe the Treatment of Acquired Syphilis.*

**LOCAL TREATMENT.**— The primary sore is treated by applying a small piece of lint soaked in blackwash. The dressing should be changed twice weekly.

**GENERAL TREATMENT.**—(a) Mercury. This can be given in the form of pills, injections, ointments, baths, vapour, or dusting powders. *Before a mercurial course is entered upon, the mouth and teeth must be carefully attended to.*

(b) Arsenic preparations, as Hectine, Salvarsan, Neo-Salvarsan, etc.

(c) Iodide of potassium is only efficacious in tertiary manifestations.



*Describe Hectine.*

This is a sodium-arsenate preparation. It may be introduced either by the mouth or hypodermically. Orally, one gramme is given daily. When injected, 0·2 centigramme is given, and from four to twenty injections constitute a course of treatment.

*Describe Salvarsan and Neo-Salvarsan.*

These arsenical preparations must not be given if chronic disease, pronounced arterio-sclerosis, or myocardial degeneration is present in the patient. The dose of Salvarsan (606) is ·4 or ·5 grammes injected intravenously; Neo-salvarsan (914), given in a similar manner, has a dosage of 0·9 gramme. Neo-salvarsan dissolves in cold water, forming a neutral solution. The water should be previously boiled and allowed to cool to 30° C. If the preparation oxidises rapidly, toxic products are formed, and oxidation occurs when neo-salvarsan is heated. It requires 20 c.c. of water to dissolve 0·15 gramme of the drug. The advantages of Neo-salvarsan over Salvarsan are (*a*) its ready solubility, (*b*) its neutral reaction, (*c*) a less volume of fluid has to be injected, and (*d*) there are less unpleasant after-effects.

*How is Congenital Syphilis treated?*

Mercury is given either in the form of grey powder or by inunction.

Grey powder is usually prescribed in half-grain doses mixed with a little powdered sugar. A powder should be administered thrice daily. For purposes of inunction, a piece of blue ointment, the size of a pea, is smeared over the flannel binder three times per week. Cod-liver oil with hypophosphites can also be given to improve the general health.





# SURGERY.

## PART II.

---

### INJURIES OF BONES.

*Name and define the Varieties of Fractures.*

1. Simple fracture: a subcutaneous break—*i.e.* without a wound of the soft parts communicating with the exterior.

2. Compound fracture: where there is a communication between the exterior and the broken bone.

Each of the above varieties may be—

(1) Incomplete (“greenstick”).

(2) Complete.

(3) Comminuted.

(4) Complicated.

(5) Subperiosteal.

*What is meant by “Complicated” and “Comminuted”?*

Where the fracture is conjoined with some other injury, as a dislocation, a wound not communicating with the broken bone, rupture of an artery, or visceral injuries. Two of the most common complications are (*a*) rupture of the urethra, in fracture of the pelvis, and (*b*) injury to the lungs in fracture of the ribs.

A comminuted fracture is one where the bone is broken into a number of pieces.

*What is “Greenstick” Fracture?*

Where the bone is bent, with a crack on the convex side, but not broken completely through. This form very often occurs in children, and the **clavicle** is the bone most frequently thus broken. A “greenstick” fracture is usually associated with rickets.

*What is an Impacted Fracture ?*

An impacted fracture is one in which one fragment is driven into the other. Two very common sites for impacted fracture are (a) the lower end of the radius, and (b) the base of the neck of the femur.

*What is a Diastasis ?*

The separation of an epiphysis. It can only occur in the young. The line of separation passes through the ossifying junction or metaphysis, and so the epiphyseal cartilage remains attached to the epiphysis.

*Mention the chief Signs of a Diastasis.*

1. "Muffled" crepitus.
2. A swelling caused by the projection of the diaphysis.
3. Unnatural mobility.
4. Slight deformity.
5. Loss of power.
6. Pain and tenderness along the line of the epiphysis.

*N.B.*—The symptoms resemble those of dislocation more than those of fracture.

*What are the causes of Fracture ?*

The immediate causes are :—

1. Direct violence.
2. Indirect violence.
3. Muscular action ; this is most frequently seen in transverse fractures of the patella.

Remember that in **direct** violence the fracture is usually transverse, and the bone breaks at the **point struck**, while in **indirect** violence the line of fracture is oblique and the bone breaks at the **weakest part**.

*Give the leading Signs of Fracture ?*

1. Swelling.
2. Abnormal mobility.



3. Alteration in the contour of the limb, *i.e.* deformity.
4. Crepitus.
5. Loss of power.
6. Pain.

*How would you proceed to examine a Case of Supposed Fracture?*

1. **Hear** what the patient or his attendants have to say.
2. **Inspect** the injured limb.
3. **Feel** the injured parts.
4. **Measure**, and in all cases compare carefully with the sound limb.

*What are the Causes of Displacement in Fracture?*

1. The force that broke the bone.
2. Muscular action.
3. The weight of the part — beyond the solution of continuity.

*Name some of the Complications of Fractures.*

- (a) Traumatic delirium.
- (b) Fat embolism.
- (c) Hypostatic congestion of the lungs.
- (d) Bed-sores.
- (e) Muscular spasm.
- (f) Hæmorrhage.
- (g) Visceral injuries.
- (h) Dislocations.

*Describe Delayed Union.*

The chief causes of delayed union are general debility, old age, and certain constitutional diseases, *e.g.* tuberculosis, diabetes, etc. Delayed union can be treated in one of several ways.

- (a) By Bier's congestion. An ordinary bandage is applied from the fingers or toes, as the case may be, upwards to a point just below the

site of the fracture. Bier's bandage is fixed around the limb at a point above the fracture, and is kept on for six to ten hours daily, with massage during the intervals between the applications.

- (b) Oil of turpentine may be injected between the fragments.
- (c) The broken ends of the bone may be rubbed together, or
- (d) The fracture may be fixed mechanically (see *Operative Surgery*, Part II).

*What are the Chief Causes of Un-united Fractures?*

- (a) The intervention of periosteum or muscular tissue between the fragments.
- (b) Suppuration.
- (c) Imperfect coaptation of the broken fragments.
- (d) Too free movement of the parts.

Operative treatment is usually called for, the ends of the bones being freshened, and the fragments secured mechanically.

*Under what circumstances should Amputations be performed in Compound Fractures?*

- (a) When it is impossible to secure asepsis.
- (b) When the soft parts are so seriously damaged that their death is very probable.
- (c) When the main blood vessels and nerves have been badly injured.
- (d) When great comminution of the bones has occurred.
- (e) When an artificial limb will be more functionally useful than a healed natural one.



## FRACTURES AND DISLOCATIONS.

### FACE—NASAL BONES.

*Describe Fracture of the Nasal Bones.*

The nasal bones are usually broken by direct violence, and the force is the only cause of the displacement. The fracture is often compound, as the mucous membrane of the nose is often torn. Comminution generally occurs. Subcutaneous emphysema may follow the compound varieties.

*How would you treat a Fracture of the Nasal Bones?*

Mould the broken bones into position by means of a pair of dressing forceps pushed up the nostrils, and the fingers without. When once in position there is no tendency to redisplacement. Union commonly occurs in fourteen to sixteen days.

*What may Result from a blow at the Root of the Nose?*

1. Fracture of the cribriform plate of the ethmoid bone, or of the orbital plate of the frontal, with possible injury to the base of the brain and the olfactory and optic nerves.

2. It may also produce a depressed fracture *into the frontal sinus*, but without injury to the inner table or cranial contents.

3. Injury to the nasal duct or lacrimal sac.

### SUPERIOR MAXILLA.

*How does Fracture occur?*

(a) The outer wall of the antrum may be broken by driving in of the **malar bone**; (b) the nasal process, in injuries of the nose; and (c) the alveolar border during the extraction of a tooth. Fracture usually occurs from great violence, as a kick from a horse, a fall of timber, a blow from machinery in motion, the overturning of a carriage, etc. The fracture is diagnosed by irregularity of the cheek,

alteration of the alveolar line, and prominence of the soft palate.

*Name some of the Complications.*

1. Subcutaneous emphysema.
2. Severe hæmorrhage.
3. Injury to the infra-orbital nerve.
4. Serious brain symptoms, should the fracture extend to the base of the skull.
5. Injury to the nasal duct.

NOTE.—In fracture of the bones of the face necrosis is rare, owing to the free blood-supply.

*How does Fracture of the Zygomatic Arch occur?*

1. From within, when a foreign body which happens to be held within the mouth is thrust outwards.
2. It may break when the upper jaw or malar bone is fractured.
3. By direct injury from without.

The displacement is not great, as the temporal fascia above and the masseter muscle below hold the fragments in position.

## INFERIOR MAXILLA.

*What are the Sites of Fracture of the Inferior Maxilla?*

The inferior maxilla is usually fractured by severe direct violence, the sites being:—

- (a) Near the canine tooth, as at this point the jaw is weakened by the long narrow alveolar cavity as well as by the mental foramen.
- (b) Near the angle.
- (c) At the symphysis (rare).
- (d) Coronoid process (rare).
- (e) Condyle.

The mucous membrane is nearly always lacerated, and so the fracture is generally compound.



*Name the Signs of Fracture.*

Pain; the mouth can scarcely be opened; saliva dribbles from the angles of the mouth; bleeding from the mouth; crepitus; deformity. The teeth are generally displaced; or they may be split, and fall down between the broken surfaces.

*Describe the Displacements of the Bone.*

Displacement is not a marked feature of fracture of the mandible, for at the angle the masseter and internal pterygoid muscles balance each other. When the fracture is near the canine tooth the supra-hyoid muscles tend to pull the inner fragment downwards. If the condyle be separated it is pulled inwards and forwards by the external pterygoid of the opposite side, and the chin points towards the **injured** side.

*How is the Fracture treated?*

1. Mould the jaw into shape, and then keep it fixed against the upper by means of the *four-tailed bandage*; in this way the upper jaw acts as a splint.

2. A chin-cap may be used, moulded from poroplastic, and kept in position by a split handkerchief.

With either of the above an interdental vulcanite or wire splint may be used.

3. Immediate wiring of the broken fragments.

4. In every case the mouth must be kept aseptic with boro-glyceride or Condyl's fluid.

5. The patient is to be fed through the gap between the last molar tooth and the coronoid process.

*How is Dislocation of the Jaw caused?*

It is usually caused by some sudden exertion on the part of the patient, or spasmodic action of the depressors of the jaw, as in gaping, fits of laughter, attempting to take too large a bite, or the extraction of a tooth. The temporo-maxillary articulation only admits of dislocation forwards.



*What is the Mechanism of this Dislocation?*

It is a muscular act, and is the most common *muscular* dislocation. When the mouth is opened, the condyle with the interarticular fibro-cartilage glides forward on to the *eminentia articularis*; but if this be continued too far, and if, at the same time, the *external pteryoid muscle* contracts forcibly, the condyle slips forward into the *zygomatic fossa*, and is then drawn up by the temporal, internal pteryoid, and masseter muscles. The varieties are (a) unilateral or incomplete; and (b) bilateral or complete.

*Give the Clinical Features.*

The mouth is open and cannot be shut; the saliva dribbles; speech and deglutition are almost impossible; depressions are noticed where the condyles ought to be; there are prominences behind and beneath the malar bones.

In the **unilateral** form the symptoms are less marked—the chin inclines to the **sound** side, and there is a depression in front of one ear only.

*How is Reduction effected?*

The surgeon lays his thumbs (protected by a towel) on the last molars of the mandible, and places his fingers firmly beneath the patient's chin. He then forcibly pushes downwards and backwards with his thumbs in order to disengage the condyle, while at the same time he pushes the chin upwards and forwards with his fingers. A four-tailed bandage should be worn for a week or ten days so as to keep the bone in position.

## THE UPPER EXTREMITY.

### CLAVICLE.

*Give the Dislocations of this Bone.*1. At the **sternal** end—

- |     |                         |         |
|-----|-------------------------|---------|
| (a) | Forwards (most common). |         |
| (b) | Backwards               | } rare. |
| (c) | Upwards                 |         |



An upward dislocation can only occur when the rhomboid (costo clavicular) ligament is torn.

In the backward variety, pressure symptoms may result from interference with the trachea, œsophagus, or innominate veins, giving rise to dyspnœa, dysphagia, or cyanosis on the affected side.

2. At the **acromial** end—

(1) Upwards.

(2) Downwards (very rare).

*What are the Sources of Strength of the Sternal End?*

1. The thick expanded end of the bone, and the powerful **ligaments** round about it. It has no muscular or bony strength.

2. The mobility of the scapula.

For these reasons, and also because the force is usually transmitted along the long axis of the bone, a fracture is more common than a dislocation.

*What are the Clinical Features of the Forward Variety?*

The shoulder is displaced downwards, forwards, and inwards; the end of the bone rests in front of the manubrium sterni, and carries its own head of the sterno-mastoid muscle with it. Rigidity, absence of crepitus and alteration of the bony points are additional features.

*How would you treat it?*

1. A pad in the axilla, to overcome the inward displacement.

2. A figure-of-eight bandage round the shoulders, to brace them back, and to overcome the forward displacement.

3. A sling to support the elbow, to counteract the downward displacement.

4. Daily massage.

*Gives the Clinical Features and Treatment of Acromial Dislocation.*

Acromial dislocations are frequently also termed dislocations of the scapula. The usual cause is either a blow



from behind or a fall upon the tip of the shoulder. Owing to the inclination of the articular surfaces of the clavicle and the scapula, the displacement is usually upwards. The leading features are :—

- (a) Rigidity.
- (b) Impaired movement of the shoulder, especially in lifting the arm above the level of the shoulder.
- (c) Alteration in the bony points ; the acromion projecting beneath the skin, and
- (d) The head inclined towards the injured side.

Reduction is easily performed, but retention is not easy. A sling and body-bandage may be employed. If this fails, and the function of the limb is interfered with, the displaced ends may be wired.

*Mention the Causes of Fracture of the Clavicle.*

1. DIRECT VIOLENCE (rare) : the fracture is transverse and occurs at the point struck.

2. INDIRECT VIOLENCE (the usual cause) : the fracture is oblique from without inwards, and from before backwards. Its usual position is at the junction of the middle and outer third of the bone.

3. MUSCULAR ACTION (rare).

*What are the Sites of Fracture ?*

- 1. At the sternal end (very rare).
- 2. At the junction of the middle and outer thirds (the usual situation).
- 3. At the coraco-clavicular ligament.
- 4. Outside the coraco-clavicular ligament ; this fracture is usually transverse in direction.

*Give the Displacement when the Bone is broken at its usual Situation.*

OUTER FRAGMENT—

- 1. Downwards, by the weight of the arm.
- 2. Forwards, by the pectorals and serratus anterior.
- 3. Inwards, because the clavicle normally acts as an outrigger by keeping the shoulder away from the chest.



#### INNER FRAGMENT—

Slightly tilted upwards by the sterno-mastoid; the integrity of the costo-clavicular ligament prevents any marked displacement.

#### *What are the Signs of this Fracture?*

1. Approximation of the point of the shoulder to the sternum.
2. The prominence of the outer end of the inner fragment, and a depression under it; depression of the outer fragment.
3. Falling of the arm, and flattening of the shoulder.
4. Inability to raise the arm; crepitus; tenderness on pressure; abnormal mobility.

#### *Describe the Treatment.*

In young females the patient must lie upon a hard mattress with a narrow sandbag or firm pillow between the shoulder-blades. Place a pad in the axilla and raise the elbow. Massage is required daily. In males when the fracture has been reduced, an ordinary sling to support the arm, and a body-bandage should be employed. Wharton Hood's method is very simple and extremely effectual. Take three strips of stout adhesive plaster (each strip being about one inch broad). They should extend from the level of the nipple to just below the inferior angle of the scapula. The central strip passes over the line of fracture, and is fixed in position first. The remaining two portions are fixed one on each side of the fracture and overlap the central piece.

#### *How is Fracture at the Coraco-Clavicular Ligament caused?*

Usually by direct violence. If the fracture occurs between the conoid and trapezoid ligaments there will be no displacement. A simple arm-sling is all the treatment required.

#### *What is the Displacement when the Fracture occurs outside the Coraco-Clavicular Ligament?*

This fracture is practically always caused by a blow on the back of the shoulder.



The small outer fragment is drawn forward until it lies at right angles to the inner long fragment. There is practically **no downward displacement**, as the coraco-clavicular ligament is intact.

## SCAPULA.

*What are the Fractures of the Scapula?*

1. Through the body.
2. The acromion process may be detached.
3. The coracoid process may be broken off.
4. At the surgical neck

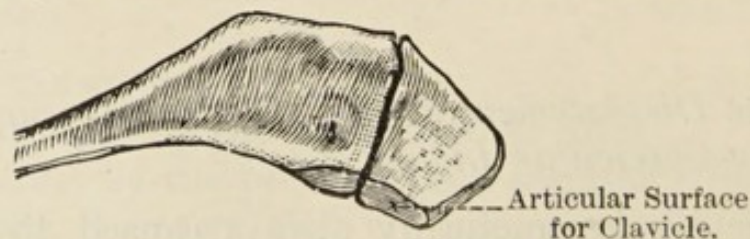
*Describe Fracture of the Body.*

This fracture results from severe direct violence, and is often complicated by injury to the ribs and lungs. The clinical signs are pain, unusual mobility, and crepitus. The displacement is very slight. Treat the fracture by placing a thick soft pad over the broken bone, and a body bandage to keep the arm to the side.

*Give the Clinical Features of Fracture of the Acromion.*

Fracture of the acromion most commonly follows a fall or blow upon the shoulder. The displacement is very slight, and crepitus is difficult to elicit. Abduction of the arm is interfered with. Non-union frequently occurs, the resulting condition often being mistaken for a separated epiphysis. Union of the acromion is very apt to be by fibrous tissue.

Fig. 1.—EPIPHYSIS OF ACROMION PROCESS.



(Unites from 22 to 25 years of age.)



*Describe Fracture through the Surgical Neck.*

The surgical neck of the scapula passes through the supra-scapular and great scapular notches, and accordingly when fracture occurs the coracoid process is upon the outer fragment. Fracture of the surgical neck is uncommon, but when present it closely simulates a sub-glenoid dislocation of the shoulder. Owing to the rupture of the coraco-clavicular and coraco-acromial ligaments, the outer fragment is depressed. On careful measurement it will be found that the injured arm is lengthened.

*Mention the Chief Points distinguishing this Fracture from a Dislocation of the Shoulder.*

| FRACTURE OF SURGICAL<br>NECK OF SCAPULA.                                                                                                                                                                                     | DISLOCATION OF SHOULDER.                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. Crepitus is present.</li> <li>2. It can be readily reduced on supporting the arm.</li> <li>3. The arm is freely movable, and the <b>coracoid process moves with it.</b></li> </ol> | <ol style="list-style-type: none"> <li>1. No crepitus.</li> <li>2. It cannot be reduced by supporting the arm.</li> <li>3. Rigidity of the arm.</li> </ol> |

In doubtful cases an X-ray examination should be made.

## DISLOCATIONS OF THE SHOULDER JOINT.

*Mention the Chief Dislocations of this Articulation.*

1. Sub-glenoid.
2. Sub-coracoid.
3. Sub-acromial.

The rarer varieties are—

4. Sub-clavicular.
5. Sub-spinous.

The dislocations are named according to the position of the head of the humerus in relation to the different bony points around the joint.

*How does Dislocation occur?*

Usually when the arm is abducted and the muscles caught off their guard, as in falls or blows on the shoulder, elbow, or hand, with the arm outstretched. Sub-spinous dislocation occurs when the arm is in the adducted position.

The head of the bone leaves the capsule at its lower and anterior part, as this is the thinnest and least supported part of the whole capsule. All dislocations, therefore, of the shoulder are primarily sub-glenoid.

*Name the General Signs of Dislocation.*

1. Flattening and squareness of the shoulder.
2. A depression below the acromion process.
3. An apparent projection of the acromion, with tension of the deltoid.
4. The head of the humerus is felt in an abnormal position.
5. Rigidity and pain.
6. An alteration in the axis of the bone.
7. A lowering of the anterior fold of the axilla.
8. DUGAS' test.—The patient cannot place the fingers of the injured limb on the sound shoulder, nor allow them to be placed there by the surgeon, while at *the same time the elbow touches the thorax*. This test is often unreliable.
9. The vertical measurement of the shoulder from the axilla over the acromion process is from one to two inches greater on the dislocated side.
10. HAMILTON'S "ruler" test.—If a straight ruler be applied to the outer side of the upper arm, it will touch both the acromion and the external epicondyle of the humerus.



*Give the Special Signs of the Sub-coracoid Variety.*

The head of the bone lies below the coracoid process, resting against the anterior lip of the glenoid cavity, and the elbow is tilted away from the side. The subscapularis is ploughed up from the subscapular fossa, while the short external rotators of the shoulder are partially torn. Pressure symptoms may arise from compression of the circumflex nerve or the axillary vessels. Dugas' sign is sometimes absent in this form of dislocation. The arm is shortened. The sub-coracoid dislocation is frequently complicated by fracture of the surgical neck of the humerus.

*Mention the Special Characters of the Sub-acromial Variety.*

This variety of dislocation generally occurs when the arm is in a position of adduction and internal rotation. The tuberosities of the humerus are frequently torn away from the shaft, and the infraspinatus is severely damaged. Other points to note are the prominence of the coracoid process, the broadening of the shoulder, and the presence of the head of the humerus beneath the acromion process or spine of the scapula. The arm is shortened.

*Describe the Sub-glenoid Variety.*

Sub-glenoid dislocation follows forcible adduction of the arm, the head of the humerus coming to lie on the infra-glenoid area of the scapula, and being supported by the long head of the triceps. The arm is slightly lengthened and rotated out. The head of the humerus can be palpated in the axilla. In some cases the circumflex nerve is injured.

*Describe the Chief Methods of reducing a Dislocation of the Shoulder-joint.*

(1) Hyper-abduction of the shoulder with traction. This method must never be attempted in old-standing cases, for fear of rupturing the axillary vessels.

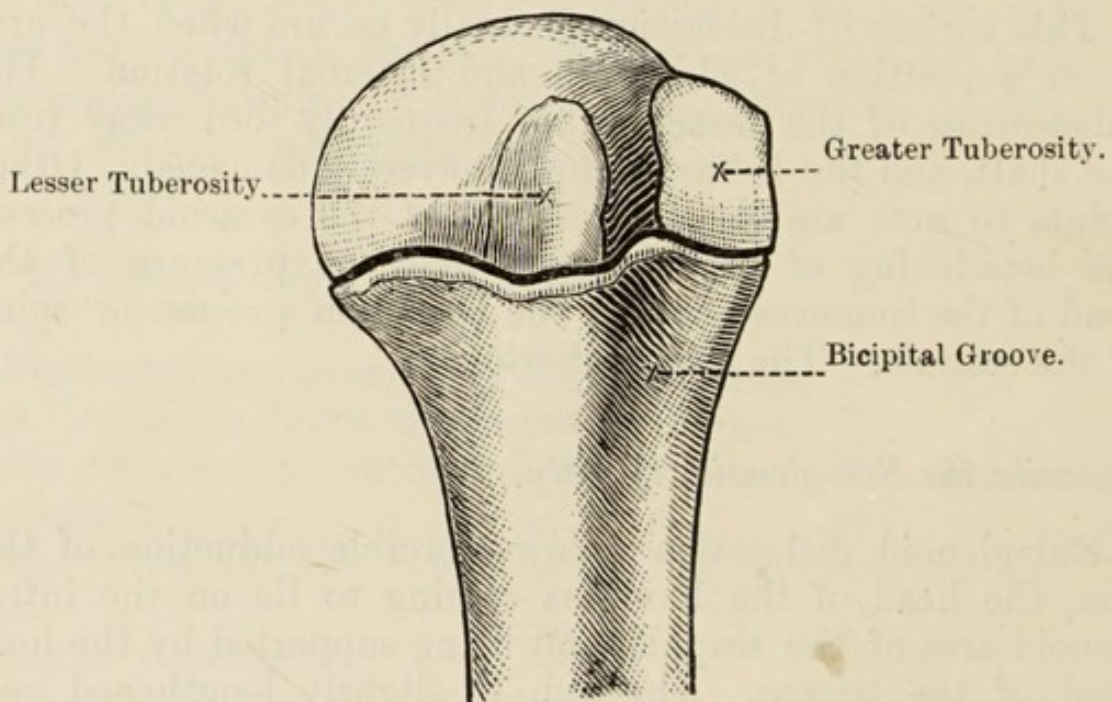
(2) MILLER'S Method.—Flex the elbow to a right angle, and gradually abduct the shoulder until the arm is hori-

zontal. Next, carefully pull the arm out from the body, an assistant meanwhile making counter-extension by means of a towel passed round the thorax. Lastly, rotate the humerus inwards.

(3) KOCHER'S Method. — This is the procedure usually adopted in cases of dislocation.

Flex the elbow and adduct the arm. Rotate outwards, and carry the arm forwards, upwards, and inwards. Lastly, rotate the arm inwards. When reduction is completed, massage the shoulder for a quarter of an hour, then place a pad of wool in the axilla, support the forearm in a sling, and fix the arm to the trunk by a body bandage.

Fig. 2.—UPPER END OF HUMERUS.



(Unites at 20 years of age).



## THE HUMERUS.

*Name the Chief Fractures of the Humerus.*

- |                |   |                                            |
|----------------|---|--------------------------------------------|
| A. UPPER END   | { | Anatomical Neck.                           |
|                | { | Surgical Neck.                             |
| B. SHAFT . . . | { | Above the insertion of the deltoid muscle. |
|                | { | Below the insertion of the deltoid muscle. |
| C. LOWER END   | { | Supracondylar. { Transverse.               |
|                |   | { T- or Y-shaped.                          |
|                | { | Either condyle.                            |
|                | { | Internal epicondyle.                       |

*Describe Fracture of the Anatomical Neck.*

It usually occurs in elderly people, and is brought about by direct violence, *i.e.* a fall upon the shoulder. It may be impacted or non-impacted. The displacement is slight, but the head of the bone may be rotated. Crepitus is present, shortening occurs, and the shoulder becomes flattened. When impacted, there is an antero-posterior broadening.

*How would you treat this Fracture?*

If the head is rotated, then excise. When rotation is absent, fix the arm to the trunk by a broad domett bandage, supporting the elbow by a sling. An external rectangular splint is sometimes added.

*Describe Fracture of the Surgical Neck.*

The surgical neck of the humerus is the area between the line of the epiphysis and the upper limit of the attachment of the pectoralis major. Fracture in this situation is most commonly met with in adults or the aged. It may be due to direct, indirect, or muscular violence. As in fracture of the anatomical neck, impaction may be present. When the line of fracture is transverse, deformity is slight; when oblique, the line of fracture is downwards, forwards, and inwards, and the upper fragment tends to become abducted and rotated out, while the lower fragment is pulled upwards and inwards by the muscles attached to the bicipital groove.

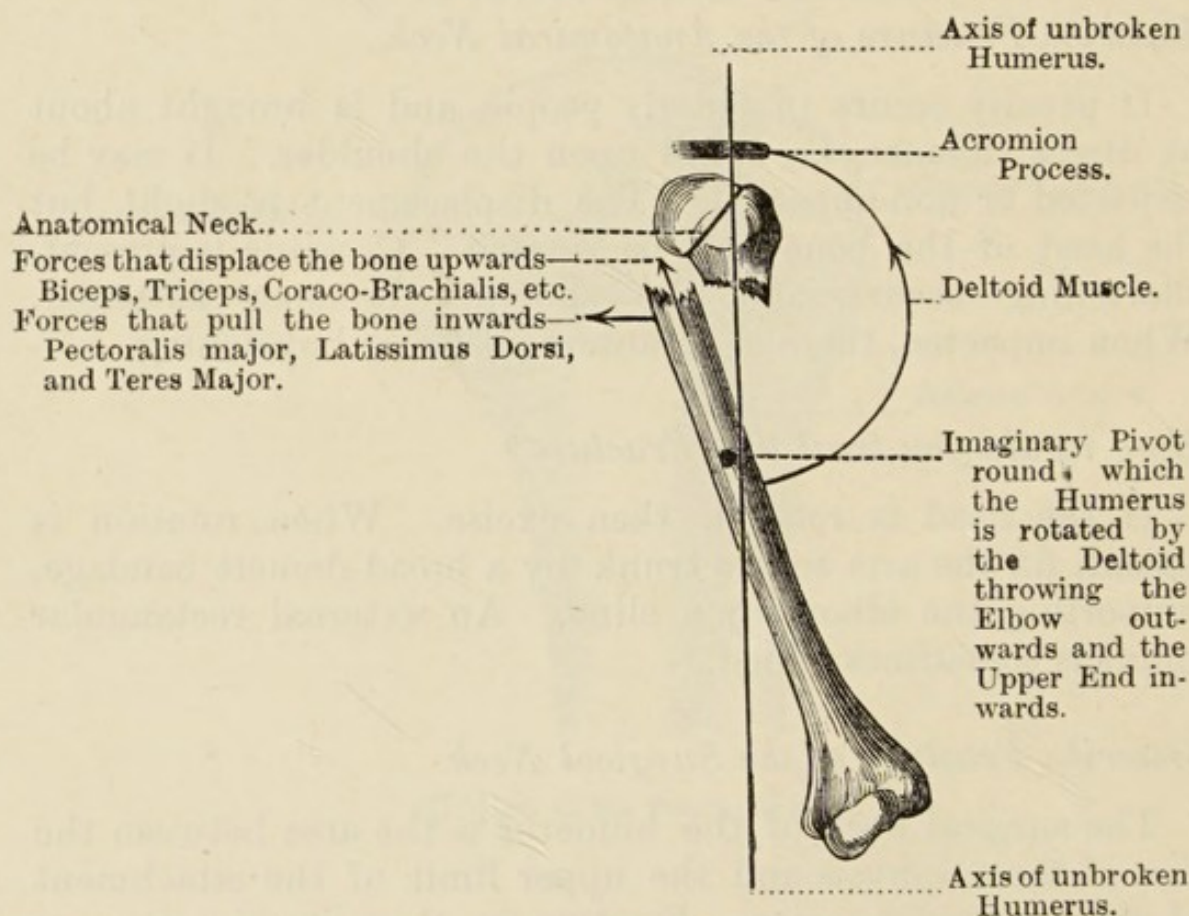


*Give the Treatment.*

(1) Chiene's method is to use the deltoid as a splint, and fix the arm to the side with a body bandage.

(2) Abduct the shoulder to a right angle, and apply extension with weight and pulley over the side of the bed. This treatment is carried out for a week, and then the patient can rise and move about, wearing a Middeldorpf's triangular splint for two weeks. Lastly, the splint is removed, and the forearm supported by a sling for another week or ten days. Massage must be employed daily.

Fig. 3.—FRACTURE THROUGH SURGICAL NECK OF HUMERUS.



*How is this Injury distinguished from Sub-glenoid Dislocation of the Shoulder?*

1. The arm is shortened, not lengthened.
2. There is increased mobility, not rigidity.
3. By the position of the head of the bone.
4. The shoulder is not flattened.



5. The head and tuberosities do not move with the rest of the arm.

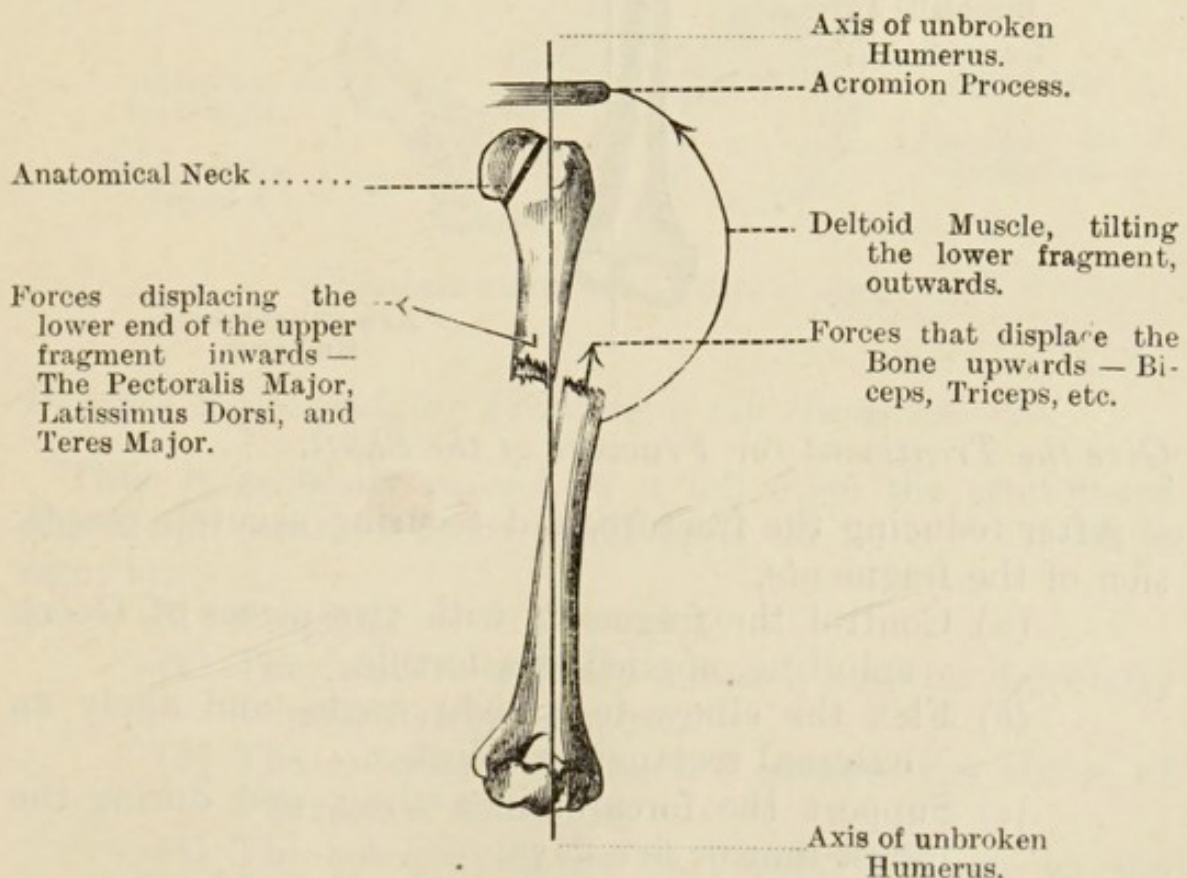
6. By X-ray examination.

*Describe Fractures of the Shaft of the Humerus.*

Fractures of the humeral shaft may be brought about by direct, indirect, or muscular forms of violence. In children the line of fracture is usually transverse, while in adults (unless due to muscular action) it is generally oblique. The displacements most frequently are:—

- |                                 |   |                                                                                                                                                                          |
|---------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a) ABOVE DELTOID<br>INSERTION. | { | Upper fragment <b>Inwards</b> by muscles<br>inserted into bicipital groove.<br>Lower fragment <b>Upwards</b> by bi-<br>cepts and triceps; <b>Outwards</b><br>by deltoid. |
|---------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Fig. 4.—FRACTURE ABOVE THE DELTOID.



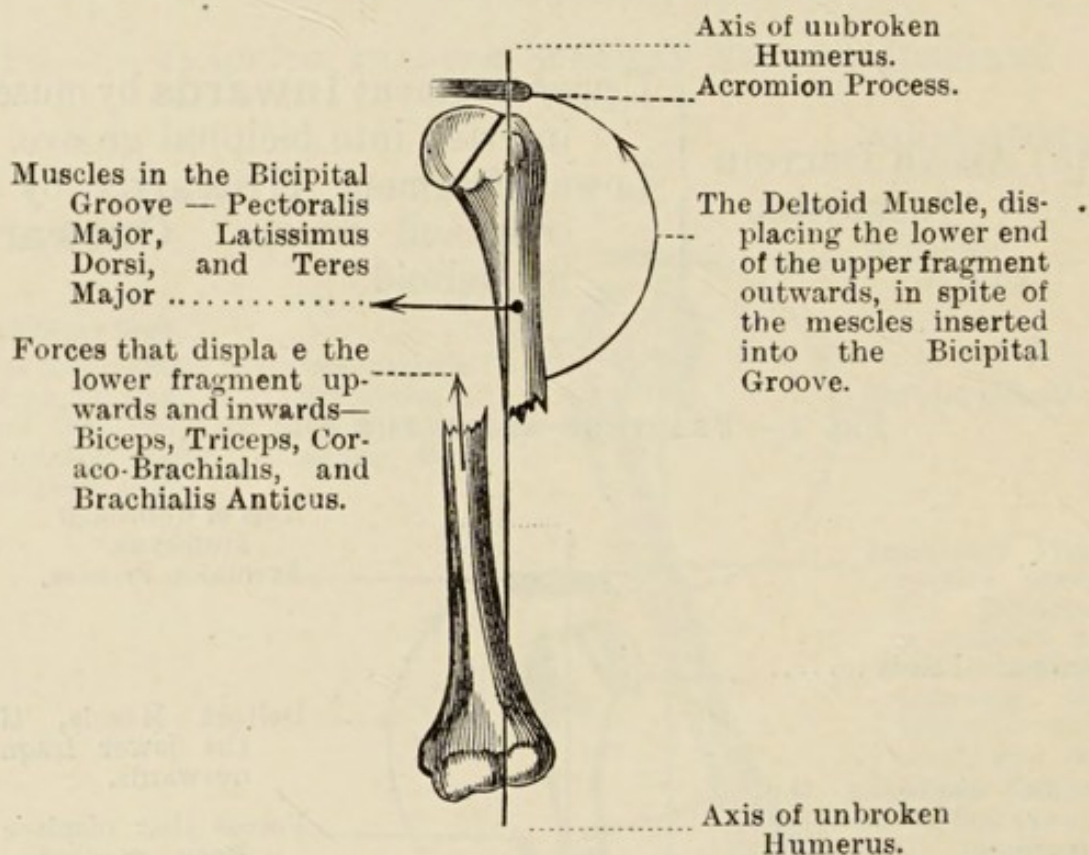
(b) BELOW DELTOID  
INSERTION.

Upper fragment **Outwards** by del-  
toid.

Lower fragment **Upwards and  
Inwards** by biceps, triceps,  
coraco-brachialis, and brachialis.

The musculo-spiral nerve is very apt to be injured in fractures of this region. The shaft of the humerus is also the commonest site for non-union.

Fig. 5.—FRACTURE BELOW THE DELTOID.



*Give the Treatment for Fracture of the Shaft.*

After reducing the fracture, and securing accurate coaptation of the fragments,

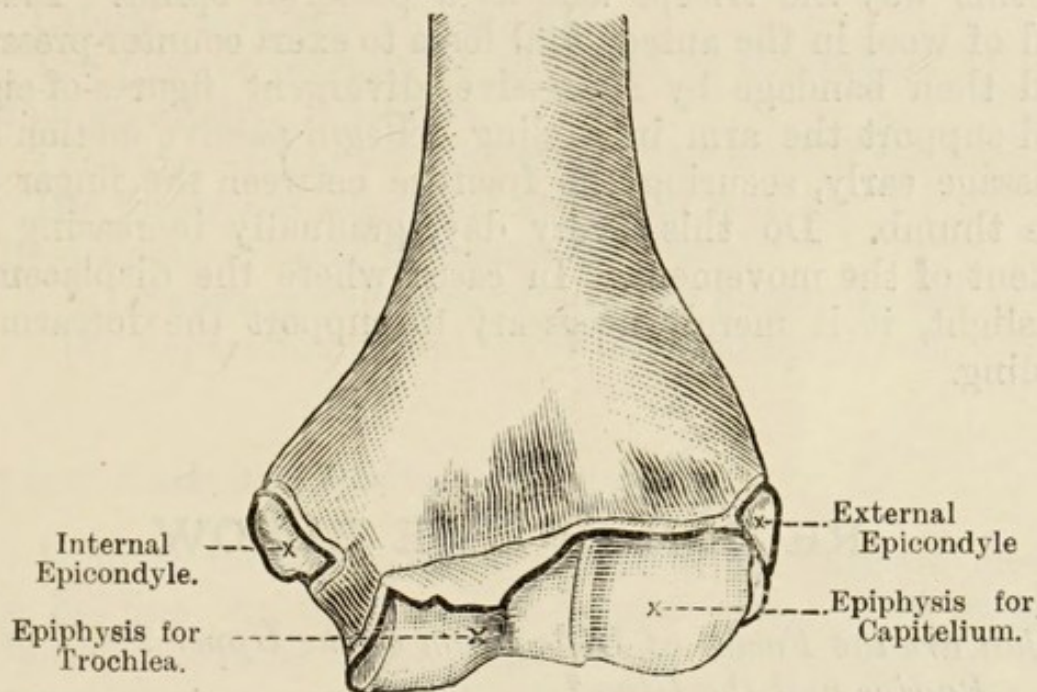
- (a) Control the fragments with two pieces of Gooch splinting, applied as a ferrule.
- (b) Flex the elbow to a right angle, and apply an external rectangular splint.
- (c) Support the forearm in a sling, and during the first four or five days.
- (d) Bind the arm to the chest by a broad bandage.



*Describe Fracture of the Internal Epicondyle.*

The internal epicondyle may be torn off by traction upon the ulnar collateral ligament, or may be knocked off by falls upon the elbow. The fragment of bone is dragged downwards and forwards by the flexor muscles taking origin from it. The ulnar nerve may be seriously damaged. The best treatment is to secure the epicondyle in position by a nail or screw fixed through the skin.

Fig. 6.—LOWER END OF HUMERUS.



(Complete union at 18 years of age.)

*Describe Supracondylar Fracture of the Humerus.*

This is generally caused by a fall upon the semi-flexed elbow, and occasionally by a fall upon the palm. The chief signs are:—

- (1) Crepitus.
- (2) The fracture is easily reduced, but the deformity immediately reappears.
- (3) The anterior swelling lies **above** the crease of flexion of the joint.
- (4) The epicondyles are in normal relation to the olecranon process of the ulna.

- (5) The upper arm is shortened about half an inch.
- (6) The lower fragment is carried backwards and upwards behind the upper fragment by the combined action of triceps and biceps.

*How would you treat this Fracture?*

Set the bones by extension of the arm and forearm, press the lower end of the humerus backwards and the lower fragment forwards, and bend the elbow to an acute angle; in this way the triceps acts as a posterior splint. Place a pad of wool in the antecubital fossa to exert counter-pressure, and then bandage by successive divergent figures-of-eight, and support the arm in a sling. Begin passive motion and massage early, securing the fracture between the finger and the thumb. Do this every day, gradually increasing the extent of the movement. In cases where the displacement is slight, it is merely necessary to support the forearm by a sling.

## REGION OF THE ELBOW.

*What are the Forms of Dislocation of the Upper Ends of the Radius and the Ulna?*

1. Backwards.
2. Forwards.
3. Laterally.

NOTE—Dislocation of the elbow is often complicated with fracture of the humerus, olecranon, or coronoid process. This dislocation very rapidly becomes irreducible.

The most common dislocation is both bones backwards. The radius goes with the ulna, because the annular ligament is so strong. This form of dislocation is very common in children. It is caused by indirect violence, as a fall on the palm of the hand with the elbow joint extended, as in this position the coronoid process loses its grasp of the trochlea. In addition, it may be brought about by a twist of the forearm.



*Give the Chief Signs.*

1. The arm is semi-flexed, and either pronated or midway between pronation and supination.

2. There is a projection behind (the olecranon process), and a swelling in front **below** the crease caused by flexure of the joint; this is the articular surface of the humerus covered by the brachialis muscle and the tendon of the biceps.

3. The general rigidity of the arm.

4. An increased distance between the olecranon process and the internal epicondyle.

5. Lateral movement of the joint.

6. The relative position of the head of the radius to the external epicondyle is altered.

7. The antero-posterior diameter of the joint is increased.

8. The forearm is shortened about an inch.

The dislocation must be diagnosed from—

- (a) Supracondylar fracture of the humerus, and
- (b) Separation of the lower humeral epiphysis.

*How is a Backward Dislocation reduced?*

By bending the elbow across the knee, the surgeon meanwhile holding the wrist and the upper arm. Now extend the joint, applying counter-extension by pulling on the wrist and the humerus, and lastly, flex slowly.

After reduction, flex the limb fully, in order to be sure that all is right; also pronate and supinate, and observe the position and movements of the head of the radius.

Put up the limb fixed to a posterior poroplastic splint, and flexed to slightly less than a right angle. Support by a sling. Wear the splint for a week. Massage and passive movements are commenced on the second day.

*Name the Dislocations of the Radius alone.*

1. Forwards. This is the most common; and is also the second most common dislocation occurring at the elbow joint.



2. Backwards.

3. Outwards.

Dislocation of the radius is very frequently combined with fracture of the upper third of the shaft of the ulna.

*How is the Forward Dislocation caused?*

Usually by indirect violence, as a fall on the hand in supination, with the elbow joint extended. It occurs specially in **young** persons, and frequently in children. The dislocation may also be brought about by violence applied to the posterior surface of the upper third of the bones.

*What are the Signs of Forward Dislocation?*

1. The head of the radius lies in front of the external epicondyle.

2. The forearm is fixed in semi-flexion, with partial or complete pronation.

3. Flexion of the joint is checked by the displaced head of the radius.

4. Slight shortening of the radial side of the forearm.

5. There may be symptoms of pressure upon the radial and posterior interosseous nerves.

The dislocation is reduced by extension, counter-extension, and by pressing the head backwards. The joint must be kept at rest for a long time, as the orbicular ligament is ruptured, and the bone is very apt to be redisplaced by the biceps muscle.

*What is Subluxation of the Head of the Radius?*

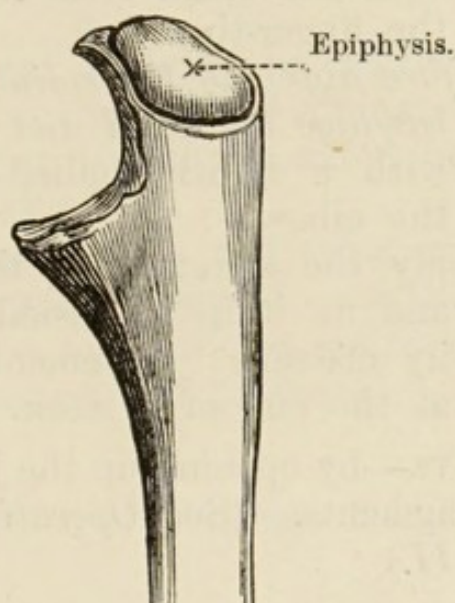
It is a form of injury apt to happen in childhood from a sudden tug of the arm (by the mother or nurse). This sudden pull, when the child is not expecting it and the muscles off their guard, is apt to produce a partial dislocation of the radius forwards. It is commonly overlooked; after a while the arm becomes stiff, flexion being especially interfered with.

The condition is treated as follows: give the child an



anæsthetic, then flex the elbow, at the same time employing gentle traction upon the forearm. Lastly, carefully pronate and supinate. Massage daily for a week, supporting the forearm during the intervals in a sling.

Fig. 7. UPPER END OF ULNA.



(Unites about Puberty.)

*What are the Varieties of Fracture of the Olecranon?*

1. Those with displacement, *i.e.* through the base of the olecranon. The triceps may considerably separate the fragments.

2. Those without displacement, *i.e.* through the summit of the olecranon.

3. Those with slight displacement, *i.e.* through the middle of the olecranon.

In direction the fracture may be transverse, oblique, or **T**-shaped. It is caused by direct violence, as a fall on the flexed elbow, or a blow with a stick.

*How would you treat Fracture without Displacement?*

Wharton Hood's method is an excellent one. He encircles the lower part of the upper arm with a broad piece of adhesive plaster.

*Give the Treatment for Fracture with Displacement.*

(a) NON-OPERATIVE—

1. A splint, cut so as to correspond to the angle made by the forearm with upper arm (and therefore not quite straight) is well padded; it should reach from the base of the axilla to the finger-tips.
2. *Before applying the splint, pad the fingers, and bandage the hand and forearm, finishing off with a lightly applied figure-of-eight round the elbow.*
3. Apply the splint along the front of the limb, and fix it in the usual way.
4. Daily massage; movement may be commenced at the end of a week.

(b) OPERATIVE—by opening up the joint-cavity and wiring the fragments. (See *Operative Surgery Catechism, Part II.*)

*Give another Non-operative Way of treating this Fracture.*

By means of elastic traction acting upon the upper fragment only, as it alone is displaced. Cut an oblong piece of plaster with horse-shoe extremities, to which stitch two extension tapes. A splint is fashioned as in the previous method, only it must extend a couple of inches beyond the finger-tips. Bandage the limb as before, and apply the plaster to the posterior surface of the upper arm, so that the upper fragment of the olecranon lies in the horse-shoe. Fix the splint on the forearm, and apply elastic bands to the extension tapes, and fasten them to the end of the splint.

## FOREARM.

*How would you divide Fractures of the Radius?*

- (a) The head.
- (b) The shaft above the insertion of the pronator teres.
- (c) The shaft below that muscular attachment.



(d) The lower end—

1. Chauffeur's fracture.
2. Colles' fracture.

*Give the Displacement in Fracture above the Pronator Teres.*

This is usually caused by indirect violence, as a fall on the hand.

The **upper fragment** is flexed by the biceps, and fully upinated by the same muscle and the supinator brevis.

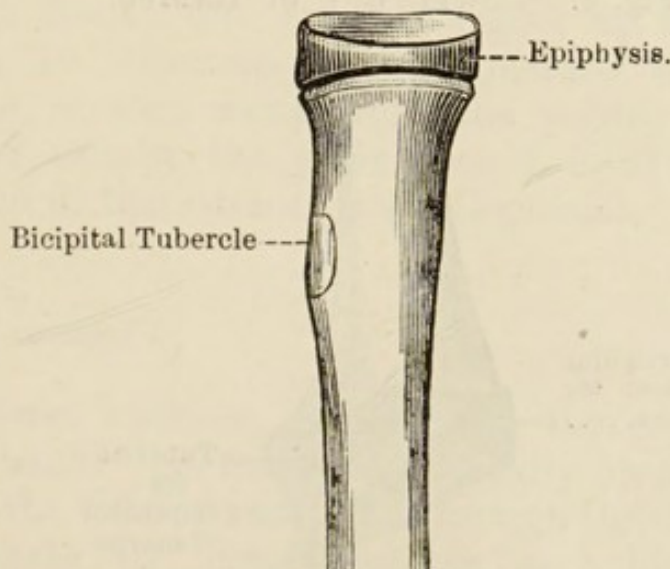
The **lower fragment** is fully pronated by the pronator quadratus and the pronator teres.

The fracture is diagnosed by pronating and supinating the hand, while the thumb is placed over the head of the radius; in a fracture, the head of the radius will not move when the hand is pronated and supinated.

*Describe the Displacement in Fracture below the Pronator Teres.*

The **upper fragment** is tilted forward, and supinated by the biceps and supinator brevis, and inwards by the pronator teres. The displacement, however, is not great, as the muscles almost balance each other.

Fig. 8.—UPPER END OF RADIUS.



(Unites about Puberty.)

The **lower fragment** is drawn towards the ulna and pronated by the unopposed action of the pronator quadratus, while the brachio-radialis tilts up the styloid process and depresses the upper end of the fragment.

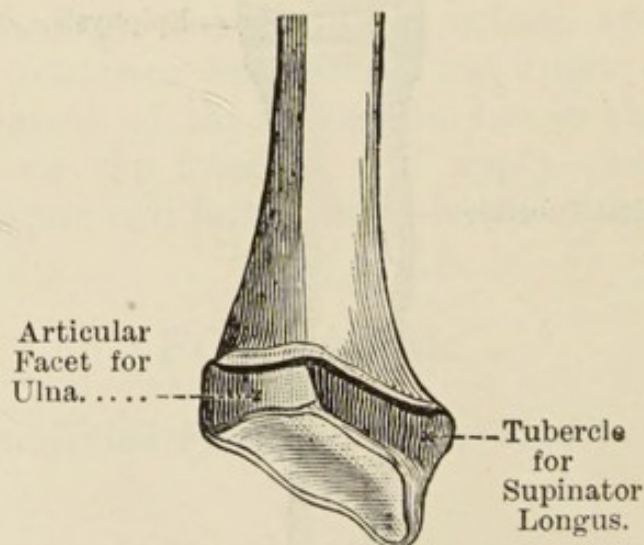
*How is the Ulna usually fractured and what Displacement occurs?*

Generally by direct violence, as in carrying something in the hand, *e.g.* a tray, when the foot slips, and, to save the contents of the hand, the whole force of the fall is received on the posterior edge of the ulna. So also it may be broken by a fall on the edge of a doorstep, or by a blow from a stick, when the arm is held up to protect the head. Both fragments are driven towards the radius by the force that breaks the bone; the muscles do not cause great displacement.

*Give the Cause and Displacement of Fractures of both Bones.*

The usual cause is direct violence, as a severe blow, or the passage of a wheel over them. When it is due to indirect violence, the bones give way at their weakest points, namely, the upper end of the radius and the lower end of the ulna.

Fig. 9.—LOWER END OF RADIUS.



(Unites about 20 years of age.)



The **upper fragment** of the radius is tilted forwards by the biceps and inwards by the pronator teres, while the **upper fragment** of the ulna is tilted a little forwards by the brachialis.

The **lower fragment** of the radius is pronated, and the two bones, approximated by the pronator quadratus, are drawn upwards and forwards, or upwards and backwards (according to the obliquity of the fracture), by the flexors and extensors.

### *Describe "Chauffeur's" Fracture.*

This fracture may occur through the lower third of the radius, or at the same level as a Colles' fracture. It is often caused by the engine of a motor-car "back-firing," and may result either from direct or indirect violence, more commonly the latter.

The deformity and the treatment are similar to that of a Colles' fracture.

### *What is Colles' Fracture?*

It is a fracture of the lower end of the radius. It is for the most part below the origin of the pronator quadratus, and about three-quarters of an inch above the articular surface, in front; but extends higher up on the posterior aspect, as the direction of the fracture is oblique. The periosteum is torn away from the palmar surface of the fragments; usually the ulnar styloid is avulsed owing to the traction of the internal lateral ligament.

### *How is it caused?*

By indirect violence, as a fall on the palm of the outstretched hand. As the hand is usually pronated, the whole weight of the fall is transmitted through the thenar eminence. When caused by direct violence, as a blow, there is no lateral displacement.

The fracture is most commonly found in old women.

*Describe the Deformity and Displacement.*

There is a prominence on the back of the wrist, and a hollow above it, caused by the lower fragment; and a projection in front, caused by the lower end of the upper fragment, the whole forming a peculiar spoon-shaped deformity. The lower fragment also is rotated on its antero-posterior axis, so that the radial side of the bone is more shortened than the ulnar side. The head of the ulna seems more prominent, but this is because the hand is driven to the

Fig. 10.—LOWER END OF ULNA.



(Unites about 20 years of age.)

radial side. The fingers are flexed, and slightly point towards the ulnar side. **Do not attempt to elicit crepitus.**

The **lower** fragment passes upwards, backwards, and outwards, partly by the traction of the brachio-radialis and the extensors of the thumb and carpus, but mainly owing to the line of force from the impact travelling in this direction.

The **upper** fragment is not displaced. Impaction frequently occurs. Bear in mind that pronation and supination are lost.



*How would you diagnose between a Colles' Fracture and a backward Dislocation of the Carpus?*

|                        | COLLES' FRACTURE.                                                                    | BACKWARD DISLOCATION OF WRIST.                                                    |
|------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Degree of Violence..   | Slight.                                                                              | Great.                                                                            |
| Patient.....           | Old woman (usually).                                                                 | Strong adult male.                                                                |
| Position of styloids.. | The radial styloid is on a level with, or at a higher level than, the ulnar styloid. | The styloid processes preserve their normal relations to each other.              |
| Measurement            | The distance between the radial styloid and the internal epicondyle is lessened.     | The distance between the radial styloid and the internal epicondyle is unaltered. |

*Give the Treatment of Colles' Fracture.*

The main essential is to bring the two fragments into accurate opposition. Administer a general anæsthetic, then grasp the patient's hand firmly, and apply extension through the forearm, the patient's wrist meanwhile being supported by the surgeon's knee. In addition, lateral movements may be required if impaction be present. Lastly, flex the wrist and carry the hand towards the ulnar side.

After reduction, fix a firm bandage round the wrist, and support the hand and forearm in a sling. Splints are, in the majority of cases, useless. Massage and passive movements must be carefully attended to.

*What is Smith's Fracture?*

When a person, with the wrist in extreme flexion, falls



upon the knuckles and dorsum of the hand, a fracture is sometimes produced the very reverse (as regards the displacement) of Colles'. This fracture is called Smith's fracture.

*Give the Treatment for Fracture of the Shaft of the Bones of the Forearm.*

Fracture of the shaft of the radius *above* the insertion of the pronator teres is put up with the forearm flexed to a right angle, and completely supinated. Fracture *below* this level, and fracture of the shaft of the ulna, are put up in a position midway between pronation and supination.

Two splints are required, *broad*er than the arm: rigid splints may be used, or Gooch splints; but if the latter, they must be padded on the *wooden* side. The splints must be broader than the arm, to prevent pressure by the bandages on the lateral aspects of the arm, as this would force the bones towards each other and encroach upon the interosseous space. The posterior splint must extend from the olecranon process to the tips of the fingers; the anterior one from the elbow (after flexion) to the webs of the fingers.

Over all, an external rectangular splint should extend from the shoulder to the fingers, and the hand be supported by a sling.

*What is Bennett's Fracture and its Treatment?*

An oblique fracture of the palmar aspect of the base of the first metacarpal bone. It is generally caused by severe violence being applied to the tip of the thumb, the base of the metacarpal then coming into forcible contact with the trapezium. The shaft of the first metacarpal forms a prominent swelling on the back of the thumb. Sometimes crepitus can be detected. There is great pain on movement. An X-ray examination may be necessary in order to complete the diagnosis.

The treatment consists in reducing the fracture by extension, then apply a Bennett's splint, or a poroplastic splint moulded to the thumb. The splint must be worn for three weeks. Massage and movement are commenced early.



*Describe Backward Dislocation of the Thumb.*

This is a dislocation at the metacarpo-phalangeal joint produced by excessive dorsi-flexion of the thumb. The lateral and glenoid ligaments are torn from the metacarpal bone. The head of the metacarpal is embraced by the tendinous slips of the flexor brevis pollicis, and the tendon of the flexor longus pollicis is dislocated to the ulnar side. Reduction may be difficult owing to (a) the glenoid ligament; (b) the flexor brevis pollicis, and its sesamoid bones; and (c) the tendon of the flexor longus pollicis.

*How is the Dislocation reduced?*

Flex and adduct the metacarpal bone, and

1. At the same time hyper-extend the phalanx; or
2. Traction by means of an "Indian Puzzle;" or
3. Tenotomy of the glenoid ligament from the dorsal aspect of the joint.

**THE PELVIS.***Mention the Chief Sites of Fracture of the Pelvis.*

- (a) Separation of the symphysis pubis.
- (b) The anterior segment of the obturator foramen, *i.e.* through the ascending ramus of the pubes, or the conjoined rami of the ischium and pubes.
- (c) The iliac fossa.
- (d) Separation of the sacro-iliac joint.
- (e) Longitudinal fracture of the sacrum.
- (f) Separation of the iliac crest.
- (g) Separation of the anterior superior or anterior inferior iliac spines.
- (h) Fracture of the coccyx.

*What are the Special Dangers of Pelvic Fractures?*

- (a) Shock.
- (b) Injury to the urinary tract, especially the bladder and membranous urethra.



- (c) Laceration of the vagina or rectum.
- (d) Rupture of the iliac arteries.

*In cases of suspected Fracture, what is the Point of Chief Importance as regards Treatment?*

Do not let the patient attempt to urinate. The surgeon should at once try to pass a catheter into the bladder, and if necessary keep it there. This precaution is necessary because if the urethra be ruptured, the patient would simply pass urine into the perineal tissues, causing extravasation of urine.

Injury to the bladder is diagnosed by introducing a catheter and noticing the escape of a few drops of blood-stained urine.

*Give the Treatment of Fracture of the Pelvis.*

The patient should lie in bed on a hard mattress. The pelvis is fixed by means of a many-tailed bandage, and the knees held together by a binder. Extension may be necessary in certain cases. Union is generally complete in six weeks to two months.

## THE LOWER EXTREMITY.

### HIP-JOINT.

*What Special Measurements are used in investigating Injuries of the Hip-Joint?*

1. NELATON'S TEST LINE.—Draw a line from the anterior superior spine of the ilium, over the outer side of the hip, to the most prominent part of the tuberosity of the ischium; the top of the great trochanter should touch this line in every position of the joint. It is better not to employ this test in suspected fractures as it can only be carried out by moving the patient.

2. BRYANT'S TRIANGLE.—As the patient lies on his back a perpendicular is dropped from the anterior superior spine of the ilium; then a second line at right angles to the first



is drawn from the top of the great trochanter; these two lines are then joined by a third from the anterior superior spine to the top of the great trochanter.

3. MORRIS'S BITROCHANTERIC MEASUREMENT.—This is of use especially in fracture, and shows the degree of inward displacement, just as Bryant's method shows the degree of vertical displacement. The distance from the tip of the great trochanter to the symphysis pubis is measured on both sides, and the figures compared.

4. CHIENE'S PARALLEL LINES.—Mark the position of the anterior superior spines of the two sides, and the top of the great trochanter on each side, and then lay two pieces of lead or tape transversely on these four points, and observe whether or not the bands are parallel with each other. This method is most useful in cases of fracture.

*Name the "Regular" forms of Dislocation of this Joint.*

1. Backwards and upwards, upon the dorsum ilii = DORSAL.
2. Backwards, into the great sacro-sciatic notch = ISCHIATIC.
3. Forwards and downwards, in the obturator foramen = OBTURATOR or THYROID.
4. Forwards and upwards, upon the pubes = PUBIC.

The head of the femur usually leaves the joint at the lower and back part.

*How are the Backward Dislocations caused?*

When the leg is adducted, flexed, and rotated inwards, and the patient receives a blow on the back. It may also occur when a person is carrying a heavy weight and falls down, or when the patient falls from a height. The head escapes through the lower and back part of the capsule and passes in front of the obturator internus.

*What are the Signs of Dislocation upon the Dorsum Ilii?*

This is the most common dislocation of the hip. The leg is shortened from one to two inches, the knee is flexed, adducted, and inverted, the knee lies partly in front of the



opposite thigh, and the great toe rests on the dorsum of the foot on the sound side. The joint is unnaturally **rigid**, and the head of the bone may be felt upon the back of the ilium under the glutei muscles. On pressing the fingers into the groin it is found that the femoral vessels have lost their firm posterior support.

The gluteal fold is higher than normal, and the hollow behind the great trochanter is lost; the great trochanter comes to lie above Nélaton's line, and Chiene's lines are not parallel.

*How does Dislocation into the Sciatic Notch differ from the above?*

The signs are very similar, but not well marked, as this dislocation is simply a less advanced form of the previous one. The head of the bone rests on the back of the ischium, a little above the level of the spine, and *below the tendon of the obturator internus*.

*Describe Forward Dislocation.*

Forward dislocation occurs from sudden or violent abduction when the limb is abducted and rotated outwards. The head of the femur leaves the capsule at its inner and lower part. In the obturator variety the leg is lengthened, the thigh is flexed, abducted, externally rotated, and the head of the bone can be felt under the adductor muscles resting upon the obturator externus. There may be pain from pressure upon the obturator nerve. When the bone is dislocated upon the ascending ramus of the pubes, the limb is abducted, markedly everted, and slightly shortened. Edema may result from pressure upon the femoral vein.

*Describe the Method of Reduction of Dislocation of the Hip.*

The patient must lie upon a firm mattress, and the appropriate manipulation be carried on under general anæsthesia. During these movements an assistant should steady the pelvis.



## A. BACKWARD DISLOCATIONS.

- (a) Flex the leg upon the thigh, and the thigh upon the abdomen.
- (b) Abduct, externally rotate, and extend the hip, bringing the injured limb parallel with the sound limb. This combination of movements is termed CIRCUMDUCTION OUT.

## B. FORWARD DISLOCATIONS.

- (a) Flex the knee and hip as before.
- (b) Adduct, internally rotate, and extend the hip, as before bringing the injured limb parallel with the sound limb. These movements are called CIRCUMDUCTION IN. When reduction has been attained, the limb should be placed between sandbags, and carefully massaged. Movement may be permitted after four or five days.

## FRACTURES OF THE NECK OF THE FEMUR.

*How are Fractures of the Neck of the Femur divided?*

- (a) Through the narrow portion of the neck, *i.e.* INTRACAPSULAR.
- (b) Through the base of the neck, *i.e.* the so-called EXTRACAPSULAR. These fractures, however, are *within* the capsule on their anterior aspect.

*How are they distinguished?*

| NARROW PART OF NECK.                                                                                                     | BASE OF NECK.                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| 1. <i>Cause</i> — generally slight and indirect, such as catching the foot in the carpet or slipping off the kerb-stone. | 1. <i>Cause</i> — usually severe and direct violence, such as falling from a height, or a blow on the hip. |
| 2. <i>Force</i> — usually applied longitudinally or obliquely.                                                           | 2. <i>Force</i> — usually applied transversely.                                                            |

- |                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>3. <i>Age</i>—rarely below fifty, most commonly in feeble, aged persons.</p> <p>4. <i>Pain and Constitutional disturbance</i>—slight.</p> <p>5. <i>Crepitus</i>—often obscure.</p> <p>6. <i>Shortening</i> — usually at first not more than one inch.</p> <p>7. <i>Impaction</i>—rare.</p> <p>8. No apparent injury to soft parts about the hip.</p> | <p>3. <i>Age</i>—usually below fifty, chiefly in vigorous adults.</p> <p>4. <i>Pain and constitutional disturbance</i> — usually considerable.</p> <p>5. <i>Crepitus</i> (when not impacted) very readily felt.</p> <p>6. <i>Shortening</i> (when not impacted) at least two inches or more.</p> <p>7. <i>Impaction</i>—common.</p> <p>8. Considerable extravasation, ecchymosis, and signs of direct injury to hip.</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Fracture through the narrow part of the neck may cause death from—

- (a) Hypostatic pneumonia.
- (b) Bed-sores.
- (c) Fat embolism.
- (d) Shock.

*What are the Signs of Impacted Fracture through the base of the Neck?*

In this fracture the upper fragment is driven into the great trochanter, splitting it and increasing its breadth. There will be great pain, but the patient may possess a considerable amount of power over the limb; there will be eversion, slight shortening, and *broadening of the great trochanter*, together with free passive movement in all directions.

*What other Conditions must be distinguished from the above Fractures?*

1. BACKWARD DISLOCATIONS.—In dislocations there is usually marked *inversion*, rigidity of the limb, and absence of resistance when the fingers are pressed into the upper part of Scarpa's triangle.



2. The condition of the hip-joint in RHEUMATOID ARTHRITIS.—The history of the case will help the diagnosis here; slow onset, and absence of any history of injury. The ilio-tibial band is relaxed in fracture; it is not relaxed in rheumatoid arthritis.

*How would you treat Fracture of the Neck of the Femur?*

In fracture through the narrow part of the neck **treat the patient**, whereas in fracture through the base **treat the fracture**.

A. NARROW PART OF NECK.—Place the patient in bed for three or four days with the injured limb between sand-bags. The patient should be propped up in bed to avoid the risk of hypostatic pneumonia. If shortening be marked, apply extension with weight (about six pounds) and pulley. Afterwards the patient should walk about with crutches for four or five weeks.

B. BASE OF NECK.—The patient should be kept in bed for six or seven weeks. The limb may be treated either with a Liston's long splint, or supported in a Hodgen's splint. Afterwards the patient should walk about on crutches for a month.

[For operative treatment of Fracture of the Neck see *Operative Surgery*, Part II.]

## FRACTURES OF THE SHAFT.

*Give a Short Account of Fractures of the Shaft of the Femur.*

They are very common in children, and may be of the green-stick variety. In adults the fracture is usually oblique, being caused by indirect violence—the bone giving way about its middle or weakest point. It may be broken:—

1. BELOW THE LESSER TROCHANTER.—In this case the upper fragment is tilted forwards and everted by the ilio-psoas, the external rotators, and the glutei muscles. The lower fragment is drawn upwards behind the upper by the rectus femoris and ham-strings; inwards by the pectineus



and adductors, and rotated outward by the weight of the limb.

2. JUST ABOVE THE MIDDLE OF THE SHAFT.—The direction of the fracture is downwards, forwards, and inwards. The displacement is similar to that of the fracture below the lesser trochanter. Shortening may vary from one to four inches.

TEST FOR FRACTURE by placing the hand beneath the thigh at the seat of injury. Do this very cautiously or the fracture may be made compound.

*What is the Treatment for Fracture of the Shaft of the Femur?*

Reduce the fracture under general anæsthesia, and either

- (a) Apply two pieces of Gooch splinting in the form of a ferrule, and fix a Liston's long splint along the outer side of the limb. Any necessary extension is provided by means of a weight and pulley, or by Steinmann's apparatus; or
- (b) By using a Hodgen's splint; or
- (c) By vertical extension. This is an excellent method for children; or
- (d) By using the long splint with a perineal band.

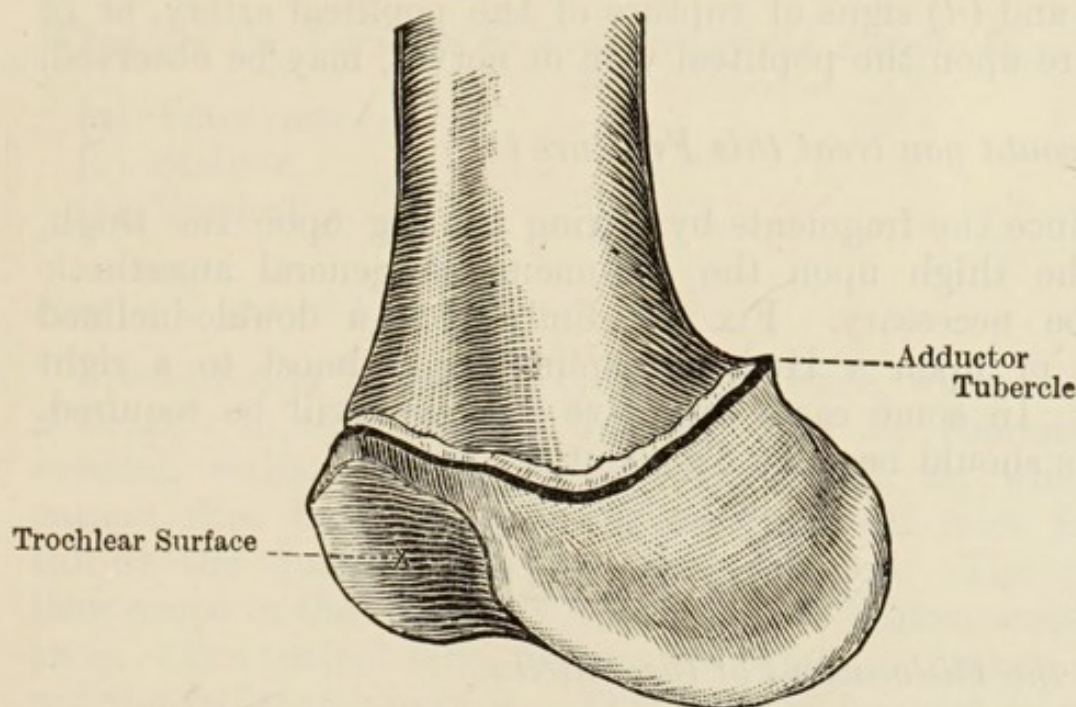
*Describe the 'Long Splint,' and its Use with a Perineal Band.*

1. The long splint is a board 4 or 5 inches wide, long enough to reach from the axilla to 6 inches beyond the foot; through its upper end are two holes, and its lower end is cut into a three-pronged fork.
2. The splint is rolled up in a sheet, so folded as to reach from the tuber ischii to the malleoli; enough of the sheet must be left free to surround both limb and splint afterwards.
3. Lay the splint thus prepared along the injured limb, with the free part of the sheet under the limb.
4. Place the perineal band in position; this consists of a large folded handkerchief passed around the perineum, and the ends brought through the holes at the upper end of the splint.



5. The foot is now fixed to the prongs of the splint by means of another large folded handkerchief, passed in figure-of-eight fashion around the ankle and foot. All points likely to be exposed to pressure must be well padded.
6. Bring the free ends of the sheet around the limb, and fasten tightly to the folds of the sheet surrounding the splint by means of pins.
7. Fasten the upper end of the splint to the trunk by means of a broad flannel bandage.
8. Finally, make extension by pulling on the PERINEAL BAND, and at the same time pushing down the splint, should it be necessary to lengthen the limb. This is the most important point of the whole procedure.

FIG. 11.—LOWER END OF FEMUR.



(Joins the shaft at 20 years of age.)

*Describe Separation of the Lower Epiphysis of the Femur.*

This is a very common injury, and most frequently occurs in boys between the ages of thirteen and eighteen. Some of the chief causes are:—

- (a) Hyper-extension of the knee;
- (b) Wrenching forms of violence; and
- (c) Unskilled attempts to correct deformities of this region.



In the majority of cases the epiphysis passes forwards, and the smooth inferior extremity of the diaphysis can be palpated in the popliteal space. A very important sign is the recognition of the abnormal mobility of the epiphysis. The treatment is similar to that for supra-condylar fracture of the femur.

*Describe Supra-condylar Fracture of the Femur.*

This fracture may be brought about by direct violence, or by falls upon the knees or feet. The **upper fragment** moves slightly forwards, while the **lower fragment** is pulled backwards by the gastrocnemius, plantaris, and popliteus muscles. The leading clinical features are:—(a) the joint swells with serum; (b) on flexing the knee, crepitus is usually obtained; (c) shortening of the thigh about one inch; and (d) signs of rupture of the popliteal artery, or of pressure upon the popliteal vein or nerves, may be observed.

*How would you treat this Fracture?*

Reduce the fragments by flexing the leg upon the thigh, and the thigh upon the abdomen. A general anæsthetic will be necessary. Fix the limb upon a double-inclined plane, or upon a Hodgen's splint bent almost to a right angle. In some cases operative measures will be required. Splints should be worn for about six weeks.

## THE PATELLA.

*Name the Dislocations of the Patella.*

1. Outwards—the most common.
2. Inwards—very rare.
3. Vertical—the edge of the patella resting upon the trochlear surface of the femur.

The outward variety is the commonest owing to the slope of the quadriceps extensor, which passing downwards and inwards, makes an angle with the ligamentum patellæ. When, therefore, the quadriceps is suddenly brought into play, it tends to assume a straight line with the ligamentum patellæ, and jerks the patella outwards.



*What are the Usual Causes?*

Sudden muscular contraction, especially in those who have a tendency to genu valgum; or a blow on the inner side of the patella during **extension**—a similar blow during **flexion** would cause fracture. The patella rests on the outer surface of the external condyle.

*How are the Lateral Dislocations reduced?*

Lay the patient on his back, flex the thigh on the abdomen, and extend the knee-joint, so as to relax the quadriceps extensor. Next, depress the edge of the patella which is further from the middle line (of the leg) so as to raise the other edge and free the bone; the quadriceps will now pull it into position.

*What are the Varieties of Fracture of the Patella?*

- (a) Transverse.
- (b) Stellate.
- (c) Vertical.

*How is it caused?*

Fracture may be due to (1) direct violence, when the knee is flexed; in this case the fracture may be comminuted, vertical, stellate, etc.; (2) muscular action, as, when the patient slips backwards, and to save himself from falling, throws the quadriceps suddenly into action. The patella then snaps in the same way that a stick is broken across the knee. The patient falls, *because* the patella is broken: it is not the fall that breaks it. This form of fracture is always TRANSVERSE, and probably also always opens into the joint as well as into the prepatellar bursa, hence the great effusion into the joint. The site of fracture is at the junction of the middle and lower thirds of the bone, and the periosteum tears at a slightly lower level.

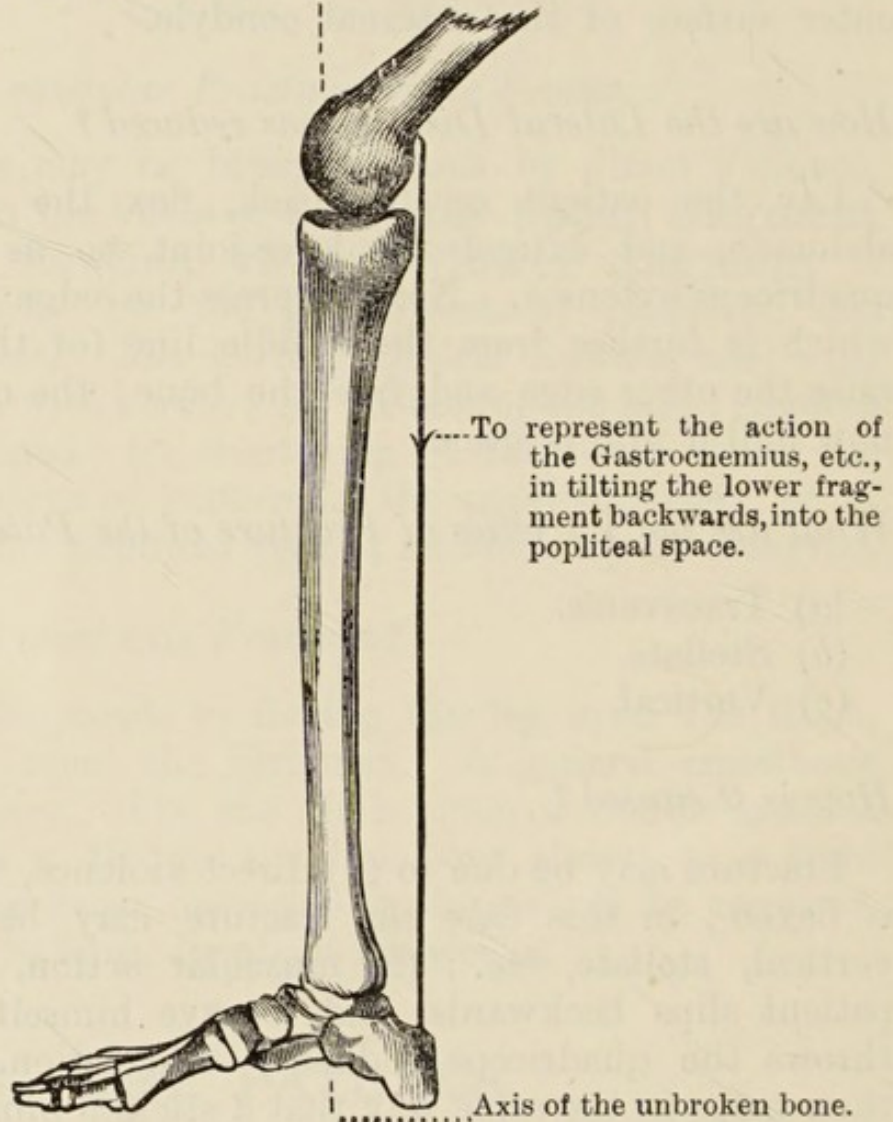
*What are the Signs of Fracture?*

The limb is useless, as the patient cannot extend his leg. Both the knee-joint and the supra-patellar bursa are dis-

tended with fluid. The fragments may be separated for a considerable distance, and the upper fragment may become adherent to the femur.

Fig. 12.—FRACTURE NEAR THE KNEE-JOINT.

Axis of the unbroken Bone



*Give the Treatment.*

Union is usually by fibrous tissue. Bony union may occur if the fragments are in accurate apposition, and if no torn periosteum intervenes between the fragments. Either wire the two fragments together by an open incision, or try the method of Wharton Hood. In the latter method, the patient is kept recumbent for three or four days, with the limb resting upon a pillow. Massage must be employed daily. Next, the lower third of the femur is surrounded by a broad strip of adhesive plaster. The patient is now able to move about with crutches.



## INJURIES OF THE KNEE-JOINT.

### *Describe Dislocation of the Knee-Joint.*

This dislocation is of rare occurrence, and only results from severe violence. The tibia may be displaced in an antero-posterior, or in a lateral direction, forward dislocation being the commonest. Dislocation of the knee-joint is readily diagnosed. Remember that lateral dislocations are often incomplete. An anæsthetic is required before the dislocation can be reduced, and the knee should be flexed during the procedure. After reduction, in antero-posterior displacements, flex the limb and rest it on a pillow. Commence massage and movement immediately. The after-treatment of lateral dislocations consists in placing the leg in a box-splint for a fortnight, so that movement is impossible during this period. Massage, however, is carried out daily.

### *What are the Normal Movements of the Semilunar Menisci ?*

(a) During flexion of the knee-joint the menisci move backwards, during extension they pass forwards.

(b) When the joint is partially flexed, rotatory movement of the leg can occur, and the cartilages move laterally.

### *Describe Mobile Meniscus.*

Undue mobility of the internal meniscus is most commonly found in young male athletes, or in coal-miners. Owing to the internal meniscus being attached to the tibial collateral ligaments, traction upon this ligament drags upon the cartilage ; the coronary ligament is stretched, and the meniscus becomes unnaturally mobile. Acute displacement is usually caused by a rapid flexion and internal rotation of the knee, most commonly the left one. The patient has a sudden excruciating pain, feels sick, the knee fills with serum, and is "locked." Flexion is a painless movement, but extension is incomplete and extremely painful. A tender area will be found to the inner side of the ligamentum patellæ.



*What is the Treatment for this Condition?*

To replace the cartilage the leg should be flexed upon the thigh, and the thigh upon the abdomen. The limb should now be abducted, rotated out, and suddenly extended. Two or three attempts may be required before the cartilage returns to its position.

When reduction has been accomplished, the knee is thoroughly massaged, and then placed between sandbags. Rotation of the joint should not be allowed for four weeks. In cases of recurrent displacement an operation may be necessary in order either to fix or to remove the meniscus.

*Give the Main Points in Connection with a Tear of the Internal Meniscus.*

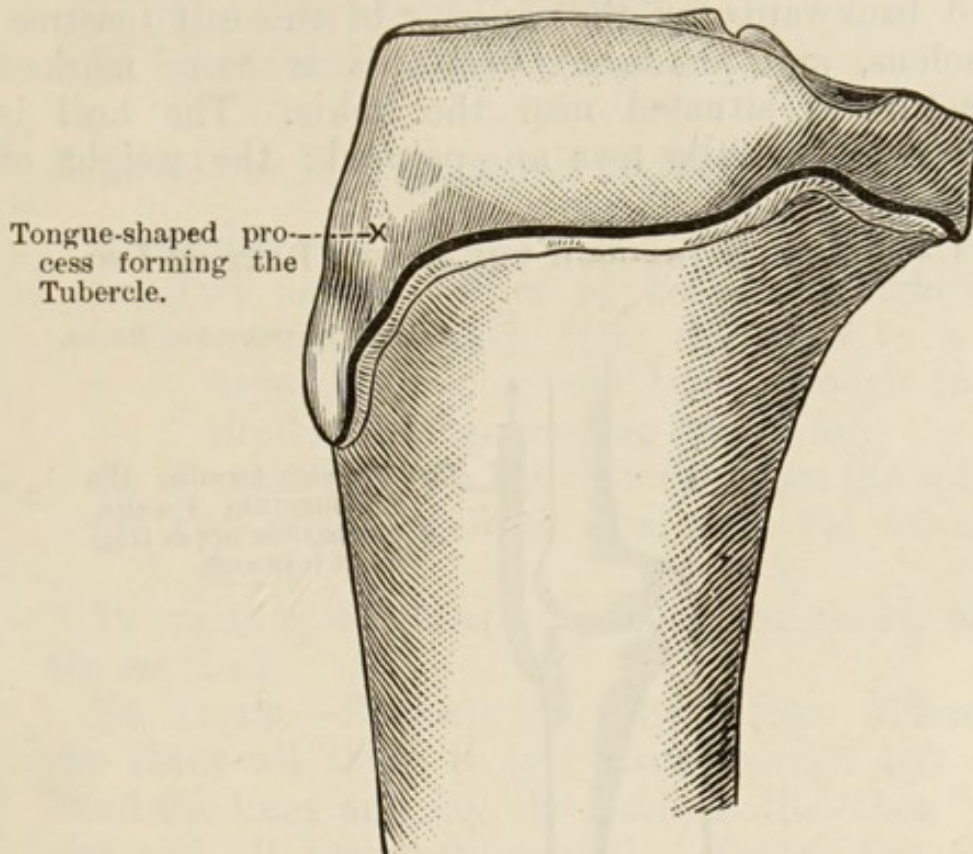
The internal meniscus may become torn either through the body or through one of the cornua, the anterior being more commonly damaged than the posterior. Sometimes the torn cornu is completely separated, forming a loose body in the joint. Usually, however, it projects as a tag. Both classes of cases clinically closely resemble mobile cartilage, but when a loose body is present, the area of tenderness varies with the movements of the joint. Pain on hyper-extension is a constant feature. The joint should be opened and the loose body removed, or the projecting tag of cartilage snipped off.

**THE LEG.***What is Schlatter's Disease?*

A condition in which the lower part of the tongue-like process of the upper tibial epiphysis is torn off, owing to the sudden traction of the ligamentum patellæ. It only occurs in young patients of athletic tendencies, and is often mistaken for tubercular disease of the bone. An X-ray examination considerably helps in making a correct diagnosis. The condition is very intractable and the treatment consists in complete rest, combined with massage of the affected part.



Fig. 13.—UPPER EPIPHYSIS OF TIBIA.



(Unites at 25 years of age).

*Describe Fractures of the Bones of the Leg.*

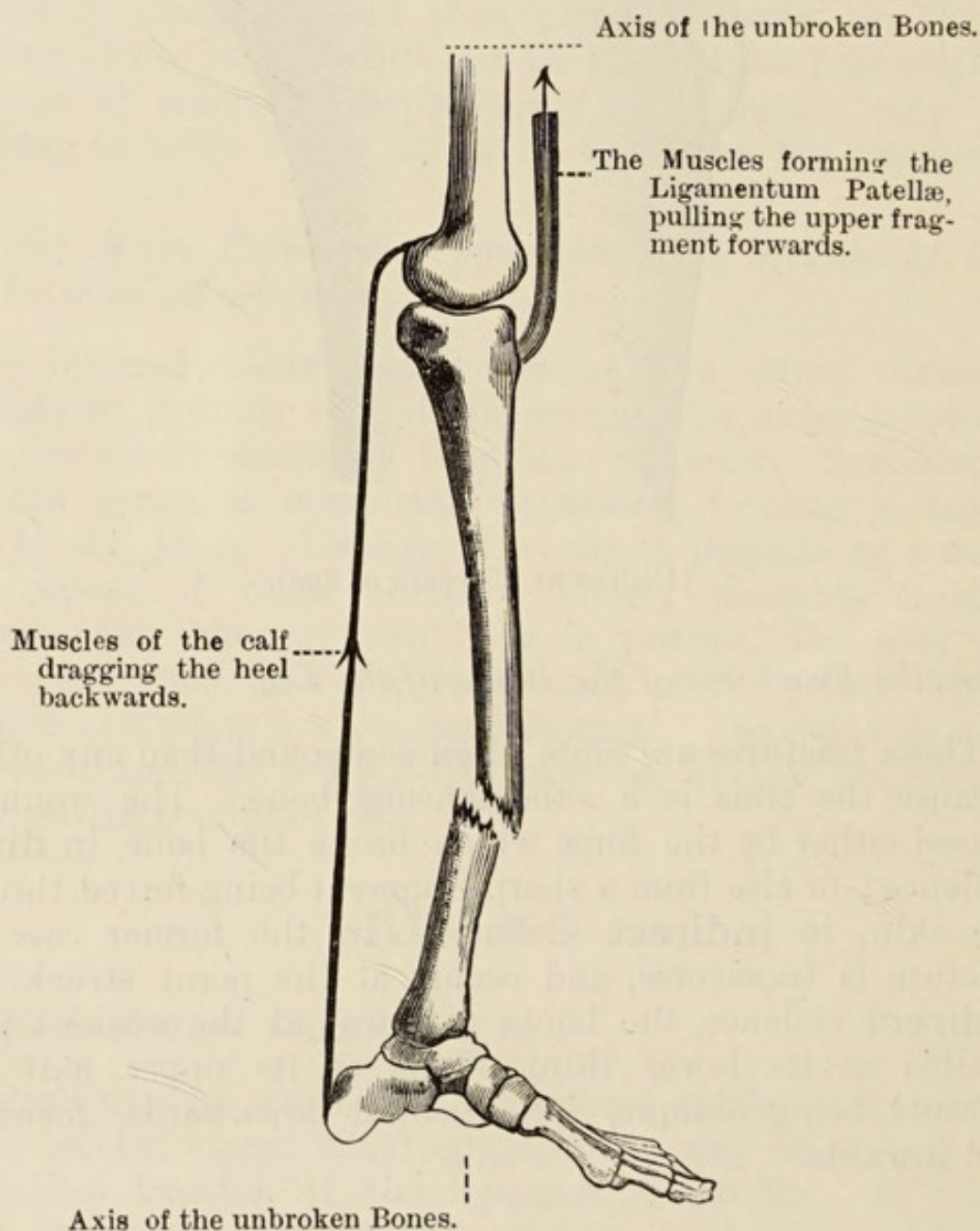
These fractures are more often compound than any others, because the tibia is a subcutaneous bone. The wound is caused either by the force which broke the bone, in **direct** violence ; or else from a sharp fragment being forced through the skin, in **indirect** violence. In the former case the fracture is transverse, and occurs at the point struck. In **indirect** violence, the bones give way at the weakest point—tibia at its lower third, fibula at its upper half—the fracture being oblique, from behind downwards, forwards, and inwards.

*State the Displacement in Fracture.*

If one bone only is broken there will be but little displacement, as the sound bone acts like a splint to the fractured one. In transverse fractures, also, there will be but little displacement. In oblique fractures, where both

bones are broken, the lower fragment is drawn upwards, and pulled backwards by the muscles of the calf (gastrocnemius, soleus, and plantaris), and this is more marked if the fracture is situated near the ankle. The heel is drawn upwards, and the toes are pointed; the weight of

Fig. 14.—FRACTURE THROUGH THE LOWER PART OF LEG.



the foot also tends to rotate it outwards. The upper fragment is tilted forwards by the ligamentum patellæ, and rotated inwards by the sartorius, gracilis, and semitendinosus. The displacement of the upper fragment is more marked the nearer the fracture is to the knee joint.



*How would you treat Fractures of the Leg?*

1. By means of a "Box" Splint.
2. By the ambulatory method.

*Describe the Box Splint and its Mode of Application.*

It consists of:—

- (a) Two narrow pieces of board, of light wood, long enough to reach from the knee to a few inches beyond the sole; and broad enough to prevent the slip-knots from pressing on the leg.
- (b) A sheet folded a little shorter than the splints.
- (c) Two small towels to form pads for the front of the limb.

In addition to these, slip-knots, bandages, and wadding are required.

**TO APPLY.**—Roll up the splints from different sides of the sheet till there is just room enough left for the leg. Bend the knee and lay the limb in the "box" thus made, and pad all prominences well. Fasten the foot at *right angles* to the leg, by figures-of-eight around ankle and splint, the bandage being carried from the inner to the outer side across the dorsum, so as to guard against eversion. Lay the towel pads in front so as to overlap at the fractured part; after which secure the splint to the leg by slip-knots, one of which is to be carried over the double pad of towel in the region of the fracture. The limb is now laid on a couple of pillows or swung, with the knee considerably flexed.

*Why do you use Two Towels in front of the Leg?*

If *one* towel only be used, then the fracture cannot be examined without undoing all the slip-knots; whereas, if *two* towels be used, crossed as above directed, by simply undoing the central slip-knot the ends of the towels can be turned back and the fracture examined.

*Describe the Ambulatory Method.*

This method consists in fixing a plaster-of-Paris case to the leg. The steps are as follows:—

*Surgery, Part II., 3rd Ed.*

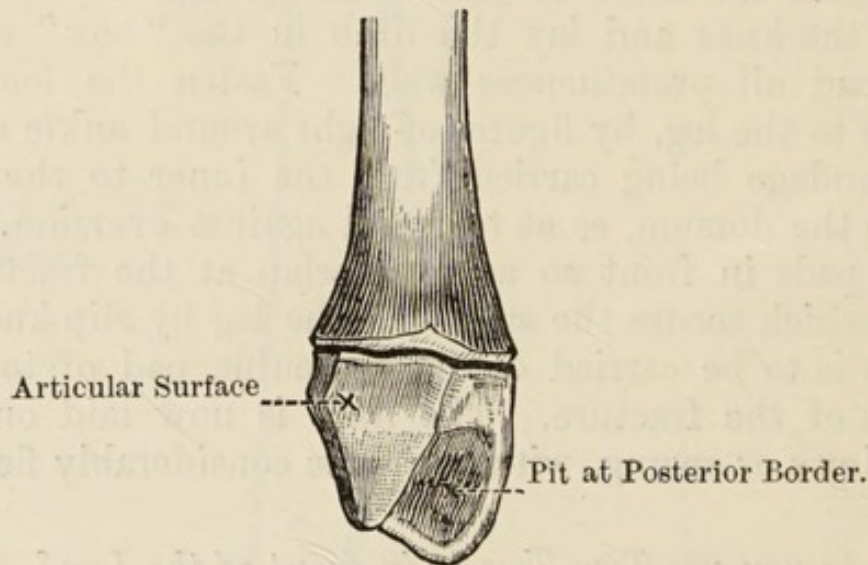
1. Wrap a boracic-lint bandage around the leg as far as the knee, placing extra pieces over the projecting bony points.
2. Apply a thick pad of cotton wool beneath the sole.
3. Fix a plaster-of-Paris bandage over the cotton wool and boracic-lint.
4. When the plaster has set the patient can walk about with a couple of sticks.

The case should be worn for three or four weeks, after which frequent massage is essential.

### *What is Potts' Fracture?*

A fracture of the lower end of the fibula resulting from combined abduction and eversion. It most commonly

Fig. 15.—LOWER END OF FIBULA.



(Unites at 20 years of age).

follows from slipping off the kerb-stone. When **eversion** predominates at the moment of injury, the fibula breaks just above the base of the malleolus, whereas, if **abduction** is the chief attitude, the bone snaps from two to four inches above the malleolus.

In each case the deltoid ligament is torn, or the internal malleolus avulsed; and frequently the inferior tibio-fibular ligament is ruptured.



*What are the Signs of this Injury?*

There may be no marked deformity. The characteristic attitude is—

- (a) Eversion of the foot.
- (b) Foot displaced backwards.
- (c) Toes pointed.
- (d) Great prominence of the internal malleolus.

Other signs are abnormal mobility, crepitus, and marked tenderness over the internal malleolus, deltoid ligament, inferior tibio-fibular ligament, and the seat of fracture. Pressure over the upper part of the fibula causes pain at the broken area. Swelling and discoloration of the neighbouring soft parts.

**Marked eversion** or **backward displacement** is sometimes present.

*What is Dupuytren's Fracture?*

The **complete** form of outward dislocation of the ankle. In this case either the inferior tibio-fibular ligament is torn, or else a strip of bone is avulsed from the tibia; the deltoid ligament is not ruptured. The trochlear surface of the astragalus is completely displaced to the outer side of the bones of the leg, and drawn upwards.

*Give the Treatment for Pott's Fracture.*

The treatment is similar to that for fracture of both bones of the leg. If **marked eversion** be present a Dupuytren's splint should first be worn for a week, while, if **backward displacement** be the prominent feature, a Syme's "horse-shoe" splint should first be applied for a week.

*How is Dupuytren's Splint applied?*

Fasten the split ends of a roller bandage through the holes at its upper extremity.

Apply a towel over the splint so that the doubled end may cover the internal malleolus, forming a soft fulcrum around which the foot is to be inverted; bring down the



bandage (fastened to the holes in the splint) over the pad, and fasten both to the splint with slip-knots.

Lay the splint thus prepared along the **inner** side of the limb; secure it to the upper part of the tibia, not going above the knee. The foot is then brought to a right angle, and inverted by properly applied figures-of-eight, passing from the inner side across the dorsum of the foot and inwards across the sole, and secured round the prongs of the splint.

Lastly, flex the knee, and lay the leg on its inner side on a pillow.

At the lower part be careful not to carry the bandage above the external malleolus, otherwise it will press the broken ends of the fibula towards the tibia.

#### *How is the "Horse-shoe" Splint applied?*

Prepare the splint in the same way as Dupuytren's.

Make a special pad for the front of the tibia—thus: A sheet or large towel is rolled up from each side towards the centre, forming a pad very thick at each side, but thin in the middle, so that when applied along the front of the subcutaneous surface of the tibia, the splint may rest on the rolled-up thick parts of the pad; this steadies the splint and also protects the anterior margin of the tibia from pressure.

Place this pad along the front of the tibia, and lay the splint over it. A bandage is then brought under the **tip of the heel**, carried round the shoulders of the prongs, there crossed, and the figure-of-eight completed round the splint and the ankle, and fastened; the object is to **lift up** the heel and secure it to the splint. Lastly, fasten the splint to the upper end of the tibia.

Note how this differs from Dupuytren's, which is fastened to the upper end **before** the foot is fastened to the lower end.



## ANKLE JOINT.

*What is meant by Dislocation of the Ankle?*

Displacement of the articular surface of the astragalus from the tibio-fibular socket, the astragalus still retaining its natural relations with the other bones of the foot. It is usually an incomplete dislocation, and is caused by some violent and sudden twist of the foot; the 'antero-posterior' forms are produced by the sudden arrest of the foot during some violent impulse of the body, as in leaping from a carriage in motion.

*What are the Varieties?*

1. Outwards
2. Inwards
3. Backwards; the most common.
4. Forwards.
5. Upwards—the astragalus passing upwards between the two bones of the leg. This variety can only occur when the inferior tibio-fibular ligament is torn.

*Give their Clinical Features.*

BACKWARD FORM—(a) The foot appears shortened; (b) the heel is very prominent; (c) the lower ends of the bones of the leg project in front.

FORWARD FORM—(a) The foot appears lengthened; (b) the heel is smaller than normal; (c) the sulci on each side of the tendo Achilles are obliterated; (d) the normal relationship between the astragalus and the internal malleolus is lost.

*What is the Treatment?*

Give a general anæsthetic, extend the foot, and flex the knee. Pull on the foot, make counter-extension on the leg, and manipulate the astragalus into position. Occasionally in forward dislocation it is necessary to divide the tendo Achilles before reduction can be brought about. Massage and movements are carried out for ten or fourteen days.

*Describe Sub-Astragaloid (Taloid) Dislocation.*

As the name implies, the dislocation consists in the rest of the foot being displaced from the talus, the ankle-joint remaining intact. The dislocation is usually only a partial one, and the foot passes backwards and inwards, or backwards and outwards. In both, the dorsum of the foot is shortened, and in the former variety the foot is adducted and inverted, in the latter it is abducted and everted. Reduction is effected in a similar manner to that employed for dislocation at the ankle-joint.

## THE RIBS AND STERNUM.

*Describe Fracture of the Sternum.*

Fracture of the sternum is a somewhat rare injury, and usually accompanies fractures or other injuries to the ribs, or fracture-dislocation of the spine.

It is caused by direct or indirect violence. The fracture generally implicates the gladiolus, and may be transverse, oblique, or vertical. The lower fragment may overlap the upper fragment. The chief signs are—(a) irregularity along the line of fracture; (b) pain on coughing or breathing deeply; and (c) injury of the thoracic viscera is frequently present.

*How would you treat Fracture of the Sternum?*

Reduce the displacement by bracing the shoulders back. The chest should be strapped as in fracture of the ribs, and the patient kept in the supine position for three or four weeks.

*Give the Causes of Fracture of the Ribs.*

1. External violence { (a) Direct.  
                                  (b) Indirect.
2. Muscular action (rare) as in parturition.



With **direct** violence—the fracture occurs at the point struck, and the fragments are driven **inwards**; with **indirect** violence—the ribs usually give way near their angles, and the fragments are driven **outwards**.

*Mention the Chief Complications of Fractured Ribs.*

1. Injury to the pleura or lung.
2. Wounds of the heart and pericardium.
3. Laceration of intercostal vessels.
4. An external wound.
5. In rare cases, the diaphragm may be penetrated and certain of the abdominal viscera injured.

*What are the Signs of a Fractured Rib?*

The ribs usually affected are the 4th, 5th, 6th, 7th, and 8th.

- (a) Severe lancinating pain over the injured part, which is aggravated on taking a deep inspiration, or coughing.
- (b) Crepitus may be detected on palpation; if not, it may be recognised on listening with a stethoscope.
- (c) Pressure on a distal part of the rib elicits pain at the seat of fracture.

Fractured ribs most frequently occur in old people or in the insane.

*How would you treat Fracture of the Ribs?*

Fix the injured side with strips of adhesive plaster. Each strip is about two inches in breadth, and should extend slightly more than half-way round the thorax. They are affixed while the chest is in a position of complete expiration, and should be imbricated from below upwards. A broad roller-bandage is then applied tightly round the chest.

## DISEASES OF BONE.

*Define the Chief Terms used in Diseases of Bone.*

- PERIOSTITIS . . . An inflammation of the periosteum.
- OSTEOMYELITIS . . . An inflammation of the bone-marrow.
- EPIPHYSITIS . . . An inflammation of the ossifying nucleus of the epiphysis.
- RAREFYING OSTITIS . . . An inflammation in which the trabeculae of the bone are absorbed.
- OSTEOPOROSIS . . . A spongy condition of the bone resulting from rarefying ostitis.
- CARIES . . . . . Molecular death of a portion of bone. It is analagous to ulceration of soft parts.
- CARIES SICCA . . . A caries without suppuration.
- NECROSIS . . . . . Death *en masse* of a portion of bone. It is analagous to gangrene of soft tissues. The dead area of bone is termed a **sequestrum** ; when superficial—an **exfoliation**.
- SCLEROSIS . . . . . A condition in which the bone becomes heavier and denser.
- HYPEROSTOSIS . . . An increase in the thickness or girth of a bone, owing to an exaggerated formation of new bone by the periosteum.

*Describe Atrophy of Bone.*

Atrophy of bone may be either eccentric or concentric. The former is probably due to arterio-sclerosis of the vessels supplying the bone, and is a senile change. The affected bone shows no change in size or shape, merely in structure. The neck of the femur is a common site. Concentric atrophy may be from (a) pressure, *e.g.* from cranial tumours ; (b) disuse, as in ankylosed limbs ; or (c) trophic disorders, as in infantile paralysis. All concentric atrophies show changes in size, shape, and structure.



## RICKETS.

*Give the Etiology of Rickets.*

Rickets is a disease caused by bad hygienic surroundings, and defective nutrition. The food given to the child does not contain sufficient proteins, animal fats, and calcium salts. Ill-health of the mother during pregnancy is said to be a contributing factor. Thymus insufficiency is put forward as a cause by some authorities.

*Mention the Main Points of the Pathological Anatomy.*

1. The bones are exceedingly soft.
2. The periosteum is thick, very vascular, and adherent to the bones.
3. The cartilage of the epiphysial disc grows actively, and hence the broadening in the region of the epiphyses.  
 "The degree of enlargement of the epiphyseal junctions is directly proportional to the amount of movement to which the bone is subject." (J. Thomson).
4. Excessive vascularity of the bone-marrow.
5. Imperfect calcification of the newly-formed bone.
6. Osteoporosis of the long bones, and also of the skull bones.

*What are the Typical Signs of Rickets?*

1. Late closure of the fontanelles.
2. Square head, with areas of craniotabes and bosses.
3. Irregularity of the mouth and teeth.
4. Beading at the costo-chondral junction, the rickety "rosary."
5. "Pigeon-breast" thorax.
6. Enlargement of the abdomen.
7. Shortening and curving of the bones of the extremities.
8. Perspiration, especially of the head.
9. Diarrhœa, the stools being of a greenish colour, and having an offensive odour.
10. Marked restlessness as the patient lies in bed.
11. Tendency to bronchial and pulmonary troubles.
12. Flabbiness of the muscles.



Late closure of the fontanelles is due to the fact that in rickets there is delayed ossification at the periphery of membranous bones. (Tubby). The prominence of the abdomen is owing to:—(a) flabby muscles, (b) enlarged viscera, and (c) distension of the intestines. Craniotabes is usually in the occipital region, and is caused by an atrophy of bone from pressure.

*Give the Treatment for Rickets.*

Correct any intestinal or gastric disturbances, and improve the surroundings. Salt water baths followed by massage. Phosphorus,  $\frac{1}{100}$ th of a grain dissolved in cod-liver oil (Thomson and Miles). Keep the child in the recumbent position. In children over six years of age any limb deformities present will probably require operation.

*Describe Scurvy-Rickets (Barlow's Disease).*

This condition is really a scurvy and occurs in children under two years of age who have been reared upon proprietary foods. The child is listless and markedly anæmic for a time. Hæmorrhages occur in the skin, conjunctiva, from the gums, and beneath the periosteum, especially of the femur. Hyperostosis occurs at the site of these subperiosteal hæmorrhages.

*What is the Treatment for Scurvy-Rickets?*

Stop the proprietary foods, substituting human or cow's milk. Fruit juices rich in citric acid. Potatoes mashed in milk (potato-cream) may be given for a time. Treat any rickety element present.

## TUMOURS OF BONE.

Osteomata, chondromata, odontomata, and pulsatile tumours of bone have been described in Part I.



*Give the Varieties of Sarcomata occurring in Bone.*

1. Myeloid, or giant-celled ; frequently called a myeloma.
2. Cellular, either round-celled or spindle-celled.
3. Fibro-, chondro- and osteo-sarcomata.

*Describe a Myeloma.*

This tumour is most frequently found in the neighbourhood of the knee-joint, growing in the lower end of the femur, or in the upper end of the tibia. Other common sites are the upper part of the humerus and the lower end of the radius. It usually appears in young adults. It is an innocent tumour for (*a*) it is painless, (*b*) grows slowly, (*c*) rarely has any tendency towards metastasis, and (*d*) causes no constitutional disturbance. An X-ray examination materially aids the surgeon in making a diagnosis.

*Describe Cellular and Fibro-Sarcomata.*

The cellular varieties originate in the bone-marrow or in the periosteum of long bones. Fibro-sarcomata arise from the deep layer of the periosteum. In **periosteal** tumours the first sign is the presence of a fusiform *swelling*, the tumour giving to the limb the appearance of a "leg of mutton." Ossification of the fibrous trabeculæ passing from the periosteum to the cortex often occurs in these tumours, forming an osteo-sarcoma. Crepitation can be detected when the part is firmly palpated.

In **central** sarcomata the first symptom is a constant aching *pain*, which is aggravated at night. Swelling is not a noticeable feature until late in the disease. In some cases pulsation can be detected in the affected portion of bone.

A pathological fracture is sometimes the first sign of sarcoma attacking a bone.

*Give the Treatment for Sarcoma of Bone.*

1. Resection of the affected portion, then substituting a corresponding portion of the tibia of the sound leg.



2. If resection be contra-indicated, a subcapsular enucleation may be carried out (see Part I., page 30).

3. Injection of Coley's fluid (see Part I., page 30).

*Describe Multiple Myelomata.*

A rare disease mainly affecting men over forty years of age. It is a primary new formation affecting the medulla and cancellous tissue of bones of the cranium and trunk; the limb bones are less frequently affected. Histologically, the neoplasm consists of nucleated round cells closely resembling marrow cells. The leading clinical features of the disease are :—

- (a) Local absorption of bones.
- (b) An absence of metastases.
- (c) Severe neuralgic pains.
- (d) Intermittent fever.
- (e) Progressive wasting, and
- (f) The appearance of Bence-Jones' albumose in the urine.

To test for Bence-Jones' albumose—add a little acetic acid to the urine and heat gently. A dense milky precipitate appears, which on further heating disappears.

## SYPHILITIC DISEASE OF BONE.

*Give the Pathology of Syphilitic Disease of Bone.*

Syphilis may attack the skeleton both in the inherited and acquired varieties. It is more common in the former than in the latter condition. During the early secondary stage an evanescent periostitis may occur, while in the late secondary and tertiary stages, periostitis and osteomyelitis are found. The chief results are syphilitic caries, necrosis, and the formation of periosteal nodes. A node is a localised hyperostosis, resulting from the ossification of a subperiosteal gumma.

Syphilitic sequestra are very dense and heavy, and separate exceedingly slowly.



*Contrast Syphilitic and Tuberculous Diseases of Bone.*

| TUBERCLE.                                               | SYPHILIS.                                                  |
|---------------------------------------------------------|------------------------------------------------------------|
| Usually attacks the articular extremities.              | Syphilis appears in the shafts.                            |
| Joint complications very common.                        | Joint complications rare.                                  |
| Mainly a rarefying osteitis, resulting in OSTEOPOROSIS. | Mainly a condensing osteitis, resulting in OSTEOSCLEROSIS. |
| Caries commoner than necrosis.                          | Necrosis commoner than caries.                             |

*Name the Bones most commonly affected by Syphilis.*

Those of the cranium, nasal, and palate bones, tibia, femur, and phalanges.

*Give the Signs of Syphilis of Bone.*

A swelling may be detected, smooth, elastic in the centre, dense round the periphery. A sinus may lead to the surface. Severe "boring" pain often causing insomnia.

*What is the Differential Diagnosis?*

A gumma must be distinguished from—

- (a) Tubercle.
- (b) Sarcoma.
- (c) Chronic osteomyelitis.

The presence of syphilis may be deduced from the—

- (a) History.
- (b) X-ray examination.
- (c) The presence of Wassermann's reaction.
- (d) The improvement following the use of anti-syphilitic remedies.

## ACUTE OSTEOMYELITIS.

*Give the Surgical Pathology of Acute Osteomyelitis.*

Acute osteomyelitis generally results from infection by staphylococcus pyogenes aureus, but may follow streptococcal diseases, or even typhoid fever. The organisms reach the bone-marrow *via* the nutrient and the metaphyseal arteries, and lurk in the small vessels of the ossifying junction (the metaphysis). They may remain latent in this region for a considerable time, but whenever the vitality of the bone is lowered, as from trauma, wading in cold water, etc., they begin to multiply. If the disease attacks both extremities of the bone, the term **bipolar osteomyelitis** is used. Pus and granulation tissue are formed, the former travelling along the Haversian canals until the exterior of the bone is reached. The pus lifts up the periosteum for a variable distance, and, owing to the action of the toxins of the organisms, this portion of the shaft undergoes necrosis. In the course of six or seven weeks the dead portion is separated by granulation tissue, and forms a **sequestrum**. Meanwhile, the periosteum is producing a new bony case, the **involucrum**, the latter being perforated here and there by the pus endeavouring to reach the surface. The holes in the involucrum are called **cloacæ**.

*What is meant by the term, "Acute Arthritis of Infants?"*

A purulent inflammation of the joint occurring in young children, caused by the pus in acute osteomyelitis erupting into the neighbouring joint.

*What are the Signs of Acute Osteomyelitis?*

|             |   |                                                                                                                                                                                                     |
|-------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (A) GENERAL | { | Usually a rigor, followed by an increase in temperature; and having morning remissions. Headache and gastro-intestinal disturbance. Cerebral symptoms such as delirium and convulsions often occur. |
|-------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



(B) LOCAL

Pain and exquisite tenderness of the affected region; swelling of the bone near the epiphysis is found at a later period. Edema of the surrounding parts takes place, and subsequently an abscess forms. When the abscess bursts a sinus develops, the discharge from which often contains small fragments of bone, fat droplets, and even blood.

*Give the Differential Diagnosis of Acute Osteomyelitis.*

Acute osteomyelitis must be diagnosed from—

- (a) Acute rheumatism.
- (b) Scarlet fever.
- (c) Erysipelas.
- (d) Cellulitis.
- (e) Erythema nodosum.

The main difference between acute rheumatism and acute osteomyelitis can be tabulated as follows:—

| ACUTE RHEUMATISM.                | ACUTE OSTEOMYELITIS.                                |
|----------------------------------|-----------------------------------------------------|
| Fugitive pains.                  | Pains are constant and stationary.                  |
| No rigors.                       | Rigors.                                             |
| Moist tongue and skin.           | Dry tongue and skin.                                |
| Joints more affected than bones. | Bones more affected than the joints.                |
| Multiple sites.                  | Single site, double in bipolar osteomyelitis.       |
| Heart early involved.            | Heart escapes, unless a septic endocarditis occurs. |
| No suppuration.                  | Suppuration.                                        |

*How would you treat Acute Osteomyelitis?*

At the commencement of the disease marked benefit results from the application of Bier's bandage for twenty

hours daily. If pus has already formed, trephine through the cortex of bone until the marrow is reached, then approximate the edges of the skin wound by retention stitches tied loosely, and employ passive hyperæmia as before. When a sequestrum is present, this should be removed (sequestrectomy), and the sinuses scraped out.

*What Method is adopted for treating a Bone Cavity?*

Mosetig-Moorhof's plan is probably the most effectual. The cavity is disinfected, and then carefully dried by a current of hot air. Afterwards, it is filled with a mixture of powdered iodoform (60 parts), oil of sesame (40 parts), and spermaceti (40 parts). Subsequently stitch up the soft parts without drainage.

If a simple method of closing the cavity be required, pack it with iodoform gauze; changing the gauze is necessary until healing commences.

*What are the Indications for Amputation in Acute Osteomyelitis?*

1. If two adjacent bones and the intervening joint are affected.
2. Excessive infiltration of the neighbouring soft parts.
3. If after opening up the marrow, the temperature remains elevated, and the patient is getting worse.

*What is Brodie's Abscess?*

A circumscribed abscess of bone occurring in young adults, following upon a previous attack of acute osteomyelitis.

*Give the Morbid Anatomy.*

The abscess, usually found near the ossifying junction (the metaphysis), is generally single, and most frequently occurs in the upper end of the tibia, the lower end of the tibia, or the lower end of the femur. During the quiescent period a small cavity is found, lined with an osteogenetic membrane, and surrounded by a zone of condensed and



sclerosed bone. The cavity is filled with clear serum. If examined during the active stage, pus is found, and the cavity lined with granulation tissue. The affected bone as a whole is thicker and heavier than normal.

*Give the Clinical Features.*

Pain is at first vague; later of a "boring" character. The pain is markedly increased on movement, and presents nocturnal exacerbations. On percussion, tenderness can be demonstrated over the seat of the abscess. The neighbouring joints often develop a hydrops.

In the early stages, both the pain and the hydrops are remittent.

If the abscess penetrate into the joint, an acute arthritis follows.

An X-ray photograph should be taken.

*What is the Treatment?*

The bone should be opened, and the abscess dealt with in a similar manner to that of a bone cavity in acute osteomyelitis.

*Describe Typhoid Osteomyelitis.*

The vertebræ, ribs, and tibiæ are the commonest bones to be affected. In a good many cases suppuration does not ensue. The symptoms usually come on about two months after the onset of the disease. Pyrexia and constitutional symptoms are usually absent. The affected bones are painful and become thickened and sclerosed. Occasionally œdema and redness occur in the superficial tissues. As a rule necrosis does not follow. The treatment consists in rest, the application of mild counter-irritants to the part, and Bier's passive hyperæmia.

## OSTITIS DEFORMANS.

*What is Ostitis Deformans?*

A bony condition (Paget's disease of bone) found in individuals over fifty years of age. It is an incurable disease whose etiology is unknown.



*Give the Chief Pathological Changes.*

The sequence of changes is—

- (a) The bone-marrow degenerates into a highly vascular connective tissue; the bone undergoes rarefaction, and bends beneath the weight of the body, hence deformities occur.
- (b) The periosteum and bone-marrow form an excess of new bone; patches of sclerosis occur, and the medullary canal may be obliterated.
- (c) The limbs may actually increase in length.

In the skull many alterations in the normal texture take place, the diploë disappears, and the sutures are obliterated.

*What are the Clinical Signs?*

Two varieties are found, painful and painless. Males are affected more frequently than females. In males the bones of the lower extremity are mainly involved, in females those of the upper extremity. The disease may first show itself in vague pains in the limbs, or in deformity of the femur or tibia. Sometimes the patient may notice that he requires a larger size of hat. An individual with Paget's disease presents a typical appearance (a) shortened stature, (b) spine curved, (c) head bent forwards, (d) curving of the legs, and (e) the arms appear excessively long. Arterio-sclerosis is a prominent feature.

*What is the Treatment?*

Nothing can be done to check the disease; any symptoms which arise should be treated appropriately. In a large number of cases the affected bones become sarcomatous.

## TUBERCULOUS DISEASE OF BONE.

*In what Manner does Tubercle affect Bones?*

Tubercular disease of bone is more frequently due to the bovine type of bacillus than to the human type; hence the ingestion of infected milk and meat constitutes the chief



source of the disease. The cervical lymphatic glands are involved first, and the tubercular toxins travel from these by the blood-stream. They cause an endrarteritis of the medullary artery which leads to a myxomatous degeneration of the bone marrow. The organisms themselves reach the bone partly by the medullary artery and partly by the metaphyseal twigs from the circus vasculosa surrounding each joint. An osteomyelitis or a periostitis follows. Both forms develop slowly, and, as a rule, painlessly. They may not be discovered until a cold abscess appears in the soft tissues. Tubercular disease has a great tendency to attack the adjacent joints.

*Describe Tuberculous Periostitis.*

This form is most frequently met with in the ribs, sternum, vertebræ, and skull. Granulation tissue forms in the deep layer of the periosteum, this tissue caseates, and subsequently a doughy swelling appears. The pus penetrates the periosteum and discharges on to the surface, leaving a sinus.

*What is the Differential Diagnosis ?*

In the subperiosteal stage tuberculous periostitis must be distinguished from :—

- (a) Sarcoma. X-ray examination and tuberculin tests are very important.
- (b) Chronic osteomyelitis.
- (c) Subperiosteal lipoma.
- (d) A gumma.

*Give the Treatment.*

Try the usual measures for tuberculous disease, *i.e.* fresh air, rest, and tuberculin. If these fail, either inject iodoform emulsion (10 per cent.), or open up the parts and scrape away the diseased bone.

*Describe Tubercular Osteomyelitis.*

This may be either localised or diffuse. In each case the disease results in—



- (a) A rarefaction of the bone from crumbling away of the trabeculæ.
- (b) Enderarteritis of all the blood vessels.
- (c) A fibrosis of the bone marrow.

If a staphylococcal infection is added, new bone is formed as in ordinary staphylococcal osteomyelitis.

#### *What is Tuberculous Dactylitis?*

A diffuse form of osteomyelitis attacking the phalanges, metacarpals, or the metatarsals. When expansion of the bone results, the term *spina ventosa* is sometimes applied. Expansion occurs owing to the formation of new bone by the periosteum. The clinical features are those of a spindle-shaped swelling, which is painless, slowly growing, and only slightly interfering with movement.

#### *What is the Treatment?*

Fix the finger to a splint and apply Bier's congestion, the bandage being wound round the upper arm.

If an abscess forms or a sinus persists, then open, and scrape with a sharp spoon. If the axillary glands are involved, it is better to amputate the finger.

## MISCELLANEOUS DISEASES OF BONE.

#### *Describe Hypertrophic Pulmonary Osteo-arthropathy.*

An enlargement of the lower parts of the legs and arms following chronic lung disease. A serous effusion occurs into the ankle and wrist joints. The deformity is symmetrical and eminently characteristic. The fingers resemble drum sticks; the thumb, the tongue of a bell; and the nails are curved like a parrot's beak.

#### *Describe Acromegaly.*

This disease results from an enlargement of the anterior lobe of the pituitary (hypophysis cerebri), either from hæmorrhage or a neoplasm. A trabecular atrophy occurs



in the bodies of the vertebræ, the bones of the carpus and tarsus, and in the angle of the lower jaw. In these bones also a subperiosteal deposit of new bone is found. The lower jaw is elongated and its angle widened. The soft parts of the nose, lips, tongue, hands, and feet hypertrophy. Additional clinical features are :—

- (a) Optic atrophy.
- (b) Enlarged liver and spleen.
- (c) Glycosuria.
- (d) Violent headaches.
- (e) Dilatation of the heart.

*Describe Achondroplasia.*

A disease occurring in utero during the third to the sixth months. It is a disturbance of the normal process of ossification of the primary cartilage of the epiphyses; the long bones are therefore chiefly affected, being shortened and thickened. The bones of the cranial base are also involved, resulting in a high cranial vault and a recession of the root of the nose. The trunk is of normal length. The condition has to be distinguished from adult cretinism.

## THE THORAX.

*Give definitions of the following Conditions.*

- PNEUMOTHORAX.** Air in the pleural cavity; usually results from injury, as fracture of the ribs, foreign bodies, violent muscular effort, and may be secondary to the various forms of pulmonary tuberculosis—from perforation.
- HÆMOTHORAX.** Effusion of blood into the pleural cavity; generally from a wound of the intercostal vessels, or of the lung substance.
- SURGICAL EMPHYSEMA.** Air in the subcutaneous tissue; frequently from fracture of the ribs. It is often associated with pneumothorax and collapse of the lung. The skin of the affected area crepitates on palpation.

- HYDROTHORAX.** Effusion of serum into the pleural cavities. It is generally bilateral.
- PYOTHORAX** A collection of sero-purulent or purulent  
**OR EMPYEMA.** fluid in the pleural cavity. Two varieties are described, pyogenic and tubercular.

*Describe Paracentesis Thoracis.*

Paracentesis thoracis consists in tapping the chest for the removal of serous or purulent fluid. A point is chosen in the 7th or 8th intercostal space, a little external to the angle of the scapula. The needle is pushed into the chest close to the edge of the *lower* rib in the space chosen; this avoids wounding the intercostal artery which lies near the lower border of the upper rib of the space. The fluid must be allowed to issue slowly.

*Where is the Pericardium tapped?*

In the 5th space on the left side close to the sternum, or  $1\frac{1}{2}$  inches away from it, in order not to injure the pleura or the internal mammary vessels. Use a very fine needle, and draw off *very slowly*. When the effusion is purulent, it is better subsequently to incise and drain the pericardium.

*How may Pyogenic Empyema arise?*

- (a) Secondary to other pulmonary diseases, *e.g.* pleurisy, rupture of a bronchiectic abscess, etc.
- (b) Following trauma of the lung and pleura.
- (c) By extension of an abdominal sepsis through the diaphragm, *e.g.* after sub-phrenic abscess.
- (d) Secondary to acute infective fevers, *e.g.* typhoid; the organisms being conveyed by the blood stream.

*Give the Chief Clinical Features of Empyema.*

- (a) Dyspnoea.
- (b) Rapid pulse.
- (c) Elevated temperature.



- (d) Rigors.
  - (e) Fixation of the affected side of the thorax.
  - (f) Dulness on percussion.
  - (g) Absence of breath sounds.
  - (h) Absence of vocal fremitus.
- } over the affected area.

*Why should an Empyema be treated as speedily as possible?*

Because the lung is pushed aside, and hopelessly bound down, so that it cannot expand again; further, the pus may burst of its own accord into the bronchi, or through the chest wall, or behind the diaphragm into the abdomen, leading to a sub-phrenic abscess, or cause death by general septic absorption.

*On what Points does the Prognosis of Empyema depend?*

- (i.) Age of patient—much more hopeful in the young, as the disease is usually of the pneumococcal variety.
- (ii.) Presence or absence of adhesions binding the lung down. If bound down, the prognosis is very much graver.
- (iii.) Septicity—when the pus is septic, it adds very much to the gravity of the case, especially if, at the same time, the patient is no longer young.

*What Methods are used in Treatment?*

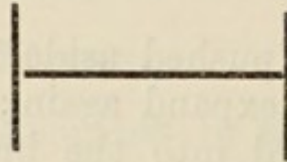
- (i.) Aspiration—see paracentesis thoracis.
- (ii.) Incision and drainage, with rib resection—thoracotomy.
- (iii.) Thoracoplasty.
- (iv.) Thoracoplasty and decortication of the lung.

*If Aspiration fail, what is next done?*

An incision should be made over the 7th, 8th, or 9th rib, in the posterior axillary line, and two drainage tubes inserted within the pleural cavity for about a quarter of an inch. Two tubes are introduced because if one tube becomes blocked, drainage can still continue.

*What other Plan is adopted in order to have Free Drainage?*

Resection of about  $1\frac{1}{2}$  inches of a rib, to give the tube more room, especially if the intercostal spaces be at all narrow. The periosteum is left, and to reflect this use an incision like this.



In the young it might be as well to remove the periosteum, as new bone forms so rapidly.

*What are the Main Points in the After-treatment?*

- (i.) See that the patient lies on the affected side to encourage drainage.
- (ii.) Fresh-air treatment as early as possible.
- (iii.) Employ suitable breathing exercises.

*When is "Thoracoplasty" to be adopted?*

In cases where the lung is bound down and cannot expand further, and the chest is unable to contract any more, so that the abscess cavity cannot become obliterated, and hence pus continues to be formed. We may—

- 1. Force out the soft parts by increasing the pressure in the lung—*e.g.* by using a spirometer (Dr James).
- 2. Allow the chest wall to fall in by removal of part of several ribs.

*What is meant by the Term "Decortication of the Lung"?*

The removal of the thickened visceral layer of pleura from the lung. It is an operation attended with considerable hæmorrhage. It is performed when the lung is bound down to the side of the vertebral column. The result of the procedure is to allow the lung to expand again.

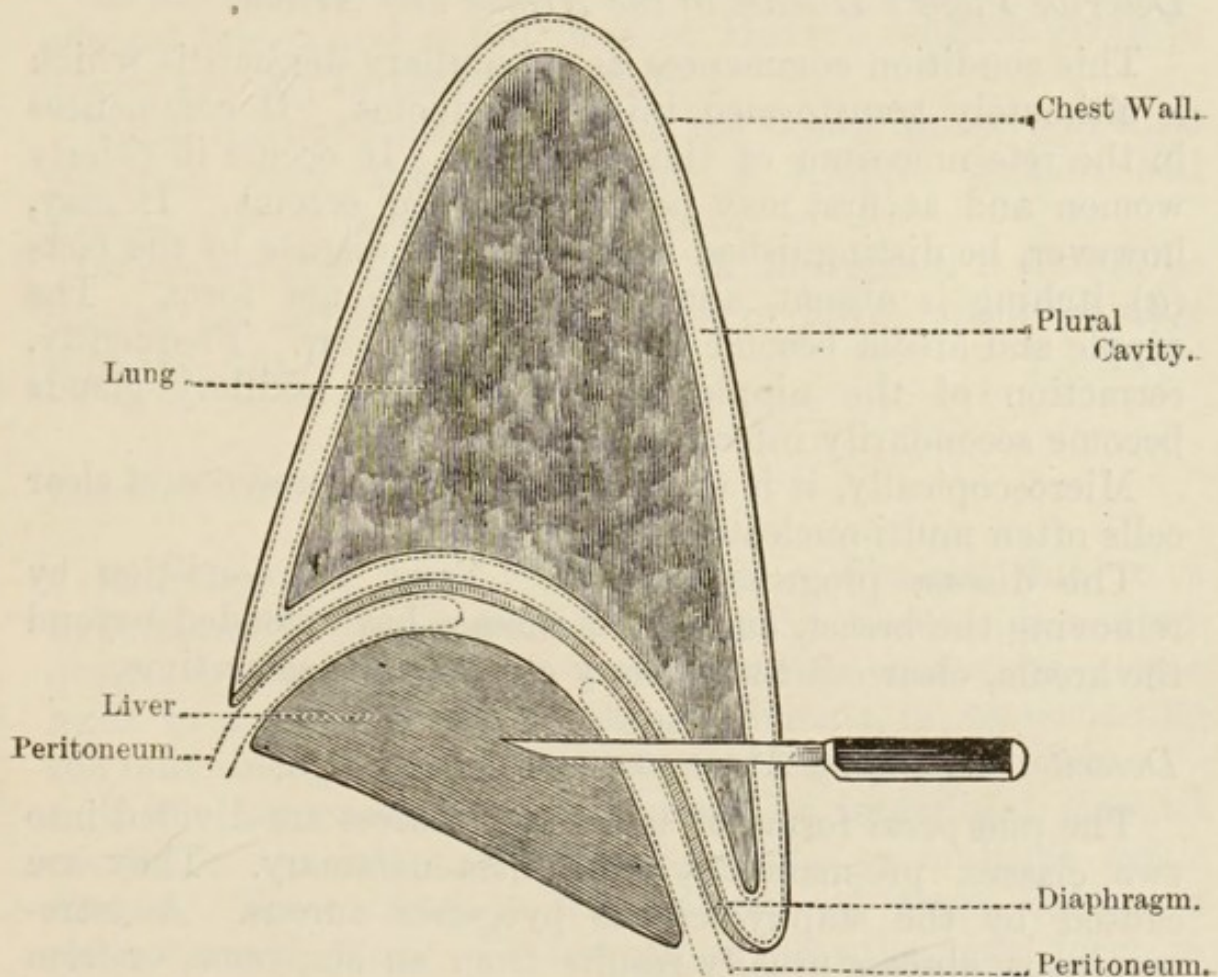


## PENETRATING WOUNDS OF CHEST WALL.

*Do they always cause Collapse of the Lung?*

No. If the wound does not involve the lung substance, and is made when the lung is expanded during inspiration, it may not collapse, but produce a hernia instead. Under opposite conditions the lung will probably collapse.

FIG. 16.—STAB THROUGH BASE OF LUNG (DIAGRAMMATIC).



*What is the Explanation of the Collapse.*

It is *not* due to the air rushing into the pleural cavity, as in any case the pressure *in* the lung and that *outside* is equal, both being that of the atmosphere. The collapse is due to the contraction of the *elastic tissue* of the lung. The elasticity of the lung is equal to 30 m.m. of mercury.



*If in doubt about the Penetrating Character of the Wound what would you do?*

*Leave the wound alone and wait?* in no case use a probe lest a non-penetrating wound be made a penetrating one by the surgeon. If in doubt treat the case as if it were simple fracture of a rib. In many cases there can be no doubt—sunk and depressed appearance of the patient, irregular pulse and oppressed respiration, and bloody sputum when the *lung* is wounded.

## THE BREAST.

*Describe Paget's Disease of the Nipple and Areola.*

This condition commences as a papillary dermatitis which is ultimately transformed into a carcinoma. It commences in the rete mucosum of the epidermis. It occurs in elderly women and at first may be mistaken for eczema. It may, however, be distinguished from the latter disease by the facts (*a*) itching is absent, and (*b*) vesicles do not form. The nipple and areola become bright red in colour. Frequently, retraction of the nipple occurs, and the axillary glands become secondarily infected.

Microscopically, it is characterised by the presence of clear cells often multi-nucleated—Paget's cells.

The disease progresses slowly. Treat the condition by removing the breast, and if the disease has extended beyond the areola, clear out the axillary gland at the same time.

*Describe Mammary Abscesses.*

The puerperal forms of mammary abscess are divided into two classes, pre-mammary and intra-mammary. They are caused by the staphylococcus pyogenes aureus. A retro-mammary abscess usually results from an empyema, or from an infection of a hæmatoma, or from tubercular disease of a rib.

Intra-mammary abscesses are of more frequent occurrence than the other two varieties.

*What are the Symptoms of Intra-mammary Abscesses?*

Severe lancinating pains during lactation; later, as pus



forms, the pain is of a throbbing character. The temperature rises to  $101^{\circ}$  or  $102^{\circ}$  F. Headache and gastro-intestinal derangements are usually present.

Locally, the breast is exquisitely tender, swollen, and reddened. When pus has formed the skin colour takes on a dusky hue, and fluctuation can be recognised. Subsequently, the abscess reaches the surface, pointing in the vicinity of the areola.

*How should Intra-mammary Abscesses be treated?*

In the first place the milk should be withdrawn from the affected breast, and a full dose of Henry's solution given to discourage any further formation.

Small incisions are made into the breast (always in lines radiating from the nipple) and a Klapp's suction bell applied for an hour twice *per diem*.

When an abscess is burrowing in the gland, it should be opened up, any loculi present broken down, and a drainage tube inserted.

*Describe Chronic Mastitis.*

Pathologically, chronic mastitis is a fibrosis, due to a hyperplasia of the periacinar connective tissues; the subsequent contraction of the newly-formed connective tissue leads to atrophy of the secreting elements, or, by occluding the milk-ducts, causes numerous retention cysts to form.

In the former condition, periacinar or interstitial mastitis results, in the latter, periductal mastitis or multiple cystic disease. These cysts, in the majority of cases, contain a clear-coloured fluid. Papillomatous growths may form in the larger cysts.

*What are the Chief Theories held regarding the Cause of Chronic Mastitis?*

(1) That it results from a chronic toxæmia, *e.g.*, syphilis, or old-standing constipation.

- (2) Traumatic.
- (3) Premature senile decay.
- (4) Uterine or ovarian disturbances.
- (5) A perversion of some internal secretion.

*What are the Clinical Features?*

The disease is mainly found in women near the menopause. The patient may complain of stinging pains shooting down the arms or towards the shoulder.

Besides a definite swelling, the breast has a knotty feeling. The swelling may suggest a scirrhus, but to distinguish, note—

- (a) The nipple is rarely retracted.
- (b) The axillary glands, although often enlarged, are not **hard** or **fixed**.
- (c) The skin moves freely over the tumour, and the mamma moves readily over the pectoralis major and its fascia.
- (d) On pressing the breast against the chest with the palm of the hand, the **swelling disappears**.

*Give the Treatment for Chronic Mastitis.*

If in doubt, or if there is the least suspicion of malignancy, remove the whole breast. At the commencement of the disease a belladonna plaster may be tried, and the breast supported by a bandage.

*Describe Cysts of the Breast.*

Cysts of the breast may be divided into five groups.

- (a) Those connected with chronic mastitis.
- (b) Those resulting from degeneration of a new growth.
- (c) Galactoceles.
- (d) Involution cysts.
- (e) Hydatid cysts—very rare.



*Contrast Galactoceles and Involution Cysts.*

| GALACTOCELES.                        | INVOLUTION CYSTS.                                                        |
|--------------------------------------|--------------------------------------------------------------------------|
| Usually single.                      | Usually multiple.                                                        |
| Occur during pregnancy or lactation. | Occur at the menopause.                                                  |
| Found in the region of the areola.   | Found at the periphery of the mamma.                                     |
| Grow rapidly.                        | Grow slowly.                                                             |
| On palpation, are soft and elastic.  | On palpation, are hard and so may be mistaken for a <b>solid</b> tumour. |
| The cyst contains milk.              | The cysts usually contain clear serum.                                   |

*What is the Treatment for Galactoceles and Involution Cysts?*

Unless growing very rapidly, a galactocoele should be left alone. A single involution cyst can be removed by an incision in the thoraco-mammary fold; when multiple cysts are present, the affected breast should be removed, else malignant disease may supervene.

**MAMMARY TUMOURS.***What are the Common Tumours of the Breast?*

|               |   |                    |                       |
|---------------|---|--------------------|-----------------------|
| NON-MALIGNANT | { | 1. Fibro-adenoma.  |                       |
|               |   | 2. Duct-papilloma. |                       |
| MALIGNANT     | { | 1. Carcinoma.      | { Acute or Medullary. |
|               |   |                    | Chronic or Scirrhus.  |
|               |   |                    | Atrophic Scirrhus.    |
|               |   |                    | Mucoid.               |
|               |   |                    | Adeno-carcinoma.      |
|               |   | 2. Sarcoma.        | Duct cancer.          |

*Describe Fibro-Adenoma.*

Fibro-adenomata occurring in the breast have two varieties, hard and soft, the former being also called a periductal fibroma. They are generally found in young unmarried woman.



The soft variety frequently becomes cystic. They develop in women nearing the menopause, and grow more rapidly than the periductal fibromata.

*What are the Clinical Signs of Fibro-Adenomata?*

A fibro-adenoma forms a small smooth swelling which is not attached either to the skin or to the pectoralis major. The nipple is not retracted, nor the axillary glands enlarged. It is usually quite painless. The treatment is to excise the tumour from the breast.

*What are the Features of a Duct Papilloma?*

A duct papilloma is most frequently found after prolonged lactation. A small elastic swelling forms near the nipple. A discharge of blood-stained serum escapes from the nipple. If a solitary tumour, remove it along with a small portion of the surrounding glandular tissue. When several papillomata are present, the breast should be completely excised.

*Describe a Scirrhus Cancer.*

It begins after thirty years of age, usually much later. The younger the patient, the more rapid the growth. The commonest site is the superior-external quadrant and the affected breast becomes a little *smaller* and slightly *elevated* as compared with the normal one. The tumour is stony hard, and later becomes fixed to the surrounding structures. On palpation, the tumour feels more evident when the breast is flattened against the chest by the surgeon's palm. At first there is no pain, but subsequently the pain becomes severe and constant.

The skin is puckered, and the nipple retracted if the cancer is near it. Ulceration takes place because the skin is infiltrated.

The glands of the axilla are enlarged, although in many subjects they cannot be definitely palpated.

*What are the Chief Points to note?*

1. The infiltrating mode of growth. 2. The tendency to contraction, as shown by the withdrawing of the nipple and the puckering of the skin. 3. The stony hardness and want



of definition. 4. The fixity. 5. The glandular affection. 6. The age of the patient.

*What are its Varieties?*

The atrophic, and the form where the skin is chiefly affected, being full of nodular growths; which are very leathery and hard—*scirrhus en cuirasse*.

*What is the Appearance of a Scirrhus on Section?*

It “cups” on section, and when scraped a creaking sensation is noticed. The outer layer is a delicate grey—the zone of multiplying cells; the middle layer is white—the fibrous contracting layer. In the centre we find degenerated tissue and fatty yellowish streaks, the whole resembling an unripe pear.

*Describe Duct Cancer.*

This is the least malignant of mammary cancers (Bland Sutton). It develops in a cyst, usually from a pre-existing papilloma. The leading clinical features are:—

(a) Slow growth. (b) Blood-stained discharge from the nipple. (c) No involvement of lymphatic glands. (d) No secondary growths. (e) The swelling is soft, not *hard*. (f) No retraction of the nipple.

The treatment consists in performing the radical operation; the results are very satisfactory.

*What are the Features of Sarcoma?*

It occurs at any age, is elastic and mobile, and involves the tissue around, though not adherent to the chest wall nor skin; the nipple is specially prominent, enlarged, and tender. The lymphatic glands at first are free, the growth is rapid, and it often reaches a large size; the skin is thin from stretching, and big blue veins are seen in it. The nipple sometimes exudes discoloured serum. It is often associated with cysts, and the cystic form is more malignant than the other. The swelling is painless. Sarcoma often causes a general rise of temperature.

*What is the Treatment of Malignant Disease of the Breast?*

Complete removal of the breast, with the overlying skin and the surrounding fascia. The pectoral muscles are in



addition cut away, and all the fat and lymphatic glands are cleared out of the axilla. (See *Operative Surgery Catechism, Part I.*)

*Describe Atrophic Scirrhus.*

Atrophic scirrhus commences very late in life, is extremely hard, grows exceedingly slowly, and is only feebly malignant. The skin over the tumour is adherent and puckered; the nipple is generally retracted. After the lapse of several years the axillary glands become involved.

*What is the Treatment for Inoperable Cancer?*

The following measures have been recommended:—

1. When the tumour has fungated, the ulcerated mass can be removed. 2. X-rays. 3. Radium emanations. 4. Beatson's method is applicable in the case of patients who have not reached the menopause. It consists in removing the ovaries and the Fallopian tubes. It is not suitable in rapidly growing cancers, nor where metastatic growths are present.

*What is Mastodynia?*

A neuralgic condition of the mamma occurring in young neurotic females. The patient, in addition, usually complains of ovarian or uterine disturbances. The pain is markedly aggravated during menstruation. The treatment is to build up the general health, and, in addition, it may be necessary to rectify the pelvic disorders.

*Mention the chief Malformations of the Breast.*

AMAZIA . . Congenital absence of either or of both mammæ.

ATHELIA . Congenital absence of the nipples.

MICROMAZIA Non-development of the breasts at puberty.

POLYMAZIA }  
AND } The presence of supernumerary breasts or  
POLYTHELIA } nipples.

GYNECOMAZIA A hypertrophic condition of the breasts sometimes found in males.



# SURGERY.

## PART III.

---

### THE SCALP.

*What are the Sites of Hæmorrhage into the Scalp Tissues ?*

(a) Superficial to the occipito-frontalis = SIMPLE CONTUSION—blood confined to injured area.

(b) In the sub-aponeurotic layer = HÆMATOMA — blood diffused over whole area of scalp.

(c) Beneath the pericranium = CEPHAL-HÆMATOMA—blood confined to area of one bone.

Cephal-hæmatomata most frequently occur during delivery at birth.

*Do not mistake a hæmatoma for a depressed fracture of the skull. If at all doubtful, make an exploratory incision.*

*What are the Special Risks of Scalp Wounds ?*

1. Profuse hæmorrhage.

2. If the sub-aponeurotic layer ("the dangerous area") be opened into, sepsis may spread along the emissary and diploic veins, and bring about cerebral complications, meningitis or sinus thrombosis.

3. Osteomyelitis of the skull bones, which may lead to necrosis, especially of the outer table.

4. Erysipelas.

*What are the Chief Tumours of the Scalp ?*

1. Adenomata.

2. Wens or sebaceous cysts.

3. Dermoids.

4. Lipomata.

5. Nævi.



*Mention the Distinguishing Features of these Tumours.*

1. ADENOMATA.—Frequently multiple ; purple appearance and covered with glistening skin. They often fungate. The treatment consists in excising them.

2. WENS.—Usually multiple ; are fixed to the skin in the centre, but may be freely moved over the deeper structures ; are not reducible, may not fluctuate, and the bone is unaltered below. In removing cysts, be sure and remove all the cyst wall, otherwise they will reform.

3. DERMOID CYSTS differ from wens in that they are beneath the occipito-frontalis, and are **fixed to the deeper structures (pericranium)**. There is usually a **depression in the bone** around the base, and the skin is freely movable over it. The walls are thin ; the contents are hair, epithelial debris, and a pultaceous material.

4. A LIPOMA lies in the subcutaneous tissue ; is freely movable over the deeper structures ; is not fixed to the skin except by fragile tags of fibrous tissue ; is lobulated, and the manner in which the rounded edge slips from under the finger should be sufficient to distinguish it.

5. A SUBCUTANEOUS NÆVUS is reducible on pressure, without causing any cerebral symptoms, and the bone is felt entire below. Be very careful in cases where a nævus is placed over a fontanelle or situated at the root of the nose. A nævus increases in size and tension when the child cries or strains.

## THE CRANIUM.

*Distinguish between Concussion and Compression.*

CONCUSSION is a condition of cerebral shock. The blow upon the skull propels a wave of cerebro-spinal fluid towards the base of the brain, and there stimulates the restiform bodies, causing cerebral anæmia (Duret).

COMPRESSION is a condition resulting from any increase of the intra-cranial tension. Collections of blood, pus, or œdematous exudates, and tumours of the brain are the usual causes of compression.



*Give the Clinical Features of Concussion.*

A. CONSCIOUSNESS.—Immediately after the injury the patient becomes unconscious. He can however be partially aroused by the application of a strong stimulus.

B. PULSE.—Small, slow, and often irregular.

C. RESPIRATIONS.—Slow, shallow, and sighing.

D. SKIN.—Cold, pale, and clammy.

E. PUPILS.—Semi-dilated, and react sluggishly to light.

F. TEMPERATURE.—Sub-normal.

G. MUSCULAR SYSTEM.—Absence of voluntary movement; but the muscles are not paralysed.

After a varying interval of time the patient vomits, and the period of reaction comes on.

1. Elevated temperature.

2. Fast, bounding pulse.

3. Pain in the head.

4. Flushed features.

*Indicate its Treatment.*

The patient must remain in bed in a dark room for two to three weeks. Absolute mental and physical rest should be insisted upon. The head should be slightly raised on a pillow. No solid food should be given. Keep the bowels open. Minute doses of atropin and ergotin are useful.

*What Conditions must be distinguished from Compression?*

1. Sunstroke.

2. Alcoholic poisoning.

3. Opium poisoning.

4. Apoplexy.

5. Uræmic or diabetic coma.

6. Post-epileptiform coma.

7. Cerebral embolism or thrombosis.

*Give the Clinical Features of Compression.*

A. CONSCIOUSNESS.—There may or may not be an interval between concussion and compression. When compression is present, the patient is completely unconscious.



- B. PULSE.*—Slow and strong.
- C. RESPIRATIONS.*—Slow and stertorous.
- D. SKIN.*—Flushed.
- E. PUPILS.*—Pupil on side of lesion is at first contracted, then fully dilated. The pupil on the uninjured side is semi-dilated.
- F. TEMPERATURE.*—101° or 102° F. Sometimes cerebral hyperpyrexia is present.
- G. MUSCULAR SYSTEM.*—Signs of irritation are first present, then subsequently signs of paralysis. Clonic jerkings of the muscles involved occur, this is termed **unilateral monospasm**; later paralysis is called **monoplegia**. Retention of urine and fæces occurs.

*Mention the Sources of Intra-cranial Hæmorrhage.*

1. Meningeal vessels, especially the middle meningeal—the blood collects between the dura-mater and the inner table of the cranium.
2. Cerebral vessels, most commonly the middle cerebral. The blood either presses upon the cerebral cortex, or pours into the lateral ventricles.
3. Venous sinuses.

*Give the Clinical Features of Meningeal Hæmorrhage.*

1. Accident.
2. Severe headache.
3. Repeated attacks of vomiting.
4. Restlessness.
5. Drowsiness.
6. Coma.
7. Monoplegia, followed by hemiplegia.

*Describe Intra-cranial Hæmorrhage of the Newly Born.*

Occasionally in first-born children, usually of the male sex, a hæmorrhagic extravasation occurs in the sub-arachnoid space of the vertex. The blood is probably derived from two sources, (*a*) rupture of small venules owing to partial asphyxia, and (*b*) tearing of the minute tributaries of the superior sagittal (longitudinal) sinus due to the traction of the overlapping parietal bones.



*Contrast Meningeal and Cerebral Hæmorrhage.*

| MENINGEAL.                                                                                                                            | CEREBRAL.                                               |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Signs of concussion, then an interval of consciousness, and lastly symptoms of compression.                                           | No interval of time between concussion and compression. |
| If a lumbar puncture be made, no blood is found in the cerebro-spinal fluid.                                                          | Blood in the cerebro-spinal fluid.                      |
| The blood may collect at the base of the skull and compress the cavernous sinus, leading to—<br>Dilated pupil<br>Proptosis<br>Ptosis. | No pressure upon cavernous sinus.                       |

*What are the Symptoms of Cerebral Hæmorrhage?*

- (a) Bulging of the anterior fontanelle.
- (b) Absence of pulsation at the anterior fontanelle.
- (c) A slow pulse.
- (d) Red cells in cerebro-spinal fluid on lumbar puncture.
- (e) Signs of local pressure especially involving the leg centres.
- (f) Drowsiness.

*Give the Treatment.*

Elevation of an osteo-plastic flap from the corresponding parietal bone, and the careful removal of all blood clots has been recommended.

## FRACTURES OF THE CRANIUM.

### *Describe Fractures of the Cranial Vault.*

Fracture by *direct* violence is sometimes termed "*fracture by bending*"; fracture by *indirect* violence is called "*fracture by bursting*."

Fracture by *contre-coup* means that the break occurs at a spot opposite to the seat of injury.

Owing to the inelastic nature of the inner table, it is usually more damaged than the outer table.

### *Classify Fractures of the Cranial Vault.*

- (a) Fissured.
- (b) Punctured.
- (c) Comminuted.
- (d) Depressed—the latter being sub-divided into pond (circular depressions), gutter (linear depressions), and indentation fractures.

In children, especially those suffering from rickets, greenstick fracture may occur.

### *Give the Treatment.*

Compound depressed and comminuted fractures should be operated on as early as possible. Simple depressed fractures may be exposed, and the sunken bone elevated, or the surgeon may wait and only operate if symptoms of pressure or irritation supervene.

### *What Conditions simulate Fissured Fractures?*

1. Normal sutures.
2. Edge of the torn pericranium.

A fissured fracture appears as a bleeding, more or less straight, **red line**, which grates under the finger nail.

A **suture** is not a red bleeding line, is not straight, but is zigzag and serrated.

The **edge of the torn pericranium** is smooth, does not grate under the finger nail, and shows a slight yielding to digital pressure.



*What Conditions simulate Depressed Fractures ?*

1. Hæmorrhage into the scalp.
2. Craniotabes, where the bones are thinned in patches (usually in the occipital region), so that they readily yield under the pressure of the finger. The commonest causes of craniotabes are rickets and congenital syphilis.

**FRACTURES OF THE BASE.***Give the Causes of Fracture of the Base.*

- I. ANTERIOR FOSSA.—Blows on forehead, nose, or face.  
Punctured wounds of orbit or nasal fossæ.  
Extension of a fracture of the vault.
- II. MIDDLE FOSSA.—Severe violence to the vault.  
Blows on symphysis menti.  
Punctured wounds of nasal fossæ.
- III. POSTERIOR FOSSA.—Severe violence to the vault.  
Falls upon the feet or buttocks.

*Describe Fractures of the Anterior Fossa.*

When the fracture is compound, blood escapes into the nose and naso-pharynx. Profuse and long-continued hæmorrhage suggests a tear of the superior sagittal (longitudinal) sinus, the ophthalmic, or meningeal vessels. Cerebro-spinal fluid trickles down the pharynx, but can rarely be detected. A sub-conjunctival ecchymosis often occurs. It is triangular in shape, and extends forwards from the outer canthus of the eye. Palpebral or retinal hæmorrhage may be present.

If the frontal air sinuses be involved, surgical emphysema may occur, or a pneumatocele capitis form.

The commonest cranial nerves to be injured are the first (olfactory) and the second (optic). If the lesser wing of the sphenoid be broken, then the nerves passing through the sphenoidal fissure (oculo-motor, trochlear, ophthalmic division of trigeminal, and abducens) may be implicated.



*Describe Fracture of the Middle Fossa.*

A dark sanious fluid may be observed welling from the ear. It consists of blood and cerebro-spinal fluid. If the membrana tympani is intact, the fluid trickles down the Eustachian tube into the naso-pharynx. Bright scarlet blood escapes when the vessels of the tympanic membrane are ruptured.

The nerves exposed to injury are the second and third divisions of the trigeminal, and the facial and auditory.

*Describe Fractures of the Posterior Fossa.*

In the majority of cases there are no special signs as the patient dies, owing to interference with the respiratory centre. If he survive, on the third or fourth day a diffuse extravasion of blood is noticed in the posterior part of the scalp and nape of the neck.

*Give the Treatment of Fracture of the Base.*

In the first place treat the patient as in all severe head injuries (see *ante*). If the fracture opens into the nose, pharynx, or ear, spray these cavities with mild antiseptics.

When marked symptoms of compression arise the skull should be trephined, and the dura mater opened. This procedure allows all excess of cerebro-spinal fluid to escape, and thus relieves the intracranial tension.

**CEPHALOCELES.***What Important Point is it necessary to determine in Congenital Tumours of the Cranium?*

Whether or not it communicates with the cavity of the cranium. The signs of such communication are—

1. The cyst is fixed to the bone.
2. There is an opening in the bone.
3. Swelling is reducible wholly or in part.
4. Pulsation—probably cardiac and respiratory—is noticed.



5. On reduction there may be cerebral symptoms—convulsions, paralysis, etc.

6. The tension and size increase when the child cries, or during strong respiratory efforts.

*Classify Cephaloceles.*

|              |   |                                                                   |                                            |
|--------------|---|-------------------------------------------------------------------|--------------------------------------------|
| CEPHALOCELES | { | Occipital                                                         | { Superior, <i>i.e.</i> , above the inion. |
|              |   |                                                                   | { Inferior, <i>i.e.</i> , below the inion. |
|              |   | Sincipital, <i>i.e.</i> , frontal.                                |                                            |
|              |   | Lateral—in region of pterion or asterion :<br>they are very rare. |                                            |

*Describe the Varieties.*

1. MENINGOCELE, where the protrusion consists of a part of the membranes filled with cerebro-spinal fluid. It is usually small in size, globular, pedunculated or sessile, fluctuating, and translucent. Its tension is increased by strong expiration, and it may be entirely reduced.

2. ENCEPHALOCELE, where the protrusion consists of brain as well as membranes. It does not fluctuate, is opaque, but pulsates along with the rest of the brain, and may be partly reducible. Usually found in frontal region.

3. HYDREN-CEPHALOCELE, where the protruded brain is distended by an accumulation of fluid within the ventricles ; it is often large, fluctuates, and may sometimes pulsate.

*Describe Cephal-hydrocele.*

Occasionally a small cystic swelling is found beneath the pericranium resulting from a simple fracture of the vault of the skull.

The signs indicative of such a swelling are—

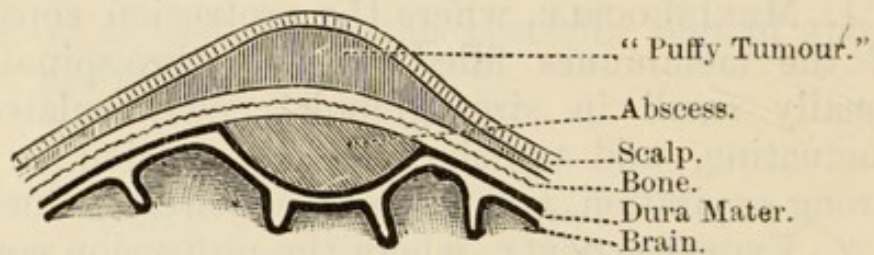
1. It can be partially reduced by pressure.
2. Its pulsation synchronises with that of the heart.
3. It becomes tense on straining or exertion.
4. After partial reduction it is sometimes possible to palpate a gap in the cranium through which the cerebro-spinal fluid has escaped.

## PYOGENIC DISEASES OF THE BRAIN AND MEMBRANES.

*Describe Pachymeningitis.*

Surgically, there are two forms of inflammation of the dura mater, serous and suppurative, the latter generally terminating by the formation of an extra-dural abscess. Pachymeningitis most commonly follows chronic otitis media, empyema of the frontal air-sinus, and septic compound fractures of the skull bones.

Fig. 17.—POTT'S PUFFY TUMOUR.



*Give the Clinical Features of an Extra-dural Abscess.*

1. RIGORS, elevated temperature, and rapid pulse.
2. SEVERE HEADACHE, with marked tenderness over the site of the abscess.
3. LOCALISED ŒDEMA of the scalp over an area corresponding to that of the abscess. This condition is termed *Pott's puffy tumour*.

The treatment of an extra-dural abscess consists in trephining over the abscess, removing all diseased bone, and providing free drainage.

*Describe Leptomeningitis.*

An inflammation of the arachnoid and pia mater. It may be pyogenic, tubercular, or diplococcal (epidemic cerebro-spinal meningitis;) the former is either diffuse or localised, forming a sub-dural abscess.



*Mention its Clinical Features.*

1. Violent headache in the frontal or temporal region.
2. Elevated temperature (usually **no rigor**) and feeble, rapid pulse.
3. Cephalic cry.
4. Cerebral vomiting, *i.e.* without nausea, and independent of the taking of food.
5. Presence of pyogenic organisms in the cerebro-spinal fluid.
6. When the meningitis affects the base of the brain, the patient has retraction of the head and squinting.

*What is its Treatment?*

1. Deal with the diseased ear or frontal sinus.
2. Repeated lumbar-puncture.
3. Appropriate vaccines.

The prognosis is extremely grave.

*Describe Temporo-sphenoidal Abscess.*

A single abscess most frequently results from chronic otitis media and occurs in the temporal lobes. Following the teaching of Macewen, three stages are described :—(a) an initial stage; (b) the stage of the fully-formed abscess; and (c) the terminal stage.

*Give the Clinical Features of the First Stage.*

The discharge from the ear ceases, and the patient has severe pain in the temporal region, followed by a slight rigor, quickened pulse, and gastro-intestinal derangement. Cerebral vomiting is a very common symptom. This stage rarely lasts more than sixteen hours.

*Describe the Second Stage.*

The features of this stage are very similar to those of poisoning by narcotics. The patient's cerebration is slowed,



he is languid and easily tired. The pain in the temporal region is diminished, but the affected side of the head is markedly tender on percussion. The temperature is sub-normal, and the pulse and respirations are slow. Localised paralysis is found.

*Describe the Terminal Stage.*

The abscess terminates in one of three ways—

- (a) By causing diffuse lepto-meningitis.
- (b) By bursting into one of the ventricles.
- (c) By its mechanical pressure bringing on coma.

The abscess may exert pressure upon the Rolandic motor area, the internal capsule, Broca's convolution (the posterior third of the left inferior frontal), superior temporal convolution, angular gyrus (a portion of the inferior parietal convolution), or the occipital lobe.

Remember that the order of the centres in the Rolandic motor area is **leg, arm, face**, from above downwards, and accordingly if the paralysis occurs in the order **face, arm, leg**, then the abscess is pressing upon the cortex. In the internal capsule the arrangement is **leg, arm, face**, from without in, and therefore when pus collects in the vicinity of the capsule, paralysis comes on in that order.

The angular gyrus and occipital lobes are vision centres, the superior temporal gyrus presides over hearing, and Broca's convolution is stated to be the motor speech centre.

*Describe Cerebellar Abscess.*

This abscess is almost always secondary to septic phlebitis of the transverse (lateral) sinus, the result of chronic otitis media. The chief signs and symptoms are—

1. Vertigo and cerebellar ataxia.
2. Pulse slow ; temperature subnormal ; respiration slow, and often Cheyne-Stokes' breathing.
3. Speech slow and syllabic.
4. Retraction of the head and neck.
5. Constant attacks of yawning.
6. Lateral nystagmus.



*What is its Treatment ?*

An abscess in the temporal lobes is reached by trephining  $\frac{3}{4}$  inch above the posterior margin of the external auditory meatus. To open a cerebellar abscess apply the trephine  $1\frac{1}{2}$  inches behind, and  $\frac{1}{2}$  inch below the external auditory meatus. (See *Catechism Operative Surgery*, Part II.)

*Describe Sinus Phlebitis.*

Septic inflammation of the transverse sinus is almost always a sequel of chronic otitis media and mastoid disease. The cardinal signs are—

1. Disappearance of the ear discharge.
2. Severe headache and tenderness over the mastoid and occipital region.
3. Rigors and swinging temperature.
4. Cerebral vomiting.
5. Thrombosis of the internal jugular vein ; it may be palpated in the neck as a hard and tender cord.

Macewen describes three types of the disease, pulmonary, abdominal, and meningeal.

*Give its Treatment.*

In the first place perform the operation for chronic otitis media (Stacke's operation). Then tie the internal jugular vein in the neck ; expose the transverse sinus on the affected side ; open the sinus, and clear out all pus and purulent thrombi. Lastly, thoroughly cleanse the sinus and pack it with iodoform worsted.

**INTRACRANIAL TUMOURS.***What Varieties of Intra-cranial Tumours occur ?*

1. GLIOMATA . . . Are almost equally frequent in the cerebrum and cerebellum. Usually single with ill-defined margins.

2. SARCOMATA . . . May arise from the pericranium, bones, meninges, or the perivascular and peri-neural sheaths. When primary they are single, when secondary, multiple. A false capsule is usually present.
3. GUMMATA . . . Often very hard and definitely encapsulated.
4. ENDOTHELIOMATA . Develop from the meninges, are densely hard and nodular. May become malignant and infiltrate.
5. TUBERCULOMATA . Often multiple ; the pia-arachnoid is frequently affected also.
6. FIBROMATA . . . Often found in the cerebello-pontine angle. Single and lobulated. Tend to take on malignant characters.
7. CARCINOMATA . Generally secondary ; the mammary gland is most commonly the site of the primary growth.
8. CYSTS . . . . These may be :—
  - (a) Traumatic.
  - (b) Parasitic.
  - (c) Arachnoid.
  - (d) Cystic degeneration.

*Give the Clinical Features of Intra-cranial Tumours.*

- (a) Headache—due to irritation of the branches of the trigeminal nerve supplying the meninges.
- (b) Cerebral vomiting.
- (c) Tenderness over the site of the tumour ; this sign is only found in cortical tumours.
- (d) Double optic neuritis.
- (e) Giddiness often occurs, due to the diminished blood tension owing to the lessened vascular supply to the cortex.
- (f) Mental failure ; frequently.
- (g) Local symptoms may be present, attacks of Jacksonian epilepsy when the motor area is involved ; various forms of aphasia ; astereognosis, *i.e.* inability to recognise the shape and size of an object when the eyes are shut. Astereognosis indicates



the presence of a tumour of the parietal lobe of the opposite side.

When the tumour is in the centrum ovale the signs are—

- (a) No tenderness on percussion.
- (b) No Jacksonian epilepsy.
- (c) Widespread motor paralysis.
- (d) Loss of sensation on the opposite side of the body.

*What are the Special Features of Tumours in the Occipital Lobe?*

Tumours involving the occipital lobe lead to homonymous hemianopia, *i.e.* blindness in the temporal half of the retina on the same side of the lesion and in the nasal half of the opposite side.

The optic nerves become atrophied and the patient loses his sight. Coma gradually ensues, and death occurs. A rapidly-growing small tumour causes the patient more distress than a slowly-growing large tumour.

*Name the Main Points of the Commoner Tumours.*

|                 | GUMMA.                                                                      | TUBERCLE.                                           | GLIOMA.                                               | SARCOMA.                                                              |
|-----------------|-----------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------------------|
| Age of patient. | 40-60.                                                                      | Children and adolescents.                           | Adolescents and young adults.                         | Between puberty and 40.                                               |
| Rate of growth. | Rapid.                                                                      | Rapid, then stationary.<br><b>Spasmodic growth.</b> | Slow, then rapid.                                     | Slow.                                                                 |
| Area involved.  | Cortex of cerebrum.                                                         | Cerebellum mainly.                                  | Anywhere, especially retina.                          | Anywhere.                                                             |
| Other features. | Severe nocturnal pains.<br>Rapid improvement with anti-syphilitic remedies. | Other signs of tuberculosis generally present.      | Not encapsulated, therefore very difficult to remove. | Sharply defined from brain tissue.<br>Easier to remove than gliomata. |



*Describe Tumours of the Pituitary.*

The internal secretion of the anterior lobe of the hypophysis is related to calcium metabolism and the growth of the skeleton, and to the development of the sexual organs, while the secretion from the posterior lobe and pars intermedia increases the blood pressure and the renal secretion, and causes contraction of non-striated muscle. Excessive secretion is termed *hyperpituitarism*, diminished secretion *hypopituitarism*. The leading features of these two conditions are—

| HYPERPITUITARISM.                     | HYPOPITUITARISM.                                                          |
|---------------------------------------|---------------------------------------------------------------------------|
| Enlargement of the sella turcica.     | No increase.                                                              |
| Acromegaly and giantism.              | Diminished stature.                                                       |
| Coarse skin and very masculine voice. | Delicate skin and shrill voice.                                           |
| Hypertrophy of sexual organs.         | Infantile genitals and obesity, <i>i.e.</i> dystrophia adiposa-genitalis. |
| Polyuria; arterial tension increased. | Diminished quantity of urine; arterial tension diminished.                |

In both cases, in addition to the normal signs of a cerebral tumour, there is an impairment of sight with the appearance of a blue haze over everything, leading at a subsequent period, to bitemporal hemianopia. The treatment is to perform a nasal "decompression" operation.

*Describe Cerebellar Tumours.*

Cerebellar tumours may be situated either in (a) the vermis; (b) a lateral lobe; or (c) the cerebello-pontine angle. In all cases, headache, cerebral vomiting, double optic neuritis, and ataxia are found. When the tumour is intracerebellar there is a conjugate deviation of the eyes to the



side opposite to that of the tumour, with well-marked lateral nystagmus. The main differences between intra-cerebellar and extra-cerebellar (cerebello-pontine) tumours are indicated in the following table:—

|                                            | INTRA-CEREBELLAR<br>TUMOURS.                           | EXTRA-CEREBELLAR<br>TUMOURS.                  |
|--------------------------------------------|--------------------------------------------------------|-----------------------------------------------|
| Optic neuritis .                           | An early and well-marked feature.                      | Variable in time of onset and intensity.      |
| Conjugate deviation and lateral nystagmus. | Present.                                               | Usually absent.                               |
| Vertigo .                                  | Patient falls <i>away</i> from the side of the tumour. | Patient falls towards the side of the tumour. |
| Tendon reflexes .                          | Variable—often diminished.                             | Increased—on the opposite side.               |
| Skin reflexes .                            | Normal.                                                | Lessened on the opposite side.                |
| Pressure on cranial nerves—                |                                                        |                                               |
| 5th .                                      | Rarely.                                                | Frequently.                                   |
| 7th .                                      | Nil.                                                   | Marked pressure.                              |
| 8th .                                      | Slight deafness on the affected side.                  | Marked deafness on the affected side.         |

## VERTEBRAL COLUMN AND SPINAL CORD.

### *What is Pott's Disease?*

Tubercular caries of the bodies of the vertebræ. The disease commences in the anterior parts of the bodies or from the deep surface of the periosteum; the former is the condition found in children—tubercular osteomyelitis, the latter, tubercular periostitis, occurs in adults. Owing to the freedom of the articular processes from disease, dislocation rarely happens. When osteomyelitis occurs in the lumbar region a sequestrum may form.

Tubercular pachymeningitis generally accompanies Pott's disease. This may interfere with the vascular supply of the cord and lead to myelitis.



*Mention its Leading Features.*

1. Pain on pressure over the diseased vertebræ ; also pain on striking the soles of the feet or the crown of the head.
2. Rigidity ; perhaps the most important sign for diagnostic purposes.
3. Deformity ; gradual when the periosteum is affected, angular when osteomyelitis is present.
4. Frequently abscess formation. The abscess is usually dumb-bell shaped.
5. Evidence of pressure upon the spinal cord or nerve roots. The signs are mainly motor, *i.e.* paresis of the muscles supplied from the area of the cord below the lesion.

The order of pressure effects is—

- (a) Paresis.
- (b) Increased reflexes.
- (c) Spastic paralysis.
- (d) Contractures and deformity.

*How may Pressure arise ?*

Pressure upon the spinal cord or nerve roots is due to either :—

1. Œdema of the membranes of the cord.
2. Granulation tissue.
3. Pus.
4. A sequestrum.
5. Pathological fracture-dislocation of the affected portion of the spine. This is very uncommon.

*Describe Pott's Disease of the Cervical Region.*

In the majority of cases the upper part of the vertebral column, *i.e.* atlas or axis, is affected. The patient keeps his neck perfectly rigid and rests his chin upon the palm of his hand. Rotation of the head and nodding movements cause considerable pain, and are only performed very slowly and incompletely. Neuralgic pains affect the occipital region, owing to the irritation of the upper posterior cervical nerves.



Any abscess forming will be retro-pharyngeal in position, and tend to cause pressure upon the glottis. The abscess can be reached by an incision along the posterior border of the sterno-mastoid.

In some cases torticollis develops. It is distinguished from the congenital variety of wry-neck by the fact that no rotation occurs.

*Give its Treatment.*

Apply extension by fixing an elastic band round the head of the patient, and by raising the head of the bed. A sand-bag should be laid on each side of the neck. Open-air treatment, rich feeding, and injections of tuberculin are important. When the acute symptoms have subsided, the patient may be allowed to rise and move about wearing a poroplastic collar.

*Describe Pott's Disease of the Dorsal Region.*

The back is held rigidly, so that in order to pick up an object from the ground, the patient bends the hips and the knees. If the flat hand be placed upon the spines of the affected vertebræ and the patient asked to bend forwards, it is noticed that the vertebræ move *en bloc* and not individually. No hyper-extension of the spine occurs on holding the child up by the heels. Muscular rigidity causes a spasmodic or grunting type of respiration. Angular deformity is often a striking feature—the tubercular hunch-back. An abscess forming in this region can point:—

1. Between the pleura and the ribs.
2. Into the pleural cavity.
3. Along the intercostal vessels on the chest-wall.
4. From the lower dorsal region pass beneath the internal arcuate ligament, enter the sheath of the psoas, and form a psoas abscess.

*What are the Features of Pott's Disease of the Lumbar Region?*

The child when standing supports his vertebral column by



leaning forward and resting his hands upon his thighs. A "belly-ache" pain is a frequent symptom. If pus forms, it usually escapes either through the triangle of Petit as a lumbar abscess, or enters the sheath of the psoas.

*Mention the Different Areas in which Referred Pain occurs in Pott's Disease.*

UPPER CERVICAL REGION—occiput.

LOWER CERVICAL REGION—shooting down the arms.

DORSAL REGION . . . —a sternal or intercostal pain.

DORSI-LUMBAR REGION —epigastrium.

LUMBAR REGION . . . —a sciatica-like pain.

### INJURIES OF THE SPINAL CORD.

*What are the Varieties of Hæmorrhage of the Cord?*

1. Extra-medullary = HÆMATORRACHIS.

2. Intra-medullary = HÆMATOMYELIA.

The main difference between the two are shown in the accompanying table.

| EXTRA-MEDULLARY.                                                                                                                                                      | INTRA-MEDULLARY.                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Symptoms of irritation first, <i>i.e.</i> cramps, hyperæsthesia, etc.; paralysis later, and coming on gradually. Usually the arms are affected earlier than the legs. | Paralysis comes on immediately. If the hæmorrhage only causes pressure, the legs are first affected—if the hæmorrhage is so severe as to disorganise the cord, then the arms are first involved. |
| No change in sensation.                                                                                                                                               | Disassociated anæsthesia for a time.                                                                                                                                                             |
| No priapism.                                                                                                                                                          | Often priapism.                                                                                                                                                                                  |
| No change in pupils.                                                                                                                                                  | Contracted pupils.                                                                                                                                                                               |
| No change in bladder or rectum.                                                                                                                                       | Retention of urine and fæces.                                                                                                                                                                    |



*Give the Treatment.*

1. Keep the patient prone.
2. Give small doses of ergotin.
3. Ice bags may be applied to the spine.
4. Tie in a catheter and watch the bowels.
5. Laminectomy may be necessary in extra-medullary hæmorrhage.

*Describe Railway Spine.*

"Railway spine" is a functional disorder resembling neurasthenia, which sometimes occurs in individuals who have been in a railway accident. No pathological changes have been found in any part of the central nervous system.

The symptoms complained of are—

- (a) General debility.
- (b) Absence of any desire to work.
- (c) Insomnia.
- (d) Sexual debility and irritability of the bladder.
- (e) Feebleness of vision and photophobia.
- (f) Hyperæsthesia along the spine.
- (g) Loss of weight.

**FRACTURE-DISLOCATION OF THE SPINE.***Describe Fracture-dislocation of the Spine.*

Fracture-dislocation of the spine is called by the laity a "broken-back." It is commonest in the dorsal and dorso-lumbar regions. It is a fracture by indirect violence, the spine being forcibly bent forwards. The articular processes are separated on each side, and one or more bodies are fractured. The upper fragment slips forwards and downwards, and the cord is compressed by the **posterior margin of the body of the lower fragment.**

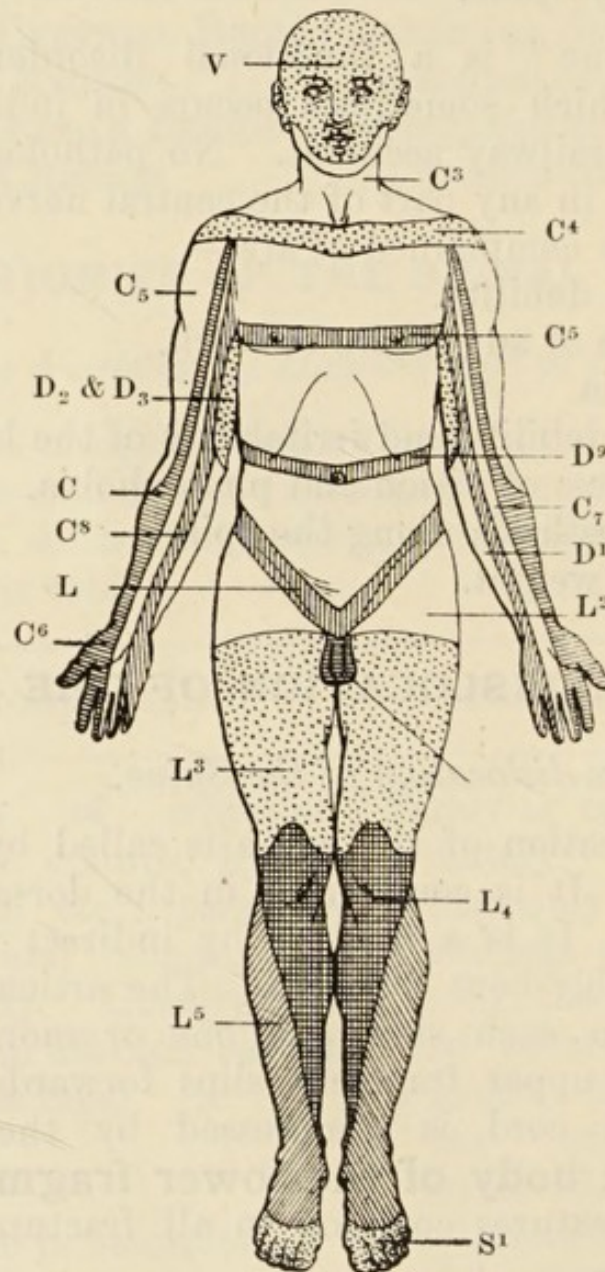
The clinical features common to all fracture-dislocations of the spine are—

1. Marked prominence of the injured vertebra.
2. Distinct depression above the prominence.
3. Pain and tenderness over the fracture.
4. Total absence of movement and sensation below the seat of injury.

*Give the Treatment.*

Under anæsthesia an effort may be made to reduce the dislocation and manipulate the fragments into apposition. Subsequently the patient is placed upon a water-bed. Remember that the two chief causes of death are bedsores

Fig. 18—DIAGRAM OF CUTANEOUS AREAS OF POSTERIOR ROOTS.  
(After COLLIER and PURVES STEWART.)



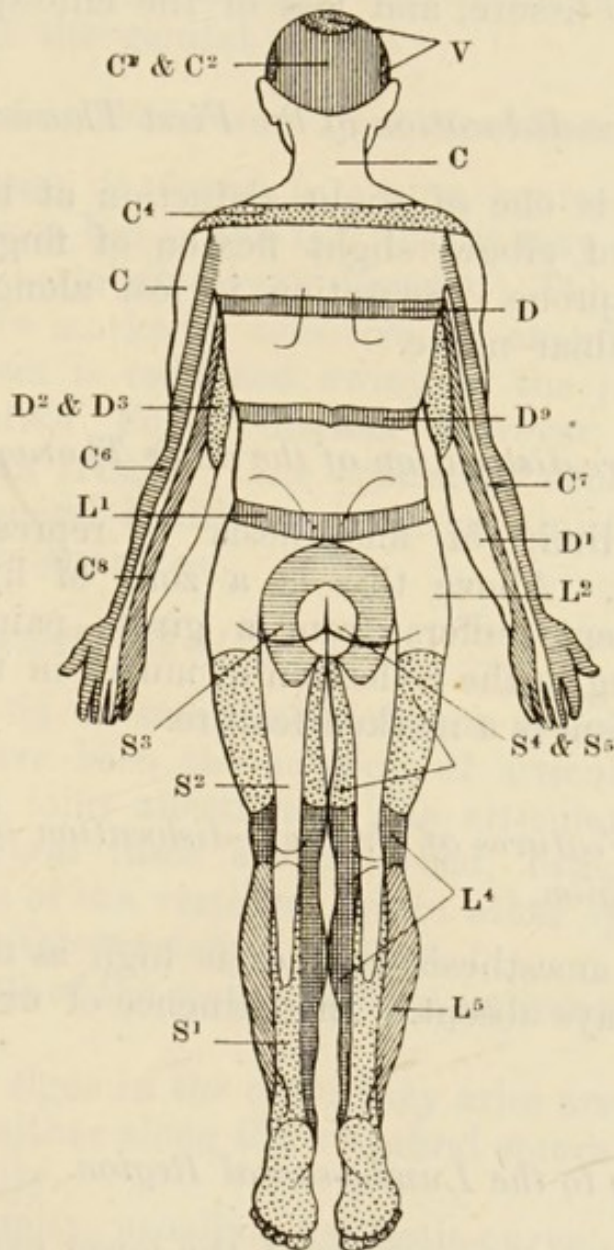
and pyelo-nephritis. Accordingly, great attention must be paid to the skin and the bladder. A catheter is fixed in the bladder and attached to a suction apparatus. Urotropin in 10-grain doses may be given thrice daily.



*Describe Fracture-dislocation of the Cervical Region.*

Complete injury to the upper part of the cervical region, *i.e.* the part above the third intervertebral disc, is always fatal, owing to the centres for the phrenic being destroyed. Damage to the segments from the fifth cervical to the first

Fig. 19—DIAGRAM OF CUTANEOUS AREAS OF POSTERIOR ROOTS.  
(After COLLIER and PURVES STEWART.)



thoracic is recognised by the following signs:—

1. The patient lies in a characteristic attitude, the shoulders are abducted, the elbows, wrists, and fingers are flexed, and the forearms are completely supinated.

2. Sensation is retained down to the level of the second intercostal space, and down the radial side of the arms.
3. Slow pulse.
4. Priapism.
5. Elevation of temperature.
6. Retention of urine and fæces.
7. Because of injury to the cilio-spinal region—recession of the globe, contracted pupils, narrowing of the palpebral fissure, and loss of the cilio-spinal reflex.

*Describe Fracture-dislocation of the First Thoracic Vertebra.*

The attitude is one of slight abduction at the shoulder, partial flexion of elbow, slight flexion of fingers, and the forearm is semiprone. Sensation is lost along the distribution of the ulnar nerve.

*Describe Fracture-dislocation of the other Thoracic Vertebrae.*

The upper limit of anæsthesia is represented by a horizontal band. Above this is a zone of hyperæsthesia, where the patient suffers from a girdle pain. Gurgling respiration owing to the collection of mucus in the bronchial tubes. Meteorism is a marked feature.

*Give the main Features of Fracture-dislocation of the Dorso-lumbar Region.*

The area of anæsthesia reaches as high as the umbilicus. Priapism is always absent. Incontinence of urine and fæces from the first.

*Describe Injury to the Lumbo-sacral Region.*

The patient develops paresis of the lower extremities. A saddle-shaped area of anæsthesia is found over the buttocks, the back of the thighs, the perineum, and external genitals. Notice that both the anal canal and the urethra are insensitive; testicular sensation, however, remains. Both the bladder and the rectum are paralysed.



*Indicate the Features of Injury to the Cauda Equina.*

All the sacral nerves are injured, but the lumbar nerves are intact. The muscles of the lower extremity are paralysed except the **extensors, adductors, and internal rotators** of the **hip**. Anæsthesia extends from the lower half of the buttock downwards, except the areas supplied by the femoral (anterior crural), lateral cutaneous, and genito-femoral; incontinence of urine and fæces, and anæsthesia of the genital organs.

*Give the Clinical Features of Hysterical Spine.*

This condition is found in young neurotic females. Its main importance lies in the fact that it may be mistaken for caries of the vertebræ (Pott's disease). The affected spines are found to be markedly sensitive on examination, and the skin over them is reddened owing to the irritation of the corsets. Unlike Pott's disease, however, the vertebral column **moves freely**. The treatment consists in attending to the general health, and the administration of such drugs as the valerianates.

*Describe Osteo-arthritis of the Spine.*

Osteo-arthritis or arthritis-deformans attacks middle-aged males who have been the subjects of articular rheumatism or gonorrhœal joint affections. The articular cartilage and the intervertebral discs are absorbed, osteophytes spring from the edges of the vertebræ, while other spicules of bone pass across the intervertebral notches.

The ligaments of the costo-vertebral articulations frequently ossify.

The clinical signs in the order they arise are :—

- (1) Pain either along the vertebral spines or referred.
- (2) Rigidity.
- (3) Deformity, usually a kyphotic curve.
- (4) Flattening of the anterior thoracic wall.
- (5) Atrophy of the shoulder and hip muscles.
- (6) Exaggeration of the tendon reflexes.
- (7) Abdominal respiration.

The treatment is similar to that of osteo-arthritis elsewhere (*See Catechism, Surgery Part II.*).



*What is Chronic Spinal Meningitis?*

This is a localised serous spinal meningitis generally affecting the lower dorsal region. It occurs in adults, often with a history of syphilis, gonorrhœa, or influenza. Pathologically, the theca is distended with a serous effusion, the cord is flattened, the nerve-roots buried in adhesions, and the periphery of the cord sclerosed. The symptoms closely resemble those of a spinal tumour, the two chief differences being—(a) the pain is more diffuse in distribution, first involving the whole of one leg, then spreading to the other leg; (b) the paralysis affects the whole leg and not a group of muscles.

The treatment is to perform laminectomy, and irrigate the membranes with 1-1000 corrosive sublimate.

**DEFORMITIES OF THE SPINE.***Mention the Deformities of the Spine.*

1. Scoliosis = a lateral curvature, with rotation of the bodies of the vertebræ.
2. Kyphosis = a backward curvature.
3. Lordosis = a forward curvature.
4. Spina bifida.

*Describe Scoliosis.*

The form occurring in adolescents usually manifests itself in young girls about the age of puberty. It is said there is a hereditary tendency to scoliosis. The chief factors in the production of this deformity are:—

- (i.) Defective ossification of the bodies of the vertebræ.
- (ii.) Feeble musculature.
- (iii.) Lax spinal ligaments.
- (iv.) The constant assumption of a faulty attitude.

Always examine the naso-pharynx in cases of scoliosis, as adenoids are often a predisposing factor.

*Give its Pathological Features.*

In the majority of cases the primary curve develops in the dorsal region of the spine, the convexity of the curve



being on the right side. Compensatory curves are found in the cervical and lumbar regions. The bodies of the vertebræ are rotated so that they point towards the convexity of the curve, and the spinous processes towards the concavity.

The bodies become wedge-shaped, the apex of the wedge facing the concavity. Following upon the osseous changes, the ligaments and muscles upon the convex side are elongated, while those upon the opposite side are shortened and contracted. On examining the ribs it will be noticed that they bulge *behind* on the *convex* side, and bulge in *front* on the *concave* side. Other changes in the skeleton are—decrease in the general stature, and the formation of a scoliotic pelvis.

*What are its Signs and Symptoms?*

1. The patient is easily tired.
2. The deformed vertebral column.
3. The deformed chest.
4. Elevation of the right scapula and nipple.
5. Well-marked infra-costal furrow on left side.
6. Large "brachio-thoracic triangle" on left side.
7. Often embarrassed respiration.

*Describe its Treatment.*

Great care must be observed in preventing the assumption of any faulty attitude either in sitting or standing.

In early cases, that is before the bodies of the vertebræ become wedge-shaped, rest in bed for two or three weeks, followed by massage of the muscles of the back and gentle gymnastic exercises. The movements devised by Klapp are very suitable for early cases. They not only strengthen the spine and muscles, but increase the mobility of the vertebral column. The exercises are carried out with the patient in the "quadruped" attitude. After learning to walk in a straight line like a quadruped, the patient later crawls in a circle towards the right. By this means the contracted left side is elongated.



In advanced cases the deformity cannot be rectified. Exercises are carried out so as to prevent the condition from becoming worse.

### *What is Spina Bifida?*

This is a congenital malformation due to imperfect development of the laminae and spinous processes. Owing to the failure of union of the posterior segments of the neural arches, the contents of the vertebral canal form a localised swelling, most commonly in the lumbar and sacral regions. Other congenital defects such as hare-lip, cleft palate, etc., frequently co-exist with a spina bifida.

### *Mention its Varieties.*

1. MENINGOCELE . = Membranes and cerebro-spinal fluid.
2. MENINGO-MYELOCELE = Membranes, cerebro-spinal fluid, and a few spinal nerves.
3. SYRINGO-MYELOCELE] = Spinal cord and a dilated medullary canal.
4. MYELOCELE . . = Spinal cord.

In this form the integument is absent over the affected vertebræ, and hence a myelocele is incompatible with life.

5. OCCULTA . . = No swelling, merely an absence of the posterior segments of the neural arches.

### *Give its Clinical Features.*

A smooth globular swelling, often translucent, and becoming tense when the child strains or coughs. If the swelling be pressed upon, it will be observed that the anterior fontanelle bulges. [This test must be applied very cautiously, or convulsions may be brought on.] In some cases the lower limbs, the bladder, and the rectum are paralysed.



*What are the Contra-indications to Operation?*

The following are contra-indications to operation for a spina bifida. —

- (a) Large size.
- (b) Marked involvement of the spinal nerves in the sac.
- (c) Hydrocephalus.
- (d) The existence of such gross congenital deformities as ectopia vesicæ, complete cleft palate, or cephalocele.
- (e) When the spina bifida affects the sacral region, as here infection of the sac by urine and fæces is very apt to occur.

If operation is decided upon, the child is placed with its head very low, so as to prevent the escape of cerebro-spinal fluid. The skin is dissected off the swelling, the latter opened, any nerves present returned to the spinal canal, and the sac removed. The flaps are then sutured together. The injection of Morton's fluid into the sac is not recommended.

*Describe Spina Bifida Occulta.*

The presence of a spina bifida occulta is often indicated by a mass of fat resembling a tail, or by a slight depression in the middle of the line of the lumbar-sacral region. From the skin a tough fibrous band passes to the spinal membranes and drags upon the nerve-roots. Paresis of the lower extremities, bladder and rectal incontinence, or a perforating ulcer of the foot may call attention to the deformity. X-ray examination is of the greatest assistance in arriving at a diagnosis. The tough membrane should be dissected away.

**TUMOURS OF THE SPINE.***Classify Tumours of the Spine.*

There are four varieties—

A. VERTEBRAL—may be either an

- (1) Osteoma,
- (2) Sarcoma, or
- (3) Carcinoma.

B. MENINGEAL—may be either a

- (1) Psammoma = an endothelioma of the dura mater,
- (2) Hydatid cyst,
- (3) Fibroma, or
- (4) Sarcoma.

C. EXTRA-DURAL—may be either a

- (1) Lipoma,
- (2) Fibroma, or
- (3) Sarcoma.

D. INTRA-MEDULLARY—may be either a

- (1) Tuberculous mass,
- (2) Glioma,
- (3) Sarcoma, or
- (4) Gumma.

*Give the Clinical Features of Extra-medullary Tumours.*

The leading clinical features are :—

- (a) Pain and tenderness over the diseased bones ; the pain is of a boring character, and is usually aggravated by movement.
- (b) Deformity of the spine is often present.
- (c) Evidence of pressure upon the nerve-roots, *i.e.* **posterior nerve-roots**—pain and hyperæsthesia followed by areas of anæsthesia ; **posterior root-ganglia**—herpes zoster ; **anterior nerve-roots**—spasmodic twitchings. The last are only rarely involved.
- (d) X-ray examination may reveal the lesion.

*Describe Intra-medullary Tumours.*

In the majority of cases the early symptoms are very vague, and it is often impossible to make a definite diagnosis. The patient generally complains of a girdle-pain or of intense neuralgic attacks ; the latter are at first unilateral, then bilateral. The pain is often referred elsewhere. Following upon the initial sensory disturbances come paresis, and then paralysis of a spastic type.



Tubercular masses are usually associated with meningeal tuberculosis. Gummata develop in the perivascular sheaths of the spinal blood vessels. The clinical features closely resemble those of syringo-myelia. Pain is not an early symptom. There is an absence of spinal tenderness or radiating pains. Local anæsthesia of the parts enervated by the affected segments comes on early. Atrophic paralysis appears at a later stage. Disassociated anæsthesia is usually present.

*Give the Treatment for Spinal Tumours.*

In the first place try anti-syphilitic remedies. If the symptoms progress, laminectomy is indicated, and an effort made to remove the growth. Relief of pain can be obtained by division of the posterior nerve-roots of the affected segments.

## THE FACE.

*Describe Harelip.*

This congenital malformation may be either median or lateral; either variety is frequently associated with a cleft of the palate. The median form is rare, and is due in some cases to a non-union of the mesial-nasal processes (*globular processes*), and in others to their absence.

Lateral hare-lip is caused by imperfect fusion of the mesial-nasal processes with the maxillary processes. The deformity may be single or double. In the bilateral forms the central part of the lips (*prolabium*) is often adherent to the premaxillary bone. Single hare-lip is far more common on the left than on the right side.

*What is the Best Time for Operation?*

This will depend upon the health and strength of the child. It may be done from a few weeks after birth up to the third or fourth month. The best age probably is between the sixth and twelfth weeks. If a cleft-palate is also present, always operate upon the lip first, as closing the lip often stimulates the growth of the palatal processes, and thus narrows the gap in the palate.

*Give the Treatment for Single Harelip.*

In cases of single hare-lip, separate the cleft half of the lip very freely from the jaw, but leave the sound side attached, so as to give a fixed point to pull the other side towards the middle line, in order to lessen the flattening of the nostril.

*Describe the Commoner Methods of Treatment.*

1. Free paring and neat apposition (Figs. 20 and 21).

OPERATION FOR HARE-LIP—FIRST FORM.

Fig. 20—First Stage.

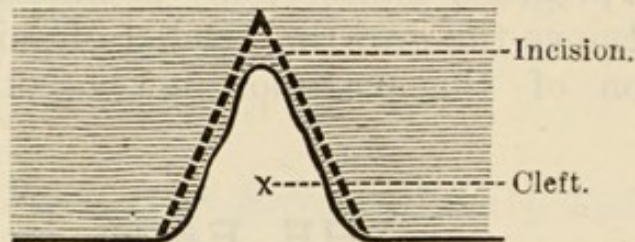
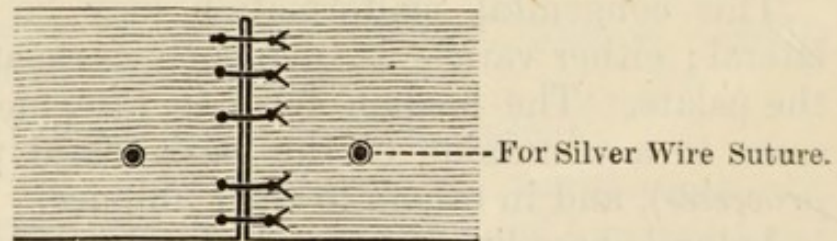


Fig. 21—Second Stage.



2. Curved incision—edges concave from above downwards. (Figs. 22 and 23).

OPERATION FOR HARE-LIP—SECOND FORM.

Fig. 22—First Stage.

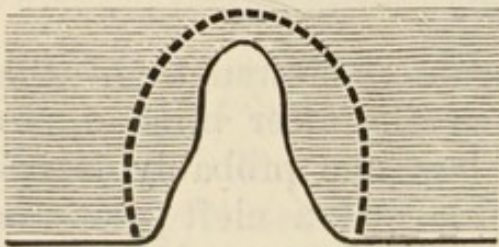
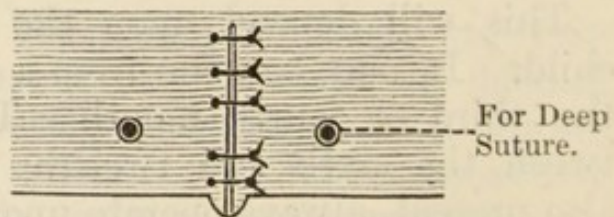


Fig. 23—Second Stage.



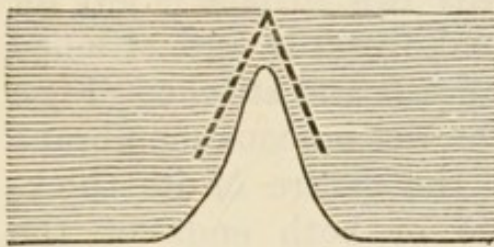
3. Nelaton's plan, in cases where the fissure does not



extend up to the nose, or in cases where a "nick" is left after a previous operation. The part pared is not **separated**, but is left attached to the free edge of the lip, and brought down so as to form a diamond-shaped wound, the sides of which are then drawn together. (Figs. 24, 25, and 26), causes a projection in the site of the cleft.

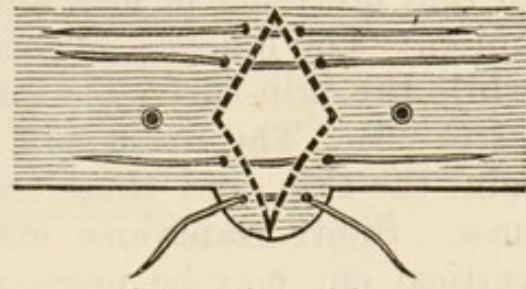
#### OPERATION FOR HARE-LIP—THIRD FORM.

Fig. 24—First Stage.



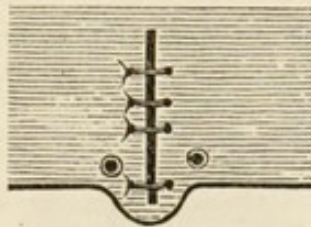
Incision.

Fig. 25—Second Stage.



Sutures in position.

Fig. 26—Third Stage.



Sutures tightened.

4. Little tags are left, and then turned down so as to make a projection at the site of the previous cleft (Figs. 27 and 28).

#### OPERATION FOR HARE-LIP—FOURTH FORM.

Fig. 27—First Stage.

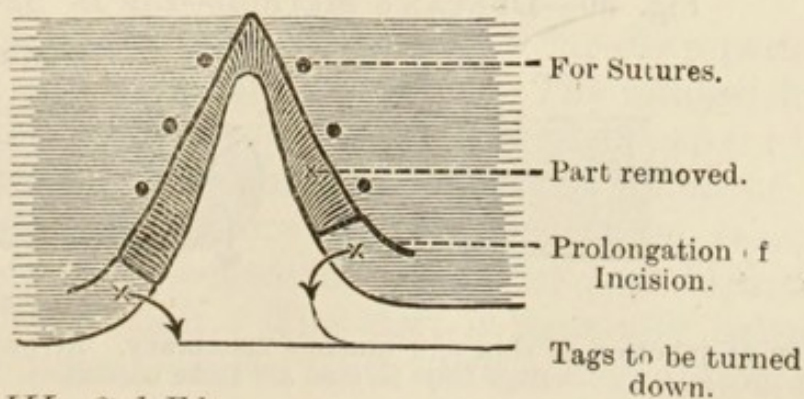
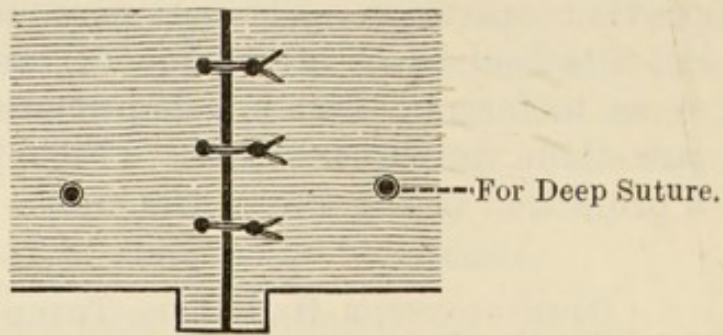
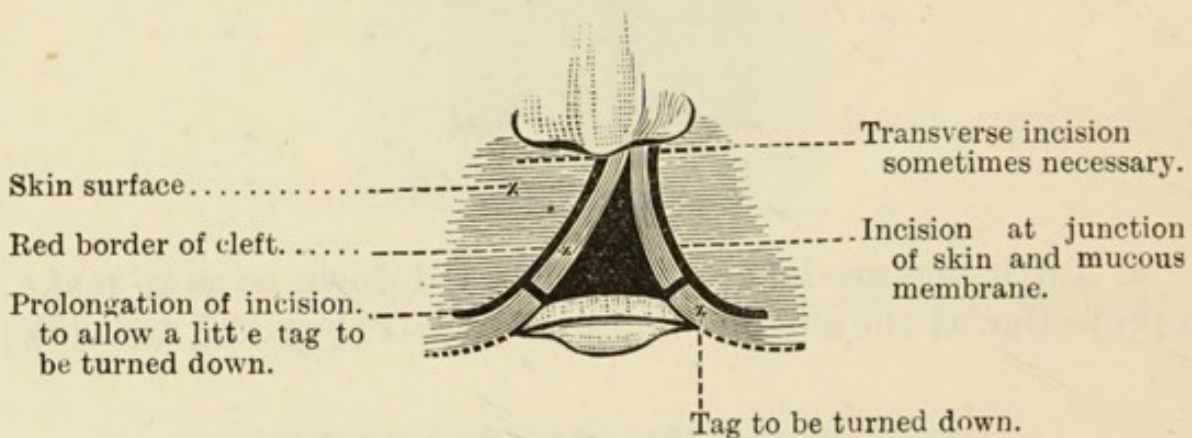


Fig. 28—Second Stage.



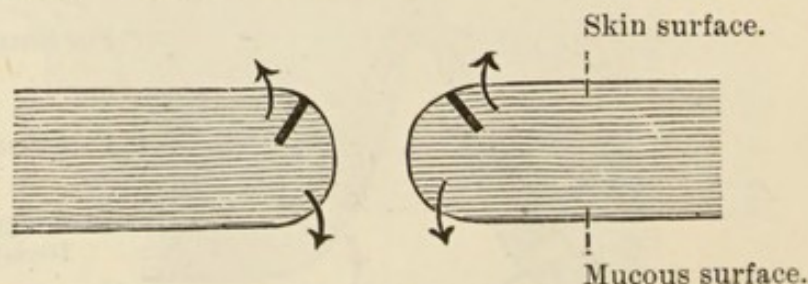
5. Duncan's method—the edges are not **pared** but **split**, so that no tissue is lost, and a **broad** raw surface is left for union. The mucous surface is turned inwards and stitched while the skin surface is turned outwards and stitched (Figs. 27 to 28). The lip is split where the red mucous membrane joins the skin, and therefore not in the centre of its thickness. Short transverse cuts at one or both ends of the vertical cut may be necessary to allow neat apposition, and further to allow of a little piece being turned down to avoid any "nick" afterwards.

Fig. 29—OPERATION FOR HARE-LIP—FIFTH METHOD.



To show cleft with incisions used when Duncan's method is adopted.

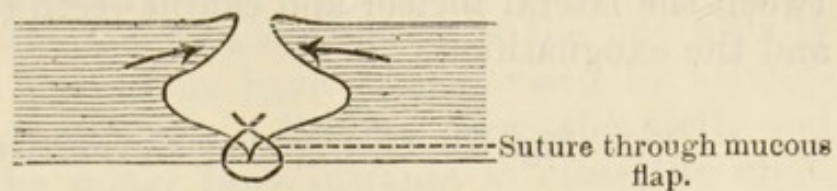
Fig. 30—DUNCAN'S METHOD—LIP IN SECTION.



Incision at junction of skin and mucous membrane. Arrows indicate how the flaps thus formed are to be turned.

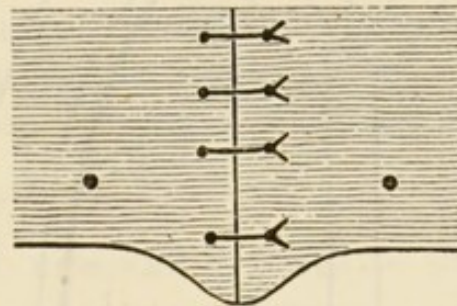


Fig. 31—DUNCAN'S METHOD—STITCHING.



Arrows show how the skin flaps are drawn together.

Fig. 32—DUNCAN'S OPERATION—FINISHED.



*What kind of Sutures are sometimes used for Harelip?*

1. Silver wire or silk-worm gut into tissues of lip, to act as a splint.
2. Horse hair to skin edges.

The sutures are introduced in that order but left loose at first, and then tied in the reverse order. Before tightening the last, see that no clot of blood lies between the edges of the mucous membrane. Cover up the ends of wire suture lest articles of dress, etc., catch it and tear it open.

A gauze dressing is applied and fixed by a little collodion.

Remove the **deep stitches** on the 4th day.

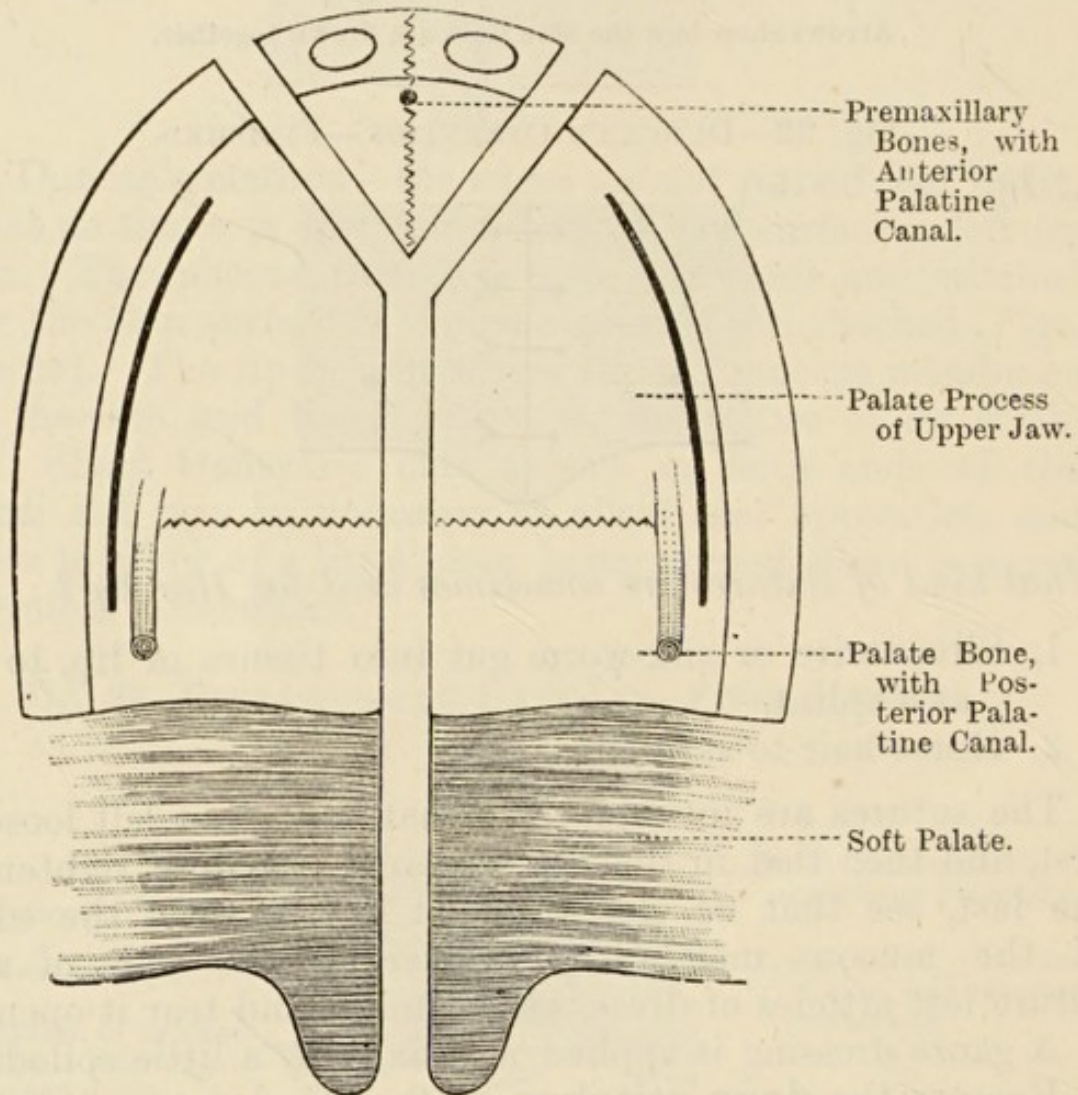
Remove the **superficial stitches** on the 8th day.

*Describe Cleft Palate.*

Cleft palate is due to the non-union of the deep parts of the mesial-nasal and maxillary processes. The mildest form is a bifid uvula; the most severe form a complete gap uniting the anterior nares and the pharynx. Normal union of the palate takes place from before backwards. Three varieties of complete cleft occur—median, tripartite, and bipartite; the last is the commonest. The cleft is generally between the central and lateral incisor teeth (the endognathion and

the mesognathion); sometimes however it intervenes between the lateral incisor and canine teeth (the mesognathion and the exognathion).

Fig. 33—COMPLETELY CLEFT PALATE.



The dark line on each side indicates the position of the incisions in cases of operation for the cure of cleft hard palate. The incisions must not injure either the anterior or the posterior palatine vessels, and, therefore, must not go too far forwards or be prolonged too far backwards.

*At what Stage should Cleft Palate be operated on?*

In early infancy (Arbuthnot Lane). Between the ages of two and three years (James Berry). The majority of surgeons advocate the latter period.

*What is the Operation for Cleft Palate?*

When a complete cleft is closed the operation is called



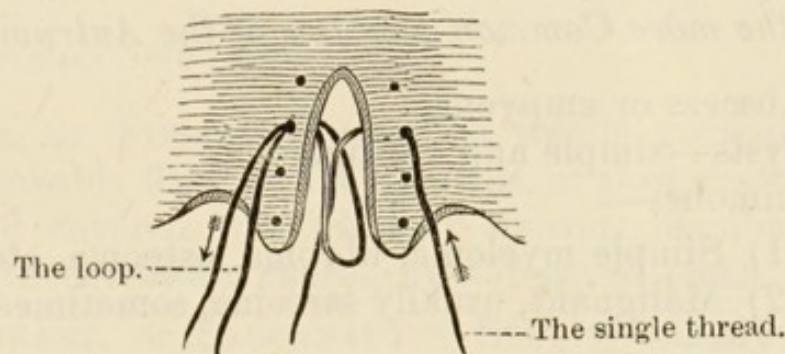
**uranoplasty**; the suturing of a cleft in the soft palate is termed **staphylorrhaphy**.

The operation devised by Langenbech is the one usually performed. Flap operations have been devised by Davies-Colley and Arbuthnot Lane. Brophy pares the cleft, and forcibly presses the upper jaws inwards to close the cleft. It is a dangerous procedure and causes considerable shock.

*How are the Sutures passed through the Soft Palate?*

Pass a single thread through one side, and a **loop** through the other, then pass the single thread into the loop, then withdraw the loop leaving the single thread in position. (Fig. 34).

Fig. 34—TO PASS THE SUTURES IN CLEFT PALATE.



*Mention the Common Diseases of the Jaws.*

1. INFLAMMATORY AFFECTIONS—

- (1) Abscess of the antrum, connected with malformation or disease of the teeth.
- (2) From the same cause, abscess also occurs **in** the lower jaw or **on** its surface.
- (3) Necrosis and caries may be due to this cause; it may also arise from syphilitic or tubercular disease, or **in the lower jaw** from phosphorus poisoning.

2. TUMOURS—

May affect the **alveolar process (Epul s)** or the **body** of the bone. The more common tumours are—

- (1) Fibroma.
- (2) Myeloma.
- (3) Osteoma.
- (4) Sarcoma.

3. CYSTS, simple and dentigerous, occur most frequently in the *body of the lower jaw*.

*What is a Gum-boil ?*

It is an inflammatory swelling in connection with a carious tooth. Periodontitis is set up, followed by suppuration, the pus evacuating itself through the mucous membrane covering the alveolar walls or palate. Sometimes the pus makes its exit through an opening in the cheek forming a **sinus**.

*Name the more Common Diseases of the Antrum.*

- 1. Abscess or empyema.
- 2. Cysts—simple and dentigerous.
- 3. Tumours—
  - (1) Simple myeloma, fibroma, osteoma, etc.
  - (2) Malignant, usually sarcoma, sometimes epithelioma.

*What are the Causes of Abscess ?*

- 1. Disease of the teeth—suppuration of roots, especially bicuspid or first molars.
- 2. Inflammation spreading from the nasal cavities and blocking up the opening from the antrum to the middle meatus of the nose.
- 3. Trauma.

*Give the Symptoms of Abscess.*

Pain and marked tenderness on pressing over the canine fossa. Facial œdema is often present. A disagreeable odour is generally noticed by the patient. A shadow on transillumination of the antrum. On examination of the middle meatus, pus will be noticed oozing through the ostium maxillare.



*What is the Treatment?*

Extract any carious teeth, and open up the antrum. In order to carry out the latter procedure, the antrum can be reached through,

- (i.) A carious tooth socket.
- (ii.) The canine fossa.
- (iii.) The outer wall of the inferior meatus of the nose.

*Describe Epulis.*

Strictly speaking, it is a tumour affecting the **alveolar process** of one or other jaw, though the name is often applied to tumours starting in other parts of the jaw bones, and involving the alveolar process secondarily.

*Give its Varieties and Characters.*

1. SIMPLE, or FIBROUS EPULIS—a sessile growth, firmly but not immovably fixed to the alveolus, of slow growth, firm, painless, and covered with healthy mucous membrane. It arises from the irritation caused by a decayed tooth.

2. MALIGNANT, or SARCOMATOUS EPULIS,—firmly fixed to the bone, rapid growth, livid colour, lobed surface, and soft to the touch: it usually arises from within the alveolus.

*Indicate the Treatment of Epulis.*

Excise the swelling along with a wedge-shaped area of the alveolar process from which it springs. The resulting defect can be bridged by a dental plate.

*How would you examine a Tumour of the Upper Jaw, and what Points is it specially important to make out?*

It may be examined from—

- 1. The face.
- 2. The orbit.
- 3. The nose.
- 4. The mouth and pharynx.
- 5. The temporal and zygomatic regions.

The important points to determine are—

1. Where did it begin?
2. What are its attachments **now**?

*What are some of the Signs of Malignant Tumour?*

1. Pressure on the nasal duct, with “epiphora.”
2. Pain from implication of the trigeminal nerve.
3. Epistaxis.
4. Displacement of the palate, teeth, etc.
5. “Egg-shell” crackling on pressing over the tumour.
6. Darkness on transillumination.
7. Proptosis.

*How would you diagnose the Point of Origin of a Sarcoma?*

1. In the **MALAR BONE**; pushes the cheek into a conical projection, and bulges into the mouth between the gums and cheek. Line of the teeth and palate normal.
2. **BEHIND THE UPPER JAW**; the jaw is pushed forward as a whole. Line of the teeth and antrum normal.
3. In the **ANTRUM**; walls of that cavity expanded, bulging into the nose, mouth, orbit, and causes a projection on the face. Line of the teeth irregular.
4. In the **ETHMOID BONE**; broadening of the root of the nose; separation or projection of one eye outwards.

*What is the Treatment?*

If the tumour be not too far advanced, or if it does not begin in the ethmoid cells, the jaw or part of it should be excised.

## THE MOUTH AND TONGUE.

*Mention the Varieties of Glossitis.*

- (1) Acute—a streptococcal infection.
- (2) Hemi—a herpes affecting one half of the tongue.
- (3) Chronic—(a) Superficial, *i.e.* leucoplakia.  
(b) Deep or sclerosing; a tertiary syphilitic manifestation.



*Describe Leucoplakia.*

Leucoplakia is a chronic inflammation of the superficial structures of the tongue. The condition mainly occurs in males over forty years of age. A syphilitic history can often be obtained. The exciting factors are the drinking of raw spirits, excessive smoking, and over-indulgence in condiments.

On examination, the tongue is found to be covered with whitish patches of horny epithelium, arranged in a mosaic pattern. In advanced cases warty excrescences and fissures occur.

The patient complains of discomfort in eating, of persistent thirst, and of a loss of taste.

Leucoplakia has a great tendency to develop into an epithelioma.

*Give its Treatment.*

Smoking, raw-spirit drinking, and all sources of buccal irritation must be stopped. Anti-syphilitic remedies are useless in this disease.

Bland mouth washes should be freely used. The dorsum of the tongue may be anointed with a mild antiseptic ointment at bedtime. Radium emanations can be tried.

*What Varieties of Ulcers are found on the Tongue?*

- (1) Catarrhal.
- (2) Traumatic.
- (3) Tubercular.
- (4) Syphilitic.
- (5) Epitheliomatous.

*Contrast Gumma, Epithelioma, and Tubercular Ulcer of the Tongue.*

|                           | GUMMA.                                                                                  | EPITHELIOMA.                                             | TUBERCLE.                                                                             |
|---------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------|
| <i>Situation</i> .        | Centre of dorsum.                                                                       | Edge of tongue.                                          | Tip of tongue.                                                                        |
| <i>Pain</i> . .           | Painless.                                                                               | Severe, and shoots towards ear.                          | Severe in late stages, painless at first.                                             |
| <i>Lymphatic Glands</i> . | Unaffected.                                                                             | Early enlargement.                                       | Sometimes affected.                                                                   |
| <i>Induration</i>         | Only when an ulcer forms.                                                               | Marked, preventing free protrusion of the organ.         | <i>Nil.</i>                                                                           |
| <i>Appearance</i>         | When it breaks down the edges are steep and often undermined; wash-leather like slough. | Warty or fissured. The edges and base are very hard.     | Friable edges, feeble granulations, yellowish discharge.                              |
| <i>Treatment</i>          | As for all tertiary syphilitic lesions.                                                 | Removal of the tongue and the affected lymphatic glands. | If possible excise the ulcer, otherwise dust with orthoform and keep the mouth clean. |

*What Cystic Swellings are found in the Mouth?*

1. Lingual dermoids.
2. Thyreo-glossal tumours.
3. Retention cysts.
4. Ranula.



*Describe Thyreo-glossal Cysts.*

These cystic swellings arise in the thyreo-glossal tract, which leads from the foramen cæcum to the thyroid isthmus. Microscopically, they are lined with ciliated epithelium, and often contain colloid substance. The mucous membrane covering the cyst-wall is very vascular. These cysts are most commonly met with in young girls about puberty. The main clinical features are :—

- (a) Dark-red colour.
- (b) Repeated attacks of hæmorrhage.
- (c) Variations in size.
- (d) Soft on palpation.
- (e) When large they interfere with deglutition and speech.

The treatment consists in painting them with an astringent paint, and in giving potassium iodide (Butlin.) If causing trouble, they should be carefully dissected out.

*What are Lingual Dermoids ?*

These occur between the tongue in the interval between the genio-hyoglossi muscles. The capsule is usually fixed to the genial tubercles by a tough fibrous band. The cysts are lined by squamous epithelium. The cyst wall pits on firm pressure. On opening into the cyst, the contents resemble the yoke of a hard-boiled egg. Other clinical features are :—

- (a) Indistinct speech.
- (b) Dribbling of saliva.
- (e) Occasionally dyspnœa from backward pressure upon the epiglottis.

*Distinguish between Retention Cysts and Lingual Dermoids.*

|                   | RETENTION CYSTS.                | LINGUAL DERMIDS.                                        |
|-------------------|---------------------------------|---------------------------------------------------------|
| <i>Site</i> . . . | To one side of the middle line. | In the middle line between the genio-hyoglossi muscles. |
| <i>Colour</i> .   | Purple.                         | Yellow.                                                 |
| <i>Appearance</i> | Translucent.                    | Opaque.                                                 |

Both varieties of cysts should be dissected out.



*Define a Ranula.*

A ranula is defined as being any cystic tumour arising from the glands situated in the floor of the mouth. It is **not** a retention cyst, but is the result of a cystic degeneration. The fluid contents are very viscid, and contain a large amount of epithelial debris and mucin. Unlike saliva, no ptyalin or sulpho-cyanide of potassium is present.

*Give the Clinical Features of Sublingual Ranula.*

This is the most common form of ranula, and has the following characters—

1. Tense, painless, and globular in shape.
2. Bluish colour.
3. Lies to one side of the frenum.
4. Does not pit on pressure.
5. A probe can be passed along Wharton's duct.

The treatment consists in incising the mucous membrane over the cyst, dissecting away the wall, and packing the cavity with iodoform gauze.

*Describe Salivary Fistulæ.*

There are two varieties (*a*) those of the gland—**parotid fistula**, and (*b*) those of Stenson's duct—**duct fistula**. The former result from suppuration occurring in the gland, *e.g.* abscesses around salivary concretions. Duct fistulæ arise from a wound of Stenson's duct, only rarely from an abscess.

*Contrast the Two Varieties of Salivary Fistulæ.*

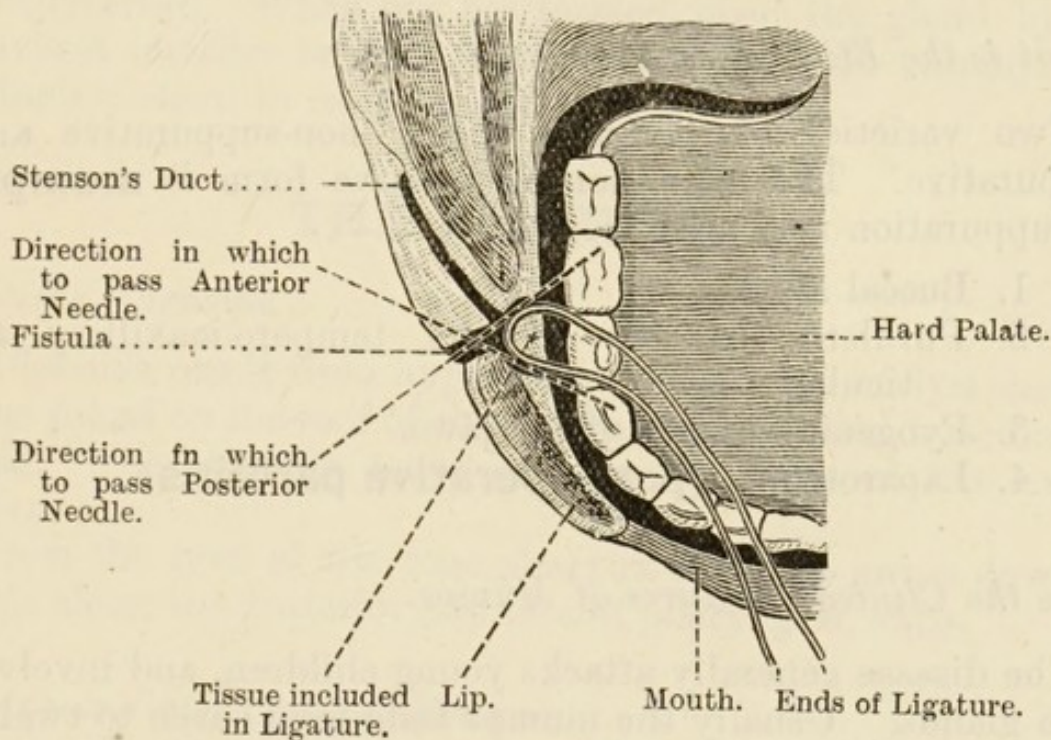
|                            | PAROTID.                                       | DUCT.                              |
|----------------------------|------------------------------------------------|------------------------------------|
| <i>Cause</i> .             | Suppuration.                                   | Injury.                            |
| <i>Site</i> . .            | Anywhere over the gland.                       | Over the buccinator muscle.        |
| <i>Discharge of Saliva</i> | Usually dry between meals.                     | Continuous discharge of saliva.    |
| <i>Prognosis</i>           | Tend to close without treatment.               | Require an operation.              |
| <i>Treatment</i>           | In persistent cases pare and suture the edges. | Make a new opening into the mouth. |



*Describe the Operation.*

A silk thread is taken with a needle at each end ; one needle is passed through the fistula, and directed inwards and backwards through the cheek into the mouth, and the end of the thread brought out through the mouth. The other needle is next passed through the fistula in a similar manner, but must be directed inwards and forwards. The two ends are then to be tied **tightly** inside the mouth, and the knot is allowed to work through the included tissue, into the cavity of the mouth. In this way a free opening is secured into the mouth (Fig. 35).

Fig. 35—OPERATION FOR SALIVARY FISTULÆ.



*What is to be done with the External Opening?*

In most cases it will close of its own accord, but if it does not, then **split the edges of the fistula**, turn the mucous surface inwards, and the skin surface outwards, and stitch each to each.

*Describe Salivary Calculi.*

Salivary calculi are formed by the action of oral micro-organisms upon the saliva. They generally occur in the



submaxillary gland or in Wharton's duct. Chemically, they consist of calcium carbonate and phosphate. In appearance they are whitish-grey, and are rough to the touch.

*Give its Symptoms.*

1. Sharp, stabbing pain on deglutition.
2. Marked swelling of the gland during meals.
3. The calculus can be palpated.
4. The contents can be discharged from the swelling by digital pressure.
5. The site of the calculus can be detected by passing a probe along Wharton's duct.

*What is the Etiology of Parotitis?*

Two varieties of parotitis occur, non-suppurative and suppurative. The main non-suppurative form is **mumps**.

Suppuration may arise from—

1. Buccal sepsis.
2. Purulent arthritis of the temporo-maxillary articulation.
3. Pyogenic diseases of the jaws.
4. Laparotomies (**post-operative parotitis**).

*Give the Clinical Features of Mumps.*

The disease generally attacks young children, and involves both glands. Usually the mumps lasts from seven to twelve days. Locally, the gland is swollen and painful, the pain being aggravated by any movement of the jaws. In many cases orchitis supervenes, which may terminate in testicular atrophy.

*Mention the Signs of Suppurative Parotitis.*

The gland is brawny, swollen, and extremely tender. Later, it becomes red, and fluctuation can be elicited. Owing to the great pain, the mouth is kept closed. Within a few days suppuration occurs, the resulting abscess burrow-



ing in the deep planes of the neck. Very serious complications may ensue from.

1. Erosion of the carotid arteries or internal jugular vein.
2. Mediastinitis.
3. Retro-pharyngeal abscess.
4. Septic arthritis of the temporo-maxillary joint.
5. Facial paralysis.
6. Salivary fistulæ.

*What is the Treatment of the Suppurative Form?*

At first hot fomentations or Klapp's suction bells. The mouth must be frequently washed out with Condy's fluid or boro-glyceride. When pus has formed, open the gland by a tranverse incision behind the angle of the jaw, employing Hilton's method to reach the abscess.

## THE PHARYNX.

*Describe Adenoids.*

Adenoids result from hypertrophy of a mass of lymphoid tissue found on the roof of the naso-pharynx, called Luschka's tonsil. They usually occur between the ages of five and fifteen.

From the roof of the naso-pharynx the mass grows downwards along the posterior and lateral pharyngeal walls.

*Give their Chief Clinical Features.*

The child has a stupid expression, breathes through the mouth, snores during sleep, is more or less deaf, and suffers from chronic catarrh of the nose. Attacks of ear-ache may bring the patient to the surgeon. Suppurative otitis media may result from the disease.

The adenoid mass should be curretted away.

*What is Quinsy?*

An acute suppuration of the tonsil and the surrounding connective tissue. The condition begins suddenly with a



rigor and a sharp rise of temperature. There is severe pain on swallowing, the pain radiating towards the ears. Respiration is somewhat embarrassed. On inspection (if the patient can open his mouth sufficiently), it will be noticed that the soft palate, tonsils, and pillars of the fauces have a purplish colour and are markedly swollen. The uvula is congested and œdematous, and usually deviated to one side. Within a week pus forms, and unless the abscess be opened, the pus is discharged into the pharynx. The lymphatic glands along the anterior border of the sterno-mastoid are tender and enlarged.

*Describe the Treatment.*

At first, antiseptic gargles or the administration of formamint lozenges should be employed. Hot fomentations are applied externally. A good dose of calomel should be given. When an abscess has developed, it should be promptly incised.

*What Malignant Tumours occur in the Tonsils?*

1. Lympho-sarcoma.
2. Epithelioma.
3. Encephaloid cancer.

Cancer is more common than sarcoma.

*Give the Clinical Features of Lympho-sarcoma.*

Although originating in the tonsil, the neoplasm quickly invades the peritonsillar tissues and the soft palate. Being nodular, and of a palish colour, the tumour resembles a quinsy. Owing to the swelling the patient complains of dysphagia and dyspnœa. At a later stage ulceration occurs, which may produce death. Cachexia is usually a pronounced feature, likewise involvement of the deep cervical lymphatic glands.

*Describe Cancer in the Tonsil.*

This disease causes considerable suffering and discomfort. The chief signs and symptoms are :—



1. Enlargement of the glands of the anterior triangle of the neck.
2. Dysphagia and dyspnœa.
3. Pain on deglutition, the pain often shooting towards the ear.
4. Salivation.
5. On digital examination, an indurated swelling will be detected.
6. Cachexia.

*What is the Pathology of Naso-pharyngeal Tumours?*

Naso-pharyngeal tumours are, in the majority of cases, fibro-sarcomatous in nature. They grow from the muco-periosteum of the naso-pharyngeal vault, usually during adolescence. They are exceedingly vascular, containing large thin-walled venous sinuses.

*Mention the Chief Clinical Features.*

1. Frequently the face is flat and wide, and the eyes are directed outwards—*frog face*.
2. Noisy respiration, especially when the patient is asleep.
3. Frontal headache.
4. Offensive discharge from the nostrils.
5. Recurrent attacks of epistaxis.
6. A certain degree of deafness.
7. The tumour can be examined digitally or by posterior rhinoscopy.

*How would you deal with such a Tumour?*

1. Do a preliminary laryngotomy.
2. Tie or clamp the external carotids.
3. Split the upper lip in the middle line, and detach the alveolar process of the jaw with a chisel. Divide the alveolar process and the hard palate mesially, and pull the two halves apart. The tumour is now exposed and can be removed. There is a great risk of death from hæmorrhage.

## THE NECK.

*What are the Varieties of Torticollis?*

1. Acute or transient "rheumatic torticollis."
2. Chronic or congenital.
3. Spasmodic.

*Describe Acute Torticollis.*

Acute torticollis results from a fibrositis of the sheath of the sterno-mastoid muscle following upon exposure to cold. Beyond the fact that it is an extremely painful condition, it is of no great importance. The treatment is to apply warmth, gentle massage, and a brisk purge. Acetylsalicylic acid is a very useful remedy in this as in all "rheumatic" affections of muscles.

*Give the Pathology of Chronic Torticollis.*

Chronic torticollis is caused by intra-uterine malposition of the foetus, the head being laterally flexed. This malposition results in constriction of the small artery from the superior thyreoid, which supplies the central area of the sterno-mastoid. Owing to the defective blood supply, ischæmia followed by a sclerotic interstitial myositis occurs. The resulting contraction of the muscle bends the head permanently to one side, and interferes with the circulation through the common carotid and subclavian arteries on that side. The cervical fascia, splenius and scalmi muscles are contracted on the same side.

*What are its Clinical Features?*

1. The head is laterally flexed on the affected side, and rotated so that the chin points towards the opposite side.
2. Atrophy of the facial muscles on the affected side.
3. The transverse axis of the mouth and eyes converge on the contracted side.
4. Drop a vertical line from the lobule of the ear; it falls to the inner side of the centre of the clavicle, instead of outside it.



5. The affected sterno-mastoid is more vertical than normal.
6. In advanced cases a scoliosis develops with the concavity on the side of the contraction.

*How should it be treated?*

The contracted structures should be divided by an open operation, care being taken not to injure the branches of the brachial plexus, the phrenic nerve, and the contents of the carotid sheath. After operation, the neck is fixed in a plaster cuirass over-corrected with the head. Fourteen days later it is removed and a poroplastic collar worn for six months.

*Describe Spasmodic Torticollis.*

The etiology of this form of wry-neck is very uncertain, but it is probably due to some irritation of the cortical centres of the sterno-mastoid and trapezius of the contracted side, and of the post-vertebral rotator muscles of the opposite side. The deformity is accompanied by constant jerking of the head. The patient becomes intensely neurotic, and suffers from insomnia.

*Indicate the Treatment.*

In mild cases massage and tonics may do good for a time; in severe cases an operation must be performed. This consists in dividing the spinal accessory nerve on the contracted side, and the posterior branches of the first four or five cervical nerves (or division of the muscles supplied by those nerves) of the opposite side.

*Describe Ludwig's Angina.*

The term, Ludwig's angina, is applied to a very virulent streptococcal suppurative cellulitis of the neck. It commences in the submaxillary region as a peri-lymphadenitis, and generally causes death, either from septicæmia or from œdema of the glottis.

*Mention its Chief Clinical Features.*

1. A brawny swelling of a dark red colour, commencing beneath the jaw and spreading rapidly.
2. Marked pain on moving the head.
3. Fluctuation cannot be elicited.
4. Laboured respiration, sometimes calling for tracheotomy.
5. Dysphagia.
6. Irritative phenomena, from pressure on the nerves of the neck.
7. The usual constitutional symptoms associated with profound septicæmia.

*Give its Treatment.*

When seen early, an attempt may be made to abort the disease by applying hot fomentations to the neck. When pus has formed, then several incisions should be made over the brawny area, and the deep cervical fascia carefully opened. Drainage should be provided for. Internally, the general treatment for septicæmia should be adopted.

**GOITRE OR BRONCHOCELE.***Describe the Etiology of Goitre.*

The etiology of goitre has not been as yet satisfactorily explained. It occurs in women oftener than men, and is epidemic in certain mountainous regions, *e.g.* Derbyshire, Switzerland, etc. Of the many theories which have been adduced the following are the chief:—

- (1) Peculiarities of the soil.
- (2) Deficiency of iodine in the drinking water.
- (3) Organic pollution of the drinking water.
- (4) Repeated congestions of the thyroid gland.
- (5) The presence of a specific amœba in the drinking water.



*Classify Goitres.*

|         |   |                           |   |             |
|---------|---|---------------------------|---|-------------|
| GOITRES | { | (a) <i>Parenchymatous</i> | = | { Colloid.  |
|         |   |                           |   | { Cystic.   |
|         |   |                           |   | { Fibrous.  |
|         |   |                           |   | { Vascular. |
|         |   | (b) <i>Adenomatous</i>    |   | Cystic.     |
|         |   | (c) <i>Malignant.</i>     |   |             |
|         |   | (d) <i>Exophthalmic.</i>  |   |             |

*Give the Pathology of the Parenchymatous Forms.*

In this variety the histological constituents of the gland undergo hyperplasia and hypertrophy. When the fibrous framework of the organ increases, a *fibrous* goitre results. This form is small and very dense, and, owing to its contraction, may endanger life by compressing the trachea and reducing it to a lateral chink ("scabbard trachea"). The term *colloid* goitre is used when the secreting vesicles are especially numerous; and when these coalesce as distinct cysts, a *cystic* goitre is produced. Hyperplasia of the blood vessels of the gland causes a *vascular* goitre.

In course of time the pressure of a goitre brings about softening of the trachea leading to dyspnœa. The swelling displaces the carotid sheath and its contents; if unilateral, the larynx and trachea are pushed towards the opposite side.

*What are the Signs and Symptoms of Goitre?*

1. A horse-shoe shaped swelling in the front of the neck.
2. The skin is freely movable over the goitre, and the superficial veins are greatly distended.
3. Notice that the tumour **cannot** be moved vertically, but **can** be moved transversely.
4. The goitre moves with the larynx during deglutition.
5. A varying degree of dyspnœa is always present.
6. Rarely, the recurrent laryngeal nerve may be pressed upon.

*Give the Treatment.*

The medical treatment is a combination of drugs and inunction. The chief drugs used are either potassium iodide, iron and arsenic, or pure phosphorus. The yellow iodide of mercury is rubbed over the gland.

Vaccines cultivated from the organism in the patient's stools have been given with marked benefit in some cases.

The following are the chief indications for operation—

1. Cardiac irregularity.
2. Marked dyspnœa.
3. Goitre increasing in size.
4. Signs of malignancy.

*Point out the Risks of Operation.*

1. Acute thyreoidism due to an excessive absorption of thyreoid secretion.

2. Tetany resulting from injury to the parathyreoids.

3. Heart failure—the chief danger. Accordingly a local anæsthetic is preferable to a general one. C. Mayo, however, injects a mixture of morphia  $\frac{1}{8}$ th grain and atrophin  $\frac{1}{120}$ th grain half an hour before operation, subsequently giving ether by the open method.

4. Cachexia strumipriva, a condition resembling myxœdema, may follow if too much of the gland has been removed.

*Describe Malignant Goitre.*

Malignant disease of the thyreoid gland may either be of the nature of a sarcoma or of a cancer. In the majority of cases it begins in individuals over fifty, who have been the subjects of goitre for a considerable time. The main signs and symptoms are :—

1. Fixity of the swelling, and therefore **only slight movement during deglutition.**
2. Pain is often a distressing feature.
3. Irregularity in the rate of growth of the goitre.
4. Enlargement of the deep cervical lymph glands, when the tumour has spread beyond the sheath of the gland.



5. Embarrassed respiration.
6. Aphonia may be present.

In the majority of cases an operation for the removal of the growth is impracticable.

*Mention the Clinical Features of Graves' Disease.*

In Graves' disease or exophthalmic goitre a thyrotoxicosis occurs. The disease is more often dealt with by the physician than the surgeon. The main signs are:—

1. Tachycardia.
2. Throbbing of the carotid and subclavian arteries.
3. Muscular tremors.
4. Excessive nervousness.
5. Proptosis.
6. Anæmia.
7. Enlarged thyroid gland.
8. Eye signs, *i.e.* Von Græfe's symptom, etc.
9. Lymphocytosis, but a diminished number of leucocytes.
10. The blood coagulates more slowly than in normal individuals.

The disease is commoner in females than in males, and generally occurs between the ages of twenty and forty-five.

*What is its Surgical Treatment?*

1. X-rays sometimes give benefit.
2. Forty minims of boiling water injected into each lobe (Porter).
3. Ligature of one or more superior thyroid arteries. This probably acts by interfering with the secretory nerves supplying the gland (Crile).
4. Partial thyroidectomy; one lobe, the isthmus and the pyramidal lobe (if present), is removed. For a fortnight before the operation, the patient should rest thoroughly, and take small doses of sodium phosphate and iodine (Kocher). If the cardiac musculature shows signs of degeneration, operation is contra-indicated.

## ŒSOPHAGUS.

*Describe the Various Methods used in examining the Œsophagus.*

1. PALPATION.—This method is only applicable to the cervical portion.

2. AUSCULTATION.—While the patient slowly drinks a tumbler of water, the surgeon applies a stethoscope opposite the common sites of stricture, along the left side of the thoracic spine.

3. PASSAGE OF BOUGIES. *N.B.*—Always exclude thoracic aneurysm before introducing an œsophageal bougie.

4. ŒSOPHAGOSCOPY.—The œsophagoscope is an elongated speculum illuminated by a small electric lamp.

5. X-RAYS.—The patient swallows food mixed with one ounce of bismuth oxychloride. The œsophagus is then examined by the screen, or a radiogram is taken.

*How would you introduce the Œsophageal Bougie?*

The patient must be seated upon a chair, with the head thrown backwards and supported. The bougie is smeared with glycerine and guided by the surgeon's left fore-finger. In order to facilitate the introduction, the bougie should be held like a pen. When the tube is felt to be gripped by the œsophagus, the patient's head is flexed towards his chest, and he is told to swallow.

*Describe Diverticula of the Œsophagus.*

An œsophageal diverticulum is produced in one of two ways, either by pressure from within or by traction from without. The latter usually follows the cicatrization of tuberculous bronchial glands. The main points of difference between the two varieties are shown in the accompanying table :—



| TRACTION.                                                              | PRESSURE.                                                             |
|------------------------------------------------------------------------|-----------------------------------------------------------------------|
| 1. Usually on anterior wall.                                           | On posterior and lateral walls.                                       |
| 2. Gives rise to no symptoms.                                          | Causes symptoms ( <i>see post</i> ).                                  |
| 3. The apex of the diverticulum is at a higher level than the opening. | The mouth of the diverticulum is at a higher level than the sacculus. |
| 4. The communication is opposite the bifurcation of the trachea.       | The communication is opposite the cricoid cartilage.                  |
| 5. Small size.                                                         | Large size.                                                           |
| 6. Rare.                                                               | Fairly common.                                                        |

*Give the Symptoms and Signs of a Diverticulum.*

The disease usually manifests itself in middle-aged males who have been addicted to swallowing food hurriedly. Food collects in the sacculus where it decomposes, leading to an offensive odour. The distended diverticulum causes dysphagia. Regurgitation of the contents of the pouch is a common feature, and the ejected material is free from pepsin and hydrochloric acid. Sometimes after taking food the diverticulum can be distinctly seen in the neck. The opening of the sacculus is readily distinguished with the œsophagoscope.

*What is its Treatment?*

Palliative measures, such as regulating the diet and irrigating the sac with mild antiseptics may be tried. If an operation is necessary, the diverticulum can be reached by an incision along the anterior border of the sterno-mastoid. The sac should be excised, and the œsophageal communication carefully closed by three rows of sutures.

*Name the Varieties of Stricture of the Œsophagus.*

1. Cicatricial.
2. Spasmodic.
3. Malignant.



*Give the Causes and Sites of the Cicatricial Variety.*

The chief causes are—

1. Swallowing of caustics.
2. Healing of tubercular and syphilitic ulcers.
3. Trauma.

The commonest sites are opposite the cricoid cartilage, and at the cardiac opening into the stomach. Dilatation of the tube above the stricture generally occurs, leading to an accumulation of food debris.

*Mention its Clinical Features.*

- (a) A gradually increasing difficulty in swallowing.
- (b) A complaint of great hunger and thirst.
- (c) Progressive emaciation.
- (d) Regurgitation of the contents of the dilated portion of the œsophagus. **Distinguish this from vomiting** by (i.) the unaltered character of the food ; (ii.) its alkaline reaction ; and (iii.) by the absence of pepsin.
- (e) Hawking up of viscid mucus between meals.
- (f) Pain, shooting either to the epigastrium or the scapular region.

The diagnosis is verified by the introduction of bougies, the œsophagoscope, the giving of food containing bismuth oxychloride and X-ray examination, and by auscultation.

*What is its Treatment ?*

The methods available are—

1. Continuous dilatation.
2. Intermittent dilatation.
3. Œsophagotomy.

*Give the Methods of Dilatation.*

Previous to the commencement of treatment, the patient should rest in bed for a week, and take nothing but a simple, fluid diet. When intermittent dilatation is adopted, graduated bougies are introduced **every three or four days** until a full-sized one can be comfortably passed. When the stricture is resilient in character, continuous



dilatation should be adopted. This consists in passing a Symonds' tube through the constriction, and leaving it in position for **two days** ; then pass a larger size and so on, until the normal diameter of the œsophagus is regained.

After dilatation a full-sized bougie is introduced monthly.

### *Describe Cancer of the Œsophagus.*

The variety of carcinoma occurring in the œsophagus is a squamous epithelioma. Most frequently it develops in the upper or lower four inches of the tube. It is uncommon before the age of forty. Remember that the growth has usually involved a considerable area before any definite symptoms appear. The cervical and bronchial glands are generally involved. As the growth increases, important structures in the immediate vicinity are affected, especially the respiratory passages, the large blood-vessels, and the recurrent laryngeal nerves.

### *What are its Clinical Features?*

The signs and symptoms of malignant disease resemble in a great measure those of cicatricial stricture. The chief differences are—

1. In addition to attacks of regurgitation, actual vomiting frequently occurs.
2. Hunger is absent.
3. The regurgitated and vomited material is often tinged with blood.
4. Dysphagia is intermittent, not persistent.
5. Emaciation is more rapid owing to cachexia supervening.
6. Excessive salivation.

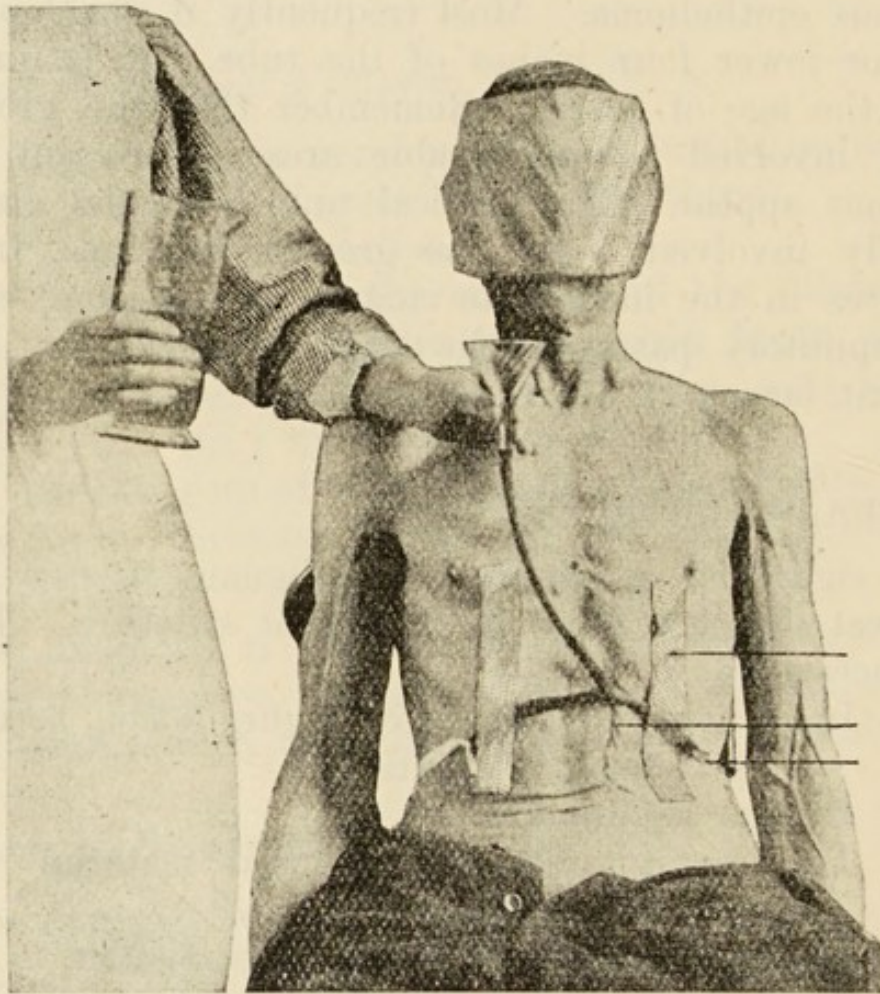
### *Mention the Causes of Death.*

1. Actual starvation.
2. Cachexia.
3. Pain.
4. Erosion of a large blood-vessel.
5. Empyema of the left pleura.

*Give the Treatment.*

In the majority of cases a gastrostomy should be performed, and the patient fed through the rubber tube. Sometimes, when the growth is near the cricoid cartilage, an œsophagotomy is possible (see Catechism, *Operative Surgery*, Part II.).

FIG. 36.



1. Adhesive Plaster.      2. Vertical Operation Scar.      3. Tape.

Shows method of fixing the stomach tube and method of feeding the patient. The gastrostomy tube passes through a large tube which is split at one end to form two flanges, over which the adhesive plaster is applied. A tape passing round the body is attached to the end of the flanges.

*Describe Spasmodic Stricture.*

Spasmodic stricture is sometimes termed œsophagismus. Although occasionally met with in persons of intemperate habits, it mostly occurs in neurotic females. The attacks of



dysphagia come on when the patient is excited, and are accordingly intermittent in character. Remember that a full-sized bougie can be passed at one time, but not at another. The treatment consists in administering such drugs as potassium bromide, belladonna, etc.

## THE LARYNX AND TRACHEA.

*What Operations are performed in this Region ?*

1. LARYNGOTOMY—An opening through the crico-thyroid membrane.
2. TRACHEOTOMY—An opening into the trachea itself.
  - (1) Above the isthmus of the thyroid body—the *high* operation.
  - (2) Below the isthmus—the *low* operation.
3. THYREOTOMY—Where the thyroid cartilage is split in the middle line, exposing the interior of the larynx.
4. LARYNGECTOMY—Removal of all the larynx.

*Give the Chief Stages of High Tracheotomy.*

1. Place the patient facing a good light, with the shoulders raised and the head thrown back; the latter is kept perfectly straight and steady by an assistant.
2. Begin the **incision** over the middle of the thyroid cartilage (for the **low** operation begin over the cricoid cartilage), and carry it downwards exactly in the **middle line**.
3. Divide the skin and superficial fascia, and secure or draw aside any evident vein, such as the anterior jugular.
4. Divide the deep fascia and separate the sterno-hyoid and sterno-thyroid muscles.
5. **With the handle of the knife** expose the trachea and the isthmus of the thyroid, and feel for the lower edge of the cricoid cartilage.
6. Pinch up the fascia over the trachea, and divide it by a transverse incision close to the cricoid cartilage; separate it from the trachea and push down the isthmus.



7. Transfix and draw forward the trachea by a sharp hook, and open it in the **middle line**, with the blade of the scalpel held between the finger and thumb about half an inch from the point, **the back of the knife being directed towards the sternum.**

8. Keep the opening patent by the handle of the scalpel, let the patient cough through the opening, then introduce and fix the tube.

*What are the Characters of a Tracheotomy Tube?*

1. The **INNER** tube should be **loose** and a **little longer** than the outer tube, so that it may be easily expelled by coughing should it become blocked.

2. The **OUTER** tube should have an opening on its upper convex surface by means of which, when the inner tube is removed, one can try by closing the external opening whether the patient is ready to breathe through his larynx again. In no case should there be an opening through both tubes at this point.

*Mention the Causes of Death after this Operation.*

1. The disease for which the operation was performed.
2. Septic broncho-pneumonia owing to blood and other discharges entering the trachea.
3. Bronchitis from the inhalation of cold air.

*Point out the Objections to the Low Operation.*

1. The trachea is deeper.
2. The presence of the inferior thyreoid and anterior jugular veins with their transverse anastomosing branches.
3. The trachea is more mobile.
4. The presence of the thymus gland in children.
5. The occasional presence of a thyreoidea-ima artery.
6. The left innominate vein may take an unusually high course and project above the sternum.
7. The carotids may arise by a common trunk, when the right will pass in front of the trachea.



*Describe the Operation of Laryngotomy.*

It may be done by a single plunge, if the case is urgent, through the crico-thyreoid membrane. In less urgent cases, make a **vertical** incision in the skin, and then a **transverse** cut through the membrane.

*What is the Chief Danger?*

Wounding the crico-thyreoid arteries that cross in front and anastomose over this membrane; as a rule they are very small and of little consequence, and by making the **transverse** incision through the membrane they are less likely to be injured. Sometimes the vessel is large, but then it may be seen pulsating and avoided.

*Why is this Operation to be preferred in the Adult?*

1. It is often as good as an opening in the trachea.
2. It is much safer.
3. It is more rapidly performed.
4. Diseases that necessitate this operation in the adult have but little tendency to spread downwards.

*For what Conditions is it used?*

1. Foreign bodies in the larynx.
2. Syphilitic ulceration of the larynx, with danger of spasm.
3. Œdema glottidis.
4. Preliminary to other operations about the mouth, head, and face, where there is danger of blood entering the trachea. The anæsthetic can be given through the lower part of the opening.

*Describe the Operation of Complete Laryngectomy.*

A preliminary low tracheotomy may be performed ten days previously, and the trachea stitched to the skin in the lower part of the wound.

An incision is made in the middle line from the tracheotomy wound to the hyoid bone. Two horizontal incisions

are carried from the extremities of this line to the anterior borders of the sterno-mastoid muscles. After retraction of the cutaneo-fascial flaps, the soft parts are dissected off the larynx, care being taken to avoid injuring the thyroid gland. The trachea is divided just below the cricoid, and the larynx dissected away from the pharynx. Pack the resulting aperture. Remove the lymphatic glands of both anterior triangles a fortnight later. If it is impossible to get away all the glands, tablets of thyroid extract should be given.

*What is the Etiology of Œdema of the Larynx?*

|                 |                  |                                                                                                                                                                                                                             |
|-----------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Œdema of Larynx | Inflammatory . . | <ol style="list-style-type: none"> <li>1. After septic conditions of mouth and pharynx.</li> <li>2. Secondary to syphilis, or tubercle of larynx.</li> </ol>                                                                |
|                 | Non-Inflammatory | <ol style="list-style-type: none"> <li>1. From pressure on large veins at root of neck.</li> <li>2. Associated with kidney or heart disease.</li> <li>3. Sometimes following administration of potassium iodide.</li> </ol> |

*Mention its Symptoms.*

The exudation is either serous or sero-purulent, and is found in the aryteno-epiglottidean folds, the valleculæ, and the false vocal cords. The following are the chief symptoms:—

1. Marked pain on swallowing.
2. Dyspnœa.
3. Stridulous inspirations.
4. Cyanosis.



*Give its Treatment.*

In slight cases the patient's glottis should be sprayed with a weak solution of adrenalin, and poultices applied externally to the larynx. In more severe cases scarification of the aryteno-epiglottidean folds should be attempted. Intubation with O'Dwyer's tubes, or even tracheotomy, may be required.

*Describe Tubercle of the Larynx.*

This disease is also known as laryngeal phthisis. It is usually secondary to tubercle of the lungs, but may occur as a primary affection.

Miliary tubercles form beneath the mucous membrane; these coalesce, break down, and leave irregular ulcers. On laryngoscopic examination, it will be noticed that the mucous membrane is pale, swollen, and ulcerated. The tissue round the ulcer is **pale in colour** (contrast with Syphilis). The main symptoms are hoarseness or aphonia, persistent cough, and often dyspnœa.

*What is Syphilis of the Larynx?*

The syphilitic affections of the larynx are:—

SECONDARY.—Ulcerous patches, catarrhal inflammation, and condylomata.

TERTIARY.—Diffuse gummatous infiltration leading to ulceration. The ulcers are deep, punched out, and covered with a dirty-yellow slough. The surrounding tissues are **red in colour**.

When the ulcers heal, stenosis of the larynx often results.

The usual syphilitic treatment is adopted. Be cautious in using potassium iodide, as œdema may ensue.

*Describe Papilloma of the Larynx.*

This tumour may occur at any age, and is very common before puberty. It generally springs from the true vocal cords or the front of the larynx, and appears as a red, warty projection. Papillomata are frequently multiple in children.

The chief symptoms are hoarseness or aphonia and dyspnœa; the latter is often paroxysmal.



*Give the Clinical Features of Cancer of the Larynx.*

Carcinoma of the larynx is a primary epithelioma, and usually appears in individuals over forty years. The site may be intrinsic or extrinsic. The main differences between the two forms are given in the following table :—

|           | EXTRINSIC CANCER.                                            | INTRINSIC.                                           |
|-----------|--------------------------------------------------------------|------------------------------------------------------|
| SITES     | Epiglottis, back of cricoid, and aryteno - epiglottic folds. | True cords, false cords, and in vestibule of larynx. |
| FREQUENCY | 30% of all cases.                                            | 70% of all cases.                                    |
| SEX       | Most common in females.                                      | Most common in males.                                |
| PAIN      | Marked.                                                      | Slight.                                              |
| GLANDS    | Early involved.                                              | Involved late.                                       |
| SYMPTOMS  | Dysphagia, frothy, blood-stained sputum, neuralgic pains.    | Hoarseness, aphonia, and spasmodic dyspnoea.         |

A complete laryngectomy with removal of the affected glands is usually the only available treatment for the extrinsic form. The intrinsic variety can be removed by splitting the thyreoid cartilage (laryngo-fissure).

*Mention the Signs and Symptoms of Foreign Bodies in the Bronchi.*

Foreign bodies usually lodge in the *right* bronchus for two reasons, (a) the right bronchus has a greater calibre than the left, and (b) the right bronchus is in a more direct line with the trachea. One of three things can happen to the object swallowed :—

- (a) It may be coughed up into the larynx and cause spasmodic dyspnoea.
- (b) It may act as a ball-valve, *i.e.* allow air to pass out but not to pass into the bronchus ; collapse of the lung then occurs.



- (c) It may produce bronchitis or pneumonia by its irritation.

In order to remove the obstruction low tracheotomy should be carried out, and the foreign body removed with suitable forceps.

## THE EAR.

*What are the Cardinal Signs of Ear Disease?*

1. Deafness.
2. Tinnitus aurium, *i.e.* subjective noises in the ear.
3. Ear-ache.
4. Vertigo or giddiness.
5. Otorrhœa, *i.e.* an aural discharge.

*Show the Methods which can be adopted for inflating the Middle Ear.*

I. VALSALVA'S METHOD.—The patient holds both nostrils, closes his mouth, and forcibly expires.

II. POLITZER'S METHOD.—A Politzer's bag and an auscultation tube are required. Place one end of the tube into the patient's ear, and the other end into the surgeon's ear. Direct the patient to partially fill his mouth with water. Now introduce the nozzle of the bag into one nostril, and close the other with the finger. Tell the patient to swallow, and immediately the larynx rises during the swallowing, forcibly compress the bag.

III. "CATHETER" METHOD.—Three instruments are necessary, namely, a Politzer's bag, an auscultating tube, and a silver Eustachian catheter. This is a very safe method, as there is no risk of rupturing the tympanic membrane, and only one ear is inflated. As in the previous method, place the auscultation tube in position; introduce the Eustachian catheter; fix the nozzle of the Politzer's bag into the outer end of the catheter, and gently inflate.



*How would you introduce a Eustachian Catheter?*

Place the patient facing a good light and stand in front of him. With the left thumb elevate the tip of the patient's nose, and carry the instrument along the floor of the inferior meatus until it reaches the posterior wall of the naso-pharynx. The catheter is then rotated inwards through a quarter of a circle, and drawn forwards until the beak impinges against the edge of the nasal septum. If now the catheter be pushed slightly backwards, and rotated downwards and outwards through half a circle, the point will enter the orifice of the Eustachian tube.

*What are the Chief Diseases of the External Ear?*

1. Eczema, which may be either acute or chronic.
2. Hæmatoma auris. This often follows a blow in boxing or football.
3. Sebaceous cysts.
4. Malignant disease, *i.e.* epithelioma or rodent cancer.
5. Diffuse inflammation of the meatus. Removing hard portions of wax with a rough instrument frequently leads to this condition. Cases have been recorded where diffuse inflammation followed sea-bathing.
6. Boils.
7. The presence of foreign bodies. These cause pain, deafness, and tinnitus. Insects, maggots, etc., are killed by instilling a few drops of pure alcohol; they are subsequently removed by syringing out the ear with warm water or weak boracic solution.
8. Impaction of wax. In order to remove any hard wax, syringe out the ear with a warm solution of sodium bicarbonate (10 grains to an ounce of water) and a little glycerine.
9. Osteomata (**aural exostoses**), ivory and cancellous.
10. Otomycosis.—A chronic inflammation of the external auditory meatus caused by a vegetable fungus such as *Aspergillus niger*. The chief symptoms are itchiness, tinnitus, sometimes giddiness, and occasionally pain. To kill the fungus, frequently syringe the ear with a warm solution of perchloride of mercury (1 in 1000).



*Describe Acute Infection of the Middle Ear.*

Acute otitis media follows sepsis of the buccal and nasopharynx. The chief signs and symptoms are—

- (a) Injection of the membrana tympani, and if pus is pointing, a yellowish area will be noticed.
- (b) Ear-ache.
- (c) Deafness.
- (d) Elevated temperature.

*Give the Treatment.*

The patient should stay indoors, and abstain from alcohol and tobacco. Give a dose of calomel followed by a saline. To relieve the ear-ache instil a few drops of laudanum or a combination of carbolic acid, cocaine, and glycerine. If the membrana tympani is in danger of rupture, perform paracentesis. Oral and nasal sepsis must be counteracted.

*Describe Chronic Otitis Media.*

Chronic middle-ear disease is a sequel of the acute variety, and has three cardinal signs—

- (a) A varying degree of deafness.
- (b) A purulent discharge from the ear.
- (c) A perforation of the membrana tympani.

*Give its Chief Complications.*

- |                    |   |                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I. INTRA-CRANIAL.  | { | <ul style="list-style-type: none"> <li>(a) Abscesses, either extra-dural, sub-dural, cerebral, or cerebellar.</li> <li>(b) Meningitis.</li> <li>(c) Phlebitis of the transverse sinus.</li> </ul>                                                                                                                                                    |
| II. EXTRA-CRANIAL. | { | <ul style="list-style-type: none"> <li>(a) Erosion of large blood vessels, <i>i.e.</i> the internal carotid artery and the internal jugular vein.</li> <li>(b) Paralysis of the facial nerve.</li> <li>(c) Mastoid disease.</li> <li>(d) Cholesteatoma.</li> <li>(e) Polypi.</li> <li>(f) Necrosis of the temporal bone and the ossicles.</li> </ul> |



*How would you treat the Disease?*

Apart from operative measures, attention should be directed to keeping the ear as clean as possible. Introduce a little hydrogen peroxide (10 volumes strength), syringe out with boracic acid solution, and dry with a few drops of pure alcohol. Inflation through the Eustachian tube is carried out daily. This should be carried out very cautiously or the mastoid antrum will become infected.

When complications occur or threaten, especially the intra-cranial ones, operation should be recommended.

*Describe Acute Mastoid Disease.*

This condition may follow either acute or chronic otitis media, the pus extending through the aditus. Owing to the floor of the antrum being at a lower level than the aditus, the discharge cannot pass back again into the middle ear. From the antrum the pus can work its way—

- (a) UPWARDS, through the tegmen antri, and infect the middle cranial fossa and its contents.
- (b) BACKWARDS, and cause thrombosis of the transverse sinus.
- (c) INWARDS, and damage the external semi-circular canal.
- (d) OUTWARDS, penetrating the floor of the supra-mental fossa and causing a sinus.
- (e) DOWNWARDS, burrowing into the digastric fossa, *i.e.* Bezold's mastoiditis.

*What are its Clinical Features?*

- 1. Marked tenderness over the mastoid.
- 2. Redness and oedema.
- 3. Pain behind the ear.
- 4. Oedema of the deep parts of the external auditory meatus, often obscuring a portion of the membrana tympani.

*Give its Treatment.*

In the majority of cases Schwartze's operation will be necessary. This consists in freely opening the mastoid



antrum and cells. A curved incision is made over the mastoid process. It runs parallel with the attachment of the pinna, and lies  $\frac{1}{4}$  inch behind it. The pinna is dissected forwards until the posterior wall of the bony meatus is exposed. Identify the boundaries of the suprameatal fossa (Macewen's triangle), and with a small trephine or chisel open the antrum through the floor of the fossa. It is necessary to work forwards and inwards, or the transverse sinus will be damaged. Scrape away the lining membrane of the antrum and cells, and make the cavity perfectly smooth. Irrigate the antrum, and pack with iodoform gauze. Renew the dressing daily until all discharge ceases.

*What Operations should be performed when Chronic Otitis Media is present?*

The Stacke-Schwartzke or "radical" operation is necessary in these cases. The antrum, attic, and middle ear are made into one cavity by chiselling away the posterior wall of the osseous meatus. The remains of the membrana tympani, malleus, and incus are removed. During the operation the facial nerve and the external semi-circular canal are protected by Stacke's protector. After the operation is completed, the opening into the antrum is closed up by means of a conchal flap, and drainage carried out through the external auditory meatus.

## DISEASES OF THE EYE.

### THE EYELIDS.

*Describe the Inflammatory Conditions of the Eyelids.*

These are three in number, namely (a) STYE or hordeolum, (b) TARSAL (Meibomian) CYSTS or chalazion, and (c) BLEPHARITIS CILIARIS or eczema of the lids.

STYE.—A suppurative inflammation of a hair follicle (*external stye*) or of a Meibomian gland (*internal stye*). The clinical features are those of a hard,



painful swelling, with œdema of the eyelid associated. Incise the swelling, when suppuration has occurred, and remove the necrosed contents.

**TARSAL CYST.**—A chronic adenitis and periadenitis of a Meibomian gland. They are very hard, often multiple, and situated deeply in the lid. The contents of the cyst should be removed with a scoop.

**BLEPHARITIS CILIARIS.**—A pustular inflammation of the margins of the eyelids. The edges of the lids are congested and painful. The bases of the eyelashes show small pustules and crusts. The eyelashes are glued together. Atrophy of the eyelashes ultimately occurs. The treatment consists in (a) bathing the lids with warm, mild antiseptic lotions; (b) careful removal of all scabs; and (c) the subsequent application of mild mercury ointment. Tonics are generally indicated. *Any errors of refraction must be corrected.* In chronic cases the yellow oxide of mercury ointment (4 gr. to the oz.) should be used.

### *What is Entropion?*

Entropion is the term applied to inversion of the edges of the eyelids. Three forms occur—(a) congenital, (b) spasmodic, and (c) cicatricial.

**CONGENITAL.**—The surfaces of the eyelashes touch the cornea. This variety is due to a hypertrophy of the orbicularis palpebrarum muscle. The leading clinical feature is excessive watering of the eye. To treat the condition, remove an elliptical piece of skin from the affected lid.

**SPASMODIC.**—A spasm of the orbicularis palpebrarum muscle, due to either (a) phlyctenular ophthalmia in children; (b) a foreign body causing irritation; or (c) operative procedures in elderly people. The spasm may be overcome by canthoplasty, *i.e.* slitting the outer commissure.



**CICATRICIAL.**—Results from severe injuries to the conjunctiva. It can only be remedied by a special operation, such as Sinclair's or Van Milligen's.

*Describe Ectropion.*

Ectropion means eversion of the eyelids. It may be brought about by :—

- (a) Chronic conjunctivitis.
- (b) Traumatic cicatrisation.
- (c) Chronic cases of facial paralysis.

*Give the Symptoms and Treatment ?*

The clinical features are—eversion of the lid, epiphora, irritation of the cheeks and chronic conjunctivitis. In early cases the successful treatment of the conjunctivitis may cure the deformity. Cicatricial cases, however, require an operation such as Argyll Robertson's or Snellen's.

## THE CONJUNCTIVA.

*Classify the Varieties of Conjunctivitis.*

|                 |   |                               |
|-----------------|---|-------------------------------|
| I. ACUTE . . .  | { | Catarrhal.                    |
|                 |   | Purulent.                     |
|                 |   | Membraneous.                  |
|                 |   | Phlyctenular.                 |
| II. CHRONIC . . | { | Simple.                       |
|                 |   | Granular ( <i>trachoma</i> ). |
|                 |   | Recurrent (spring catarrh).   |

*Give the Causes of the Catarrhal Form.*

- (a) Following upon scarlet fever or measles.
- (b) Secondary to nasopharyngeal catarrh.
- (c) Trauma, *e.g.* foreign bodies, dust, etc.

*Describe the Clinical Features.*

- (a) Lachrymal irritation.
- (b) A muco-purulent discharge.
- (c) Photophobia.
- (d) A pricking sensation on the eyeball.
- (e) Redness of the conjunctiva.
- (f) Dimness of vision.
- (g) A varying degree of œdema of the lids.

*What is the Treatment?*

Keep the patient indoors and shade the eyes. Give a brisk purge. The patient must avoid exposure to irritating fumes, especially tobacco smoke. Locally, bathe the eyes frequently with boracic lotion, at night anointing the lids with boracic ointment. In very severe cases, thoroughly dry the mucous membrane, and paint a little  $\text{AgNO}_3$  solution (10 grains to the ounce) on the lids once daily.

*Describe Purulent Conjunctivitis.*

The gonococcus is the main causal agent in this form of conjunctivitis. In infants the condition is called OPTHALMIA NEONATORUM. The clinical features are those of the catarrhal variety, but more severe. Affections of the cornea are very apt to follow, leading to corneal opacity or ulceration. Prophylactic measures are of the greatest importance when a suspicion of gonorrhœa exists in the maternal passages. In addition, the baby's eyes must be carefully washed with weak corrosive sublimate. **The secretion from purulent conjunctivitis is extremely infectious.**

*What is Trachoma?*

A variety of conjunctivitis in which granular elevations are formed, which subsequently degenerate and cicatrise. The disease is very infectious, only affects adults, and is



most prevalent amongst Eastern races. The prognosis is very unfavourable, as despite treatment the disease is very apt to involve the cornea.

*Mention the Clinical Features.*

- (a) Pain and photophobia.
- (b) Excessive lacrymation.
- (c) A muco-purulent discharge.
- (d) Ptosis.
- (e) Conjunctival injection.
- (f) Small yellowish-grey elevations ("sago-grain" bodies) on the palpebral conjunctiva.
- (g) In later stages the upper segment of the cornea become vascular—PANNUS.

*Give the Treatment.*

- (a) **All toilet articles used by the patient must not be used by any other person.**
- (b) Avoid alcohol and tobacco.
- (c) Wash with boracic lotion.
- (d) In chronic cases, zinc chloride or silver nitrate should be applied with a brush.
- (e) The contents of the granular elevations may be squeezed out.

## IRITIS.

*What are the Varieties of Iritis?*

- (a) Tubercular.
- (b) Traumatic.
- (c) Rheumatic.

*Give the Clinical Features of Iritis.*

- (a) A deep-seated throbbing pain, mainly nocturnal.
- (b) A "misty" appearance of objects is noticed by the patient.

- (c) Photophobia.
- (d) Increased lacrymation.
- (e) Subconjunctival injection around the corneal margin.
- (f) The normal striated appearance of the iris is absent.
- (g) The pupil is grey in colour and reacts very sluggishly to light.
- (h) Irregularity of the pupil owing to adhesions forming between the iris and the lens-capsule.

*N.B.—Very few adhesions are formed in the rheumatic variety.*

### *What is the Treatment?*

Warm fomentations will relieve the pain. Shade the eyes. Atropin drops are required daily in order to prevent adhesions. If increased intra-ocular tension occurs, *stop the atropin* and give eserine.



# SURGERY.

## PART IV.

---

### THE ABDOMINAL WALL AND PERITONEUM.

*What are the Tumours of the Abdominal Wall?*

1. LIPOMATA.—These tumours may form in connection with either the superficial fascia (“subcutaneous”) or the sub-peritoneal fat (“subserous”).
2. FIBROMATA.—As in other regions of the body, both hard and soft varieties are met with. Multiple forms sometimes spring from the sheaths of the subcutaneous nerves—a neuro-fibromatosis.
3. RECURRENT FIBROIDS. The recurrent fibroids of Paget are transitional forms between fibromata and sarcomata. They are often multiple.
4. MALIGNANT.—Secondary carcinomata and sarcomata.
5. DERMoids.—These cysts are occasionally present in the neighbourhood of the umbilicus.

*How do you classify Wounds of the Abdomen?*

1. Of the ABDOMINAL PARIETES—*Non-penetrating* wounds may cause either diffuse suppuration between the different layers of muscles, or peritonitis. *Penetrating* wounds may be followed by immediate visceral protrusion, or a hernial protrusion may occur later through the cicatrix.



## 2. Of the ABDOMINAL VISCERA—

(a) With protrusion of viscera, such as the stomach or a portion of intestine. If the wound be large, the treatment is to establish an abnormal anus or a gastric fistula; if small, return the viscus and stitch up the abdomen.

(b) Without protrusion.

Hence penetrating wounds are of the following varieties:—

1. Through the abdominal wall alone.
2. With protrusion of viscera.
3. With protrusion and wound of viscera.
4. With wound of viscera without any protrusion.

*Describe a Patent Meckel's Diverticulum.*

In early embryonic life a communication is found between the primitive alimentary tube and the yolk-sac. This channel is termed the vitelline duct. It arises from the ileum usually about  $2\frac{3}{4}$  feet above the ileo-cæcal valve, and passes through the umbilicus. The duct normally undergoes obliteration about the end of the second month of foetal existence. If it remains patent, it is known as Meckel's diverticulum. Only in rare cases does this remain open as far as the umbilicus. When it does so, a fistula is formed which discharges mucus, or even faecal material. If faeces escape, the abdominal cavity must be opened, and the diverticulum excised. Sometimes a small section of the duct in the umbilical cord remains unobliterated; and when the stump of the cord separates, the mucous membrane of the vitelline duct grows, forming a tumour resembling a raspberry—an *enteroteratoma*. It should be excised.

*Describe Urachal Fistulae and Urachal Cysts.*

The urachus may remain patent throughout its whole length, and if there be any obstruction at the neck of the bladder or in the urethra, urine will escape at the umbilicus—a urachal fistula. If the umbilical extremity of the urachus closes normally, but the vesical extremity remains open, any septic infection of the bladder will spread into the



urachus and cause an abscess. This abscess points at the umbilicus, and both pus and urine escape. Sometimes both the umbilical and vesical extremities of the urachus close, and the intervening portion becomes cystic—urachal cysts. In the majority of cases they are extra-peritoneal in position.

Such abnormal conditions of the urachus should be rectified by operation.

### *Classify Peritonitis.*

NON-INFECTIVE.

|                     |   |         |   |              |   |               |
|---------------------|---|---------|---|--------------|---|---------------|
| INFECTIVE OR SEPTIC | { | Diffuse | { | Pneumococcal | { | Tubercular    |
|                     |   |         |   |              |   |               |
|                     |   |         |   |              |   | Actinomycosis |

### *Mention the Chief Causes of Septic Peritonitis.*

1. Acute appendical conditions.
2. Perforating gastric, duodenal, or intestinal ulcers.
3. Strangulated herniæ.
4. Intussusception.
5. Volvulus.
6. Thrombosis or embolism of the mesenteric blood-vessels.
7. Acute pancreatitis.
8. Hepatic abscess.
9. Septic conditions of the biliary passages.
10. Penetrating wounds of the abdomen.
11. Pyosalpinx.
12. Intra-peritoneal rupture of the bladder.

### *What are the Clinical Features of a Typical Case of Diffuse Peritonitis?*

1. APPEARANCE OF PATIENT.—The face is pale, sunken, and anxious. In the later stages it becomes cyanosed.
2. ATTITUDE OF PATIENT.—The patient lies in a supine position, with the knees drawn upwards.
3. TEMPERATURE.—Frequently subnormal.



4. PULSE—Rapid and feeble—later becomes running in character.
5. RESPIRATIONS—Owing to the abdominal muscles being reflexly contracted, the respirations are of the thoracic type.
6. PAIN.—This is an early and prominent symptom. It is usually most acute in the region which is the seat of mischief. Pain is often absent towards the end.
7. OTHER FEATURES.—Regurgitant vomiting; no passage of flatus or fæces from bowels; scanty urine, often containing albumin and indican. Subsequent distension of the abdomen with gas (meteorism) should be remembered.

*Give the Treatment.*

Perform a laparotomy, and endeavour to discover the causal factor. When this has been dealt with in an appropriate manner, the surgeon should provide efficient drainage, and close the abdominal wound, except where the tubes emerge. After the operation, keep the patient in the Fowler position, *i.e.* raise the head of the bed so that fluid will gravitate into the pelvis. Saline transfusion is usually necessary to counteract shock and aid excretion of toxins. The bowels must also be attended to. Pituitarin is often helpful in combating shock.

*Describe Post-Operative Peritonitis.*

Peritonitis, following operation, may result from (a) opening into an abscess without previously packing off the peritoneal cavity; (b) contamination by gastric or intestinal material; or (c) leaking of the sutures closing a viscus.

The usual signs of diffuse peritonitis are very feebly shown, or are even absent. An increasing rate of the pulse, the vomiting of fluid containing altered blood, and the rapid and progressive weakness of the patient suggests the diagnosis.



*Describe Gonococcal Peritonitis.*

This variety of peritonitis is practically confined to females, and follows gonorrhœal infection of the Fallopian tubes. In the very rare cases where the disease is found in males, infection arises from the vesiculæ seminales. Frequently only the peritoneum lining the pelvis is affected—pelvic peritonitis. Gonococci may be discovered in the vaginal or urethral discharge. The affected Fallopian tube should be removed, and the peritoneal cavity drained.

*Describe Pneumococcal Peritonitis.*

The pneumococcal organisms reach the peritoneal cavity either—

- (a) *Via* the blood-vessels, or
- (b) By penetrating the diaphragm from the pleura, or
- (c) Along the genital passages in females.

The disease is most common in young females.

*What are the Clinical Features?*

1. Acute onset.
2. Pain in the hypogastrium.
3. Abdominal distension, chiefly marked in the hypogastric region.
4. Distressing vomiting.
5. Diarrhœa.
6. Constitutional reaction.
7. The symptoms are intermittent.

The treatment is similar to that of the other varieties of peritonitis.

*Classify Tuberculous Peritonitis.*

|            |   |                          |   |                              |
|------------|---|--------------------------|---|------------------------------|
| A. ACUTE   | { | (i) With fluid exudation | { | Serous { Diffuse<br>Encysted |
| B. CHRONIC | { | (ii) Dry                 | { | Purulent                     |



*Describe the Acute Form.*

Acute tuberculous peritonitis is usually associated with acute miliary disease of the lungs. The constitutional symptoms and signs are those of general tuberculosis. The disease is frequently mistaken for one of the enteric group of fevers. It is practically always fatal.

*Describe Chronic Serous Peritonitis.*

When diffuse, this form is known as tuberculous ascites. It is commoner than the encysted variety. In addition to the ascites, enlarged mesenteric glands are found. They can be frequently palpated through the anterior abdominal wall. Distension of the abdomen, with dilatation of the superficial veins is a marked sign. The child is emaciated, and suffers from fever of a hectic type.

*Give the Treatment.*

Open-air measures and other anti-tubercular treatment should be promptly adopted. Inunction of cod-liver oil into the abdominal wall is highly spoken of. Exposure to the X-rays may prove of benefit. Laparotomy should be performed, unless the patient is improving, within three months. It is better to dispense with a drainage tube (Thomson and Miles).

*Describe Purulent Tuberculous Peritonitis.*

The purulent form was formerly called "cold abscess of the belly." It is most commonly found in young females. The progress of the disease is more rapid than that of the serous variety, and the hectic fever more pronounced. The fluid in the peritoneal cavity looks like pea-soup. Laparotomy should be carried out as early as possible.

*Describe Dry Tuberculous Peritonitis.*

This variety results in the formation of adhesions, which cause the omentum and viscera to become matted together. Very little fluid is poured out, and therefore the abdomen is



only slightly distended; on percussion, patches of dulness are found. These areas when palpated have a doughy feeling. The prognosis in dry tuberculosis peritonitis is very grave. X-rays may be tried as a curative measure. Laparotomy may be very difficult owing to the numerous adhesions present.

### *Describe Ascites.*

Ascites is a collection of serous fluid in the peritoneal cavity. The main causes are: (a) hepatic cirrhosis, (b) tubercular peritonitis, (c) malignant disease of the peritoneum, (d) cardiac disease, and (e) renal disease.

### *Give the Main Signs.*

1. A bulging in the flanks when the patient is in the supine position, and the front of the abdomen is flattened, but when well marked, the swelling is of a uniform globular outline.

2. Dulness at the sides, as the fluid gravitates there; the centre is clear owing to the intestines being floated upwards. The upper limit is concave in the erect posture.

3. The fluid is free, and any change of position alters the line of dulness, as the fluid gravitates to the lowest part.

4. Swelling of the feet and ankles is an early symptom.

5. The veins are very distended, and fill most quickly from below upwards, as the pressure of the free fluid obstructs the inferior vena cava.

6. Fluctuation, or a fluctuation wave, is well marked.

A chronic fibrous thickening of the peritoneum usually follows ascites, leading to the formation of adhesions.

### *What is the Treatment?*

Endeavour to remedy the cause of the condition. When due to a cirrhotic liver, stitch the great omentum to the parietal peritoneum (See *Operative Surgery*, Catechism Part III.). This brings about an **extra** communication between the systemic and portal circulations. In other cases tapping or *paracentesis* of the abdomen may be required. A Southey's tube is introduced between the umbilicus and



the anterior superior iliac spine. Allow the fluid to drain away slowly. Some of the risks of the operation are—

- (a) Syncope.
- (b) Septic peritonitis.
- (c) Hæmorrhage.
- (d) Wound of the intestines.

*What is meant by the Term Sub-phrenic Abscess?*

A collection of pus immediately beneath the diaphragm. The names right-sided and left-sided are used according to the position of the abscess with regard to the falciform ligament. Either variety may be intra-peritoneal or extra-peritoneal.

*Describe a Right-sided Abscess.*

This form of abscess most commonly follows—

- (a) Suppurative hydatid cysts, and tropical abscess of the liver.
- (b) Suppurative cholangitis or cholecystitis.
- (c) Perforation of a duodenal ulcer.
- (d) Appendiceal abscesses.
- (e) Empyema.
- (f) Suppurative lesions of the right kidney.

The abscess may pursue an acute or a chronic course. The leading clinical features are—

1. Pain.
2. Swinging temperature.
3. Vomiting.
4. Increasing leucocytosis.
5. Gastro-intestinal derangement.
6. Profuse sweating.
7. Pain and tenderness over the lower costal margin.
8. An abdominal swelling (frequently).
9. A dome-shaped extension of the hepatic dulness.
10. On percussion, if gas is present in the abscess, and if there be no pleurisy, one can distinguish from above downwards, **resonance of lung; tympanitic resonance of gas; dulness of pus and liver.**



*Give the Etiology of a Left-sided Abscess.*

- (a) Perforation of a gastric ulcer.
- (b) Abscess of the spleen.
- (c) Empyema.
- (d) Suppuration of the left kidney.

*Give the Clinical Features.*

- (1) Upward displacement of the diaphragm and the heart.
- (2) On percussion from above downwards distinguish—**resonance of lung ; tympanitic resonance of gas ; dulness of pus ; resonance of stomach.**

The remaining features are similar to those of an abscess on the right side.

*What is the Treatment of Sub-phrenic Abscess ?*

The abscess must be evacuated whenever there are signs that the lung has been displaced upwards. The pus is usually reached by the transpleural route. Before commencing the operation, verify the diagnosis by an exploratory puncture, beginning at the tenth intercostal space. Don't forget to stitch the diaphragm to the intercostal muscles after the operation.

## GENITO-URINARY SYSTEM.

### THE KIDNEY.

*Mention some of the Chief Methods used in examining the Kidneys.*

1. PALPATION . . . It is doubtful if a normal kidney can be felt through the abdominal wall. During palpation the patient should be supine, with the head and shoulders raised and the hips flexed.
2. PERCUSSION . . . The relation of the large bowel to the kidney should be determined. Remember that the *ascending colon* lies

to the *inner* side of a right kidney swelling, and the *descending colon* in *front* or on the *outer* side of a left renal swelling.

3. X-RAYS . . . A skiagram is very useful when a renal calculus is suspected. A small urate stone, however, does not cast a shadow.
4. INJECTION OF FOREIGN SUBSTANCES . . . (a) *Pigments*.—These should be pure and free from arsenic. They must dissolve completely in water. The most commonly used pigments are methylene blue (15 minims of a 5 per cent. solution) and indigo-carmin (20 cc of a 4 per cent. solution). The pigment solution is slowly injected into the glutæal muscles. With methylene blue, chromagen (olive green) appears in the urine in a quarter of an hour, and a trace of blue in half an hour after injection. Indigo-carmin tinges the urine about five minutes after injection. These figures only apply when the kidneys are functioning normally. In disease it is necessary to discover which kidney is the inadequate one. To solve this problem the *cystoscope* or the *separator* should be used.  
(b) *Phloridzin*.—30 minims of a  $\frac{1}{4}$  per cent. solution of phloridzin is injected subcutaneously. In health, sugar appears in the urine in twenty minutes.
5. CYSTOSCOPE . . . The cystoscope is generally used under local anæsthesia. Two drachms of a 1 per cent. solution of eucain, together with a little adrenalin, are injected into the urethra. An important practical point to bear in mind is:



the cystoscope should be allowed to remain in the bladder for thirty seconds after the current has ceased to flow. This obviates any risk of burning the urethra during the withdrawal of the instrument.

6. LUY'S SEPARATOR . . . .

The separator is provided with two separate catheters and a septum. After the instrument has been introduced into the bladder, the septum is projected from the anterior face of the tube, thus the bladder is divided into two halves, each of which is collecting the urine from the corresponding kidney.

7. CATHETERISATION OF THE URETERS . .

The ureteral catheters are made of silk. A catheter is attached to the cystoscope and inserted for about  $\frac{3}{4}$ -inch into a ureter. In females they can be introduced without a cystoscope by Kelly's technique.

8. KRYOSCOPY . .

This method consists in comparing the freezing point of the patient's blood with that of distilled water. It is not a very reliable method, and is rarely carried out nowadays.

9. PHENOL-SULPHONE-PHTHALEIN TEST . .

This delicate test is employed in order to determine if the kidneys are excreting normally. One cc. of a solution containing 6 milligrammes of phenol-sulphone-phthalein is subcutaneously injected into the upper arm, and some urine collected. The urine is rendered alkaline with sodium hydrate solution, a purple red colour being produced.



Add distilled water to the coloured product until 1 litre of fluid results. Compare the tint of this with that of a standard solution—made by adding  $\frac{1}{2}$  cc of the phenol-sulphone-phthalein to a litre of water and made alkaline with sodium hydrate. In normal cases colouring matter appears in the urine in 5-10 minutes.

*Mention some of the Congenital Malformations of the Kidneys and Ureters.*

1. Fusion of the lower poles of the kidneys: a “horse-shoe kidney” resulting.
2. Absence of one kidney.
3. Imperfect development of one kidney.
4. Congenital cystic disease.
5. Congenital displacement (**Dystopia**).
6. Presence of a valve at the pelvis of the ureter.
7. Double ureters.

The majority of these abnormalities are surgically important, as they are apt to lead to a condition of hydro-nephrosis.

*Describe Injuries of the Kidney.*

The kidneys are more frequently injured in males than in females. A slight degree of violence results in **contusion**; severe violence leads to **rupture**. In the former condition the capsule of the kidney (or perirenal fascia) is **not** torn, and therefore the extravasated blood permeates the perirenal fat. Often, in addition, blood passes along the uriniferous tubules. When the kidney is ruptured, the capsule is likewise torn; thus blood is also extravasated into the perirenal fat, and into the loose connective tissues behind the peritoneum. Urine escapes along with blood when the pelvis is torn, and unless drained, such a collection will become septic. Rupture of the kidney is especially dangerous in children, as there is an absence of perirenal fat; the peritoneum is therefore frequently torn.



*What are the Clinical Features of Injury to the Kidney?*

Immediately after the injury, the patient collapses and displays all the signs of profound shock. After a varying interval reaction ensues; this is marked by shooting pains along the line of the ureter, pain in the kidney region, and vomiting. If rupture has occurred, a swelling forms in the loin. Additional important features are—

- (a) Hæmaturia (**Absent** if the ureter is avulsed, or if it is blocked by a clot).
- (b) Rigidity of the abdominal parietes on the side of injury.
- (c) Meteorism.

*What Signs are found when the Peritoneum is torn?*

- 1. Great Shock.
- 2. Increasing dulness in the lower parts of the abdomen.
- 3. Septic peritonitis commencing about the third day after the injury.

*Mention the Signs when Septic Changes occur after the Injury.*

Sepsis may result after two days from infection of the extravasated fluid. The chief features are—

- 1. Constitutional disturbances, as rigors, sweating, etc.
- 2. An increase in size of the swelling in the loin.
- 3. Pyuria.
- 4. Diminution in the total quantity of urine passed.

*Give the Treatment of Renal Injuries.*

- (a) *In Slight Cases.*—Keep the patient in bed for a few days with a pad of cotton wool over the injured kidney. A fluid diet should be enforced. To diminish the risk of septic infection administer urotropin, 10 grains thrice daily, or helmitol, 15 grains thrice daily.
- (b) *In Severe Cases.*—Operative treatment is required if there is (a) only a small quantity of urine being excreted, or (b) a marked increase in the renal swelling, or (c) profuse hæmorrhage going on.



### *What is the Pathology of Nephroptosis?*

In nephroptosis, or acquired displacement of the kidney, the kidney either slips about within the perirenal fascia (**movable kidney**), or passes forwards towards the front of the body (**floating kidney**). The suprarenal body is not displaced.

As the kidney moves about, the upper pole is tilted forwards, thus kinking the ureter and renal vessels. In course of time, a condition known as **hydronephrosis** often follows, the kidney swelling when displaced, and returning to its normal size when the kink is undone.

### *Give the Etiology of Nephroptosis.*

The condition is most common in females, and is generally found on the right side. The predisposing causes are said to be (a) an imperfectly formed, and shallow kidney-bed and (b) a diminished amount of perirenal fat.

Exciting factors are (a) violent gymnastics, (b) trauma, (c) lifting heavy weights, (d) tight-lacing, and (e) pregnancy. In certain cases the nephroptosis is part of a general prolapse of the abdominal viscera, **Glenard's disease**.

### *What are the Symptoms?*

Four main types are to be distinguished.

1st type—no symptoms.

2nd „ symptoms of neurasthenia.

3rd „ gastro-intestinal disturbances.

4th „ symptoms simulating renal calculi.

In the latter group of cases attacks of renal colic (Dietl's crises) occur, *i.e.* shivering, collapse, rapid feeble pulse, often vomiting, and agonising pain shooting down the ureter. The pain due to a movable kidney is always worse after severe exercise, and usually disappears when the patient lies down.

### *Give the Treatment.*

If the pain is severe, or the patient is subject to attacks of renal colic, the operation of nephropexy is indicated. Otherwise, palliative measures should be tried. These comprise



massage and exercise of the abdominal muscles, and the wearing of a special corset. The latter should be applied when the patient is lying down, and during complete expiration. The corset is also taken off with the patient in the same position.

*From what other Conditions has Nephroptosis to be distinguished?*

1. "Constriction lobe" of the liver.
2. Pyloric tumours.
3. Tumours of the colon.
4. Distension of the gall-bladder.
5. Ovarian cyst.
6. Uterine fibroid with a long pedicle.

*What is Hydronephrosis?*

A condition in which the pelvis and calyces of the kidney are permanently dilated.

*Give the Etiology.*

|                     |                                                                                                                                                                                                                                                            |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A. RENAL CAUSES     | { <ul style="list-style-type: none"> <li>Tumours.</li> <li>Calculi.</li> <li>Nephroptosis.</li> <li>Repeated congestions of mucosa of renal pelvis.</li> </ul>                                                                                             |
| B. URETERAL CAUSES  | { <ul style="list-style-type: none"> <li>Abnormal opening of ureters.</li> <li>Double ureters.</li> <li>Impacted renal calculus.</li> <li>Aberrant renal arteries.</li> <li>Pressure on the ureters from without.</li> <li>Injuries to ureters.</li> </ul> |
| C. VESICAL CAUSES   | { <ul style="list-style-type: none"> <li>Calculi.</li> <li>Tumours.</li> <li>Cystitis.</li> <li>Paralysis of bladder.</li> </ul>                                                                                                                           |
| D. REMAINING CAUSES | { <ul style="list-style-type: none"> <li>Enlarged prostate.</li> <li>Stricture of urethra.</li> <li>Phimosis.</li> </ul>                                                                                                                                   |

All the above causes only delay the flow of urine ; if the flow is completely stopped, suppression will result. Hydronephrosis is at first **intermittent**, later it becomes **permanent**.

*Give the Morbid Changes which occur in Hydronephrosis.*

1. The pelvis and calyces are distended, and their walls atrophied.

2. The secreting tissue likewise becomes atrophied.

3. The urine from the affected kidney is diminished in quantity, in the amount of solids, and in urinary pigments.

4. The ureter is fixed to the posterior surface of the pelvis.

5. The inferior part of the pelvis often sags below the beginning of the ureter.

6. In advanced cases, the hydronephrotic fluid resembles blood serum.

*What has a Hydronephrotic Cyst to be distinguished from ?*

1. Ovarian cyst.

2. Hydatid cyst of liver.

3. Distended gall-bladder.

4. Tumour of kidney.

*Give the Treatment.*

When an obvious cause, *e.g.* phimosis can be distinguished, this should be remedied. When the cause is within the abdomen, expose the affected kidney and deal with the lesion found. If the secreting tissue is markedly atrophied, and the other kidney is perfectly functional, remove the affected kidney. In cases not suitable for nephrectomy, the dilated pelvis should be opened, and any valve obstructing the ureteral orifice split. A few stitches are inserted to narrow the dilated pelvis. Sometimes, in addition, it is necessary to divide the ureter and fix it into the most dependent part of the pelvis.



*Classify Anuria.*

- (a) Hysterical.
- (b) Obstructive.
- (c) Circulatory.
- (d) Reflex.
- (e) From destruction of the renal tissue.

*Give the Treatment.*

- (a) Hot fomentations and hot hip-baths.
- (b) Diuretics—the common ones being :—
  - 1. Hot Contrexeville water.
  - 2. Diuretin, 10 grains.
  - 3. Caffein, 5 grains.
  - 4. Potassium citrate, 25 grains.
- (c) Hot saline or glucose (5 per cent.) solution introduced into the rectum.
- (d) In urgent cases, 1 pint of glucose (25 per cent. solution) should be injected into the median basilic vein.

**RENAL CALCULI.***What is the Etiology of Renal Calculi ?*

Most probably a renal calculus follows some catarrh of the renal epithelium. A few cells are detached, albumin exudes, and the crystals are deposited around the epithelial nidus in the albuminous meshwork.

*What are the Varieties ?*

- 1. Urates.
- 2. Oxalates.
- 3. Phosphates.
- 4. Cystin.

*Describe Uratic Calculi.*

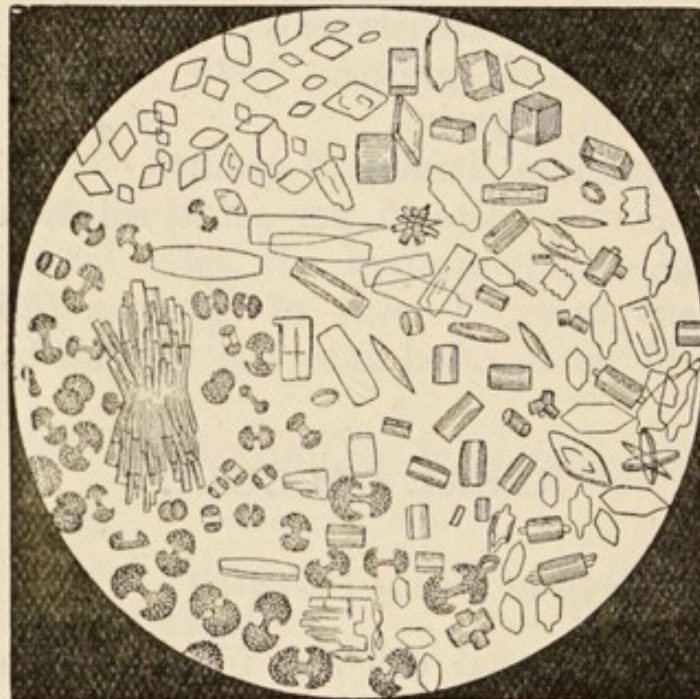
These stones are frequently multiple, and in such cases they present facets. The colour is brownish yellow. The

surface of the calculus generally resembles morocco leather. They are of a hard consistence.

*Describe an Oxalate Calculus.*

A calculus composed of calcium oxalate is extremely hard, of a chocolate brown colour, mammillated on the surface, and displaying a zig-zag lamination on section. It gives an intensely sharp shadow on X-ray examination.

Fig. 49—URIC ACID CRYSTALS.



*Describe Phosphatic Calculi.*

Phosphatic stones are deposited in alkaline urine, containing an abundance of muco-pus. Chemically, the calculi consist of the triple phosphates, together with magnesium and calcium carbonates. They are white in colour, rough on the surface, light in weight, and very friable.

*Describe a Cystin Calculus.*

Cystin stones are of rare occurrence. They are yellowish (sometimes greenish) in colour, and very soft. A cut section is said to resemble bees-wax. Cystin is derived from the sulphates of the food.



*What are the Common Shapes of Renal Calculi?*

|              |                          |
|--------------|--------------------------|
| URETERAL . . | Elongated—"date-stones." |
| PELVIC . . . | Triangular.              |
| CALYX . . .  | Rounded.                 |

*Give the Clinical Signs and Symptoms of Renal Calculi.*

There may be no symptoms (**latent stone**). Usually, however, there are the following signs and symptoms:—

1. Pain; worse after exercise, and relieved by lying down for a time.
2. Retraction of the testicle.
3. Increased frequency of micturition.
4. Urinary changes.

The chief urinary signs are:—

- (a) Presence of blood corpuscles; **no leucocytes unless sepsis is present.**
- (b) Urine, usually acid in reaction (except when phosphatic calculi present).
- (c) Crystals.

An X-ray examination should always be carried out. Beware of identifying as renal calculi—(1) ossified costal cartilages; (2) transverse processes of the upper lumbar vertebræ; (3) enteroliths; (4) calcified mesenteric glands; (5) calcified plates in the wall of the aorta; or (6) phleboliths in the spermatic and renal veins.

*Give the Order of Density of Renal Calculi.*

When examined by X-rays, a shadow is given by a renal calculus. The degree of density depends to a great extent upon the composition of the stones, an oxalate appearing very dark. In order, the degree of density is:—

- (a) Oxalate.
- (b) Cystin.
- (c) Calcium phosphate.
- (d) Triple phosphates.
- (e) Uric acid—very little, if any, shadow.

Fig. 50—TRIPLE PHOSPHATES  
(Coffin-lid Type).

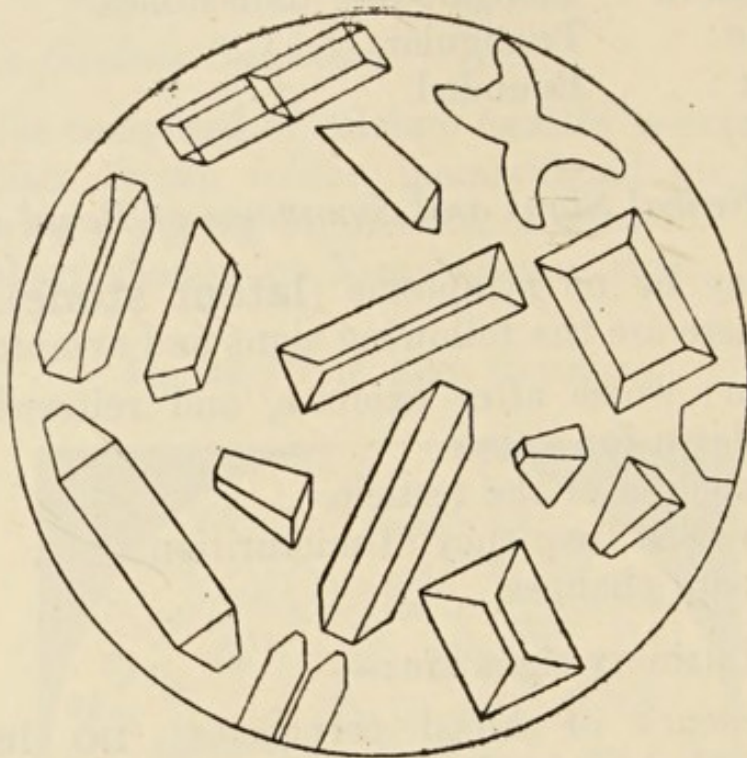
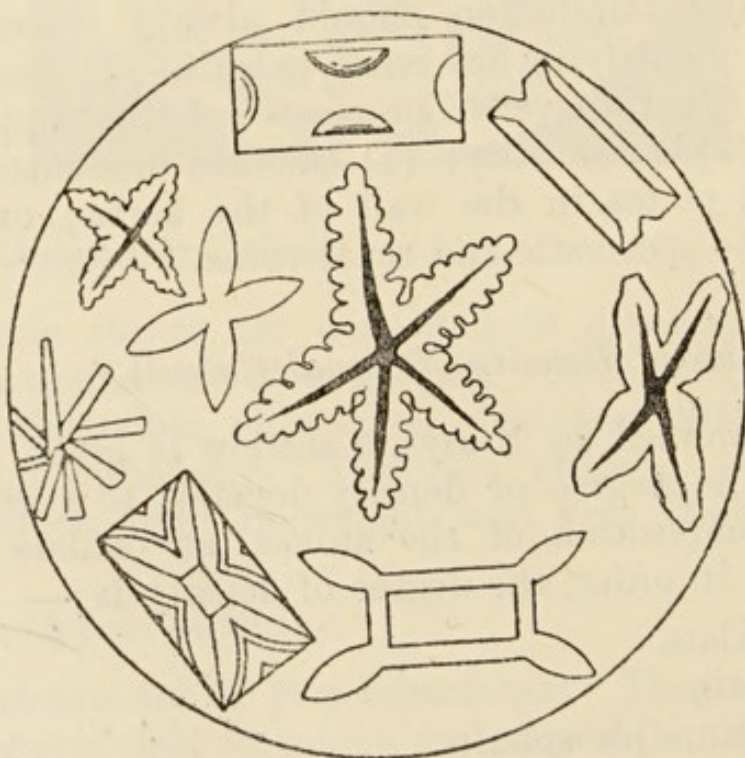


Fig. 51—TRIPLE PHOSPHATES (Stellar Type).





*Describe an Attack of Renal Colic.*

Renal colic occurs when a calculus leaves the pelvis of the kidney and enters the ureter. The pain is due to the spasmodic contraction of the unstriated muscle. The attack comes on suddenly, is paroxysmal in character, and the pain shoots along the genito-femoral nerve to the groin or testicle. Other features are—nausea, vomiting, collapse, often syncope, and strangury.

*What is the Treatment for Renal Colic?*

If possible, place the patient in a hot bath, give a hypodermic injection of morphia, and apply hot fomentations to the seat of pain. In very severe cases, a little chloroform should be administered.

*Give the Treatment for Renal Calculi.*

In the majority of cases an operation—*nephro-lithotomy* is indicated. Oxalic calculi are especially suitable for removal. In the case of phosphatic stones, drainage of the kidney—*nephrostomy*—will be required in addition.

Apart from operation, diuresis should be tried. The renal organs should be flushed with bland fluids, such as Contrexèville water. Urotropin (gr. x. t.i.d.) or helmitol (gr. xv. t.i.d.) should be taken daily to prevent the onset of sepsis.

**PYOGENIC DISEASES OF THE KIDNEY.***Define the Pyogenic Diseases of the Kidney.*

- |                   |                                                               |
|-------------------|---------------------------------------------------------------|
| PYELITIS . . . .  | A septic inflammation of the pelvis of the kidney.            |
| PYELO-NEPHRITIS . | A septic inflammation of the pelvis and the renal parenchyma. |
| PYONEPHROSIS . .  | A pyelo-nephritis, together with abscesses in the calyces.    |



*Describe Pyelo-nephritis.*

Pyelo-nephritis is generally secondary to septic cystitis, the organisms reaching the kidney *via* the peri-ureteral lymphatics (urogenic infection) or by the blood stream (hæmatogenous infection). On section of the diseased kidney, the following points will be noticed, (a) marked congestion and catarrh of the pelvis, (b) numerous small abscesses in the glomeruli, and (c) radiating yellow streaks through the medulla showing the presence of pus in the uriniferous tubules. In the majority of cases both kidneys are affected.

*What are the Signs and Symptoms?*

1. One or more rigors.
2. Quick pulse and respiration, marked constipation, headache, nausea, and dry, furred tongue.
3. Urine is diminished in quantity, ammoniacal in odour, and contains pus, blood, and albumin.
4. Tenderness on palpation of the kidney region.

*Give the Treatment.*

Treat the symptoms until the pyelo-nephritis has abated, then deal with the cause of the cystitis. Hot fomentations to the loin; milk and potash diet. Contrexèville water, and urotropin (gr. x. t.i.d.).

*Describe Pyonephrosis.*

Pyonephrosis usually follows either (a) septic cystitis, (b) renal calculus, or (c) hydronephrosis. In the former case the condition is bilateral, in the latter cases it is unilateral. Some obstruction to the outflow of urine from the pelvis of the kidney is constantly present. Although the abscess cavities at first communicate with each other and with the pelvis, at a later stage they are shut off, and form independent collections of pus. Endarteritis obliterans of the renal arteries is a common sequel.



*Give the Clinical Signs.*

The signs are those of hydronephrosis, plus constitutional disturbances, the latter being due to septic absorption and diminished urea excretion. Usually there is a large quantity of pus in the urine.

*What is the Treatment?*

Opening up the renal abscesses (**nephrotomy**), and if the parenchyma shows cirrhotic changes, nephrectomy should be performed.

## TUBERCULOSIS OF THE KIDNEY.

*Give the Etiology of Tubercular Disease of the Kidney.*

The tubercle bacilli found in genito-urinary tuberculosis are generally of the bovine type, and reach the kidney by the blood stream. Tuberculosis of the genital organs (Fallopian tubes, prostate, or epididymis) is often associated with renal tubercle. The disease is said to be more common in females than in males. Renal tuberculosis is nearly always unilateral.

*What is the Morbid Anatomy?*

The bacilli are arrested in the glomeruli; they subsequently involve the apices of the renal papillæ and the mucous membrane of the calyces. Typical grey tubercles are formed; these caseate, thus becoming yellow tubercles; the latter break down, leaving shaggy ulcers. The coalescence of these ulcers results in the production of large irregular cavities filled with caseous debris.

Both the renal and vesical extremities of the ureter are involved. The ureter is adherent to the kidney, and owing to the extension of the disease to the perirenal fat and perinephric fascia, the kidney becomes fixed to the peritoneum and neighbouring viscera. Frequently the outer surface of the kidney is covered with projections corresponding to the abscess cavities.



*Describe the Leading Clinical Features.*

At first the disease may suggest either (a) renal calculus, (b) malignant tumour of the kidney, or (c) cystitis. Early signs are:—

1. Pain in the back.
2. Slight hæmaturia.

These two features are not relieved by rest. Compare with renal calculus.

3. Increased frequency of micturition.
4. Pyuria and acid urine—the pyuria does not disappear after washing out the bladder.
5. Injection around the vesical orifice of the corresponding kidney. At a subsequent period retraction and often ulceration occurs.
6. Attacks of renal colic.
7. Tubercle bacilli in the urine.

Later, the signs are diagnostic, for the patient emaciates, suffers from hectic fever, and has an enlarged kidney with irregular nodules. Unless treated, the patient dies from toxæmia, exhaustion, or uræmia.

*Give the Characters of the Urine from the Affected Kidney.*

A separator or ureteral catheter should only be used in the early stages. The urine has the following features—

- (a) Acid in reaction.
- (b) Turbid in appearance, containing pus, tubercle bacilli often, and sometimes blood.
- (c) Marked diminution of the total amount of urinary solids.

*What is the Treatment for Renal Tuberculosis?*

If possible, excise the affected kidney (having previously tested the adequacy of the opposite kidney). Be sure and remove all the perirenal fat and fascia. Stitch the ureter in the lower angle of the wound, and periodically inject iodoform into it; this benefits the tubercle in the vesical extremity, and the tubercle of the bladder. A course of tuberculin treatment should follow the operation.



## TUMOURS OF THE KIDNEY.

*Mention the Common Renal Tumours.*

1. Adenoma.
2. Cystic kidney.
3. Carcinoma    { adeno-cancer  
                      { papillary.
4. Sarcoma        { of adults,  
                      { of infants.
5. Hypernephroma.
6. Villous papilloma of the renal pelvis.

*Give the Clinical Features of Malignant Renal Tumours.*

The renal sarcoma of infants is really a myosarcoma, and may attain a considerable size without causing any symptoms or inconvenience. It is usually unilateral, but when the diseased kidney is removed, the opposite kidney is generally affected.

In all malignant growths of the kidney metastasis is late; it most commonly occurs through the medium of the blood-vessels, rarely by the lymphatics. The leading clinical features are:—

- (a) Renal tumours grow forwards, and are therefore most readily palpated from the front.
- (b) The tumour at first ascends and descends with respiration.
- (c) With the patient supine the fingers can be inserted between the tumour and the costal margin.
- (d) Reniform in outline.
- (e) Its relation to the colon (*see ante.*).
- (f) Pain.
- (g) Hæmaturia: This has certain characteristics. It is (1) spontaneous, (2) capricious, (3) independent of rest or exertion, (4) often copious, (5) contains clots resembling maggots (Israel). The passage of clots leads to—
- (h) Renal colic.



- (i) In some cases a suddenly occurring varicocele due to a fragment of the tumour occluding the orifice of the internal spermatic veins.
- (j) The urine shows—(1) blood casts, (2) sometimes minute fragments of tumour, (3) a decrease in the natural constituents of the urine, (4) more or less albumin.

*Describe Hypernephroma.*

Pathologists are not yet agreed regarding the origin of this tumour. The chief theories are—(a) it is developed from a suprarenal “rest”; (b) it is a carcinoma derived from the renal epithelium, and (c) it originates from the Wolffian body. A hypernephroma affects the right kidney more frequently than the left, is commoner in males than in females, and is the most frequent of new growths in the kidney. It is rarely bilateral. In the kidney the tumour is usually cortical, and has a capsule of firm fibrous tissue. The commonest age for hypernephroma is between fifty and sixty.

The clinical features resemble those given in the previous question.

## THE BLADDER.

*How may Drainage of the Bladder be carried out?*

The bladder can be drained (a) suprapubically, (b) by the perineum, or (c) through the urethra. In the suprapubic and perineal methods, a rubber tube is inserted into the bladder, and connected to a Cathcart's drainage apparatus. When the urethra is used, tie in a rubber catheter, and unite this to the apparatus. An examination of Fig. 3 will enable the student to understand the principle of the method. Instead of Cathcart's apparatus, that devised by Professor Caird may be used.

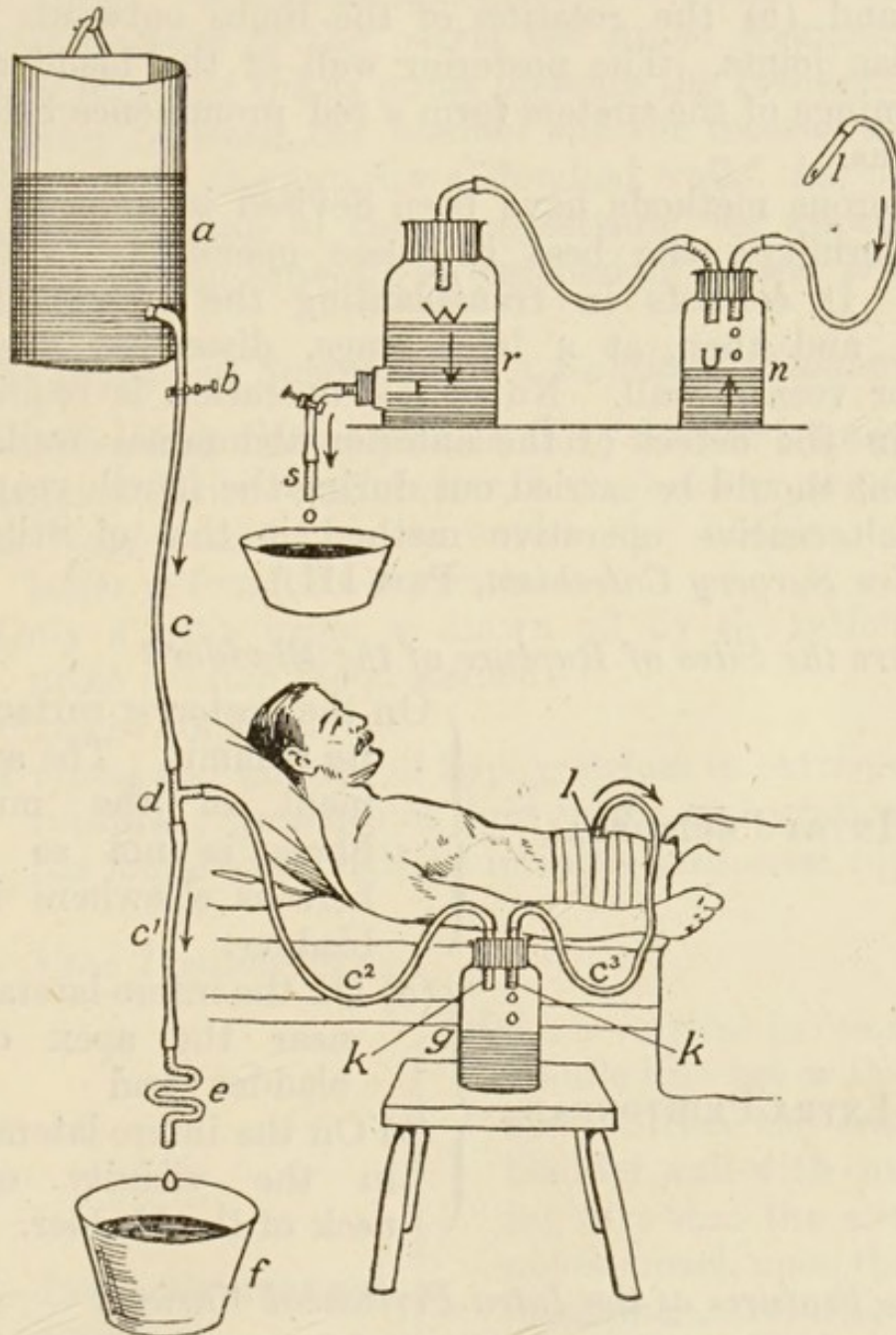
Speaking generally, the quantity of fluid required for urethral or perineal drainage is one pint per diem; for suprapubic drainage four to six pints are necessary.



*How may continuous Drainage of the Bladder be carried out?*

Either Mr Cathcart's or Professor Caird's method may be used. The principle of both methods will be understood from a consideration of Fig. 52.

Fig. 52. METHODS OF DRAINING THE BLADDER.



CATHCART'S METHOD.

- a. Douche Can.
- b. Regulating Clip.
- c. c¹, c², c³, Rubber Tubing.
- d. T-Shaped Glass Tube.
- e. Glass Tube with Bends.

- f. Pail.
- g. Jar for Urine.
- k. k. Straight Glass Tubes and perforating stopper.
- l. Catheter.

CAIRD'S METHOD.

- l. Catheter.
- s. Outflow.

- n. Urine Jar.
- r. Water Jar.

- U. Urine.
- W. Water.

*Describe Ectopia Vesicæ.*

Ectopia vesicæ is also known as extroversion of the bladder. It is a congenital malformation in which the lower part of the anterior abdominal wall, the inferior lateral wall of the bladder, and the roof of the urethra are absent. Other changes noticed are (a) the absence of the symphysis pubis, and (b) the rotation of the limbs outwards at the sacro-iliac joints. The posterior wall of the bladder, with the openings of the ureters form a red prominence below the umbilicus.

Numerous methods have been devised in order to rectify the deformity; the best of these operations is that of Peters. It consists in transplanting the ureters into the rectum, and then, at a later stage, dissecting away the posterior vesical wall. No plastic operation is required to cover in the defect of the anterior abdominal wall. The treatment should be carried out during the fourth year.

An alternative operative method is that of Stiles (see *Operative Surgery Catechism*, Part III.).

*What are the Sites of Rupture of the Bladder?*

- |                       |   |                                                                                                                                                  |
|-----------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------|
| A.—INTRA-PERITONEAL . | { | On the posterior surface, near its summit. The arrangement of the muscular fibres is not so strong here as elsewhere in the bladder.             |
| B.—EXTRA-PERITONEAL . | { | (a) On the infero-lateral wall, near the apex of the bladder; and<br>(b) On the infero-lateral wall, in the vicinity of the neck of the bladder. |

*Give the Features of the Intra-Peritoneal Variety.*

The bladder is full at the time of injury, and the violence is applied to the lower part of the abdominal wall. The tear is longitudinal in direction, and implicates the peritoneal more than the mucous coat. Urine, usually blood-stained, passes into the recto-vesical pouch, and unless operated upon, the patient develops septic peritonitis on the third day following the rupture,



*Mention the Features of the Extra-peritoneal Forms.*

Rupture occurring near the apex is usually associated with a distended bladder, and an injury to the abdominal wall immediately above the symphysis pubis. The urine collects in the space of Retzius, and then ascends towards the umbilicus. A tear in the region of the neck is a common sequel of fracture of the pelvis, the upper fragment of the ascending ramus of the os pubis piercing the bladder. Urine accumulates between the bladder and the rectum, and often ascends beneath the anterior abdominal wall. In the latter case note a bulging of the hypogastrium, the upper edge of the swelling being convex; on percussion dulness is elicited.

*Give the Signs and Symptoms of a Ruptured Bladder.*

1. Sudden and violent pain in the pelvis or hypogastrium.
2. Intense desire to micturate, but no urine passes.
3. A *rigid* catheter easily enters the bladder, and the latter is found to be contracted.
4. Only a little urine is drawn off by the catheter; the urine is often blood-stained.
5. Signs of collapse.
6. Dulness and bulging of hypogastrium in extra-peritoneal ruptures; presence of fluid in the recto-vesical pouch (on rectal examination) in intra-peritoneal rupture.

*What is the Treatment?*

A.—INTRA-PERITONEAL  
RUPTURE . . .

Make a vertical incision in the middle line below the umbilicus. Stitch the tear in the bladder wall with catgut, taking care that the stitches do not encroach upon the mucous membrane, and that they extend *beyond* the rupture. Wash out the peritoneal cavity with saline solution, and drain the recto-vesical pouch through the abdominal incision.



*B.—EXTRA-PERITONEAL  
RUPTURE.*

- (a) *Near the Apex.*—A similar incision to that for intra-peritoneal rupture is made. Wash out the infected area with saline solution, and suture the rent as before.
- (b) *Near the Neck.*—Make a mesial incision in the perineum from the perineo-scrotal junction to a point one inch from the anus. Deal with the soiled area and the torn bladder as above.

*How may the Bladder be examined?*

1. Suprapubic palpation and percussion.
2. Catheterisation.
3. Sounding.
4. Chemical and microscopical examination of the urine.
5. Cystoscopy.
6. X-rays.
7. Digitally, by a suprapubic or perineal incision.

*Give the Pathology of Cystitis.*

The predisposing causes of cystitis are : (a) an obstruction to the passage of urine from the bladder ; and (b) congestion of the vesical mucosa. The exciting factor is a bacterial infection, of which the chief organisms are the urobacillus, the bacillus coli communis, the staphylococcus pyogenes aureus, and the diplococcus ureæ. These bacteria lead to an ammoniacal decomposition of the urine.

*What is the Etiology of Acute Cystitis?*

1. Septic injury from instrumental interference.
2. Extension from a septic condition of the urethra, *e.g.* gonorrhœa.
3. Fracture-dislocation of the vertebral column.



4. Retroversion of the gravid uterus (membranous or gangrenous cystitis).
5. Certain drugs, *e.g.* cantharides.

*What are the Sequelæ of Acute Cystitis?*

1. Resolution.
2. Chronic cystitis.
3. Ulceration or even gangrene of the vesical mucosa.
4. Abscess of the bladder.
5. Pyelo-nephritis.

*Give the Symptoms of Acute Cystitis.*

A varying degree of suprapubic and perineal pain is complained of. Gonorrhœal cystitis is particularly painful, while the cystitis resulting from spinal injuries is painless. A certain amount of fever with the resulting constitutional disturbance is constantly present. Frequent and painful micturition causes the patient great distress. Urine is often passed a drop at a time, in a spasmodic manner. The urine is characteristic, being turbid and containing fibrin, pus-cells, and organisms. It is often ammoniacal. In gangrenous cystitis it is chocolate-coloured (altered blood), and has a very offensive odour.

*Apart from Cystoscopic Examination, what are the differences between Pyuria of Vesical Origin and Pyuria of Renal Origin?*

When the pus is coming from the kidney it—

- (a) is intimately mixed with the urine;
- (b) does not deposit on standing;
- (c) the urine contains tube casts; and
- (d) the urine contains a large amount of albumin.

*Give the Treatment of Acute Cystitis.*

An endeavour should be made to deal with the cause of the cystitis. Place the patient in bed, and raise the foot of the bed. The diet should consist of milk and potash



until the acute symptoms have passed off. Keep the bowels open. The painful spasms can be relieved by hot sitz baths, or by morphia and belladonna suppositories. The patient should drink freely of Contrexèville water or even barley water. Urotropin should be given after the first two or three days.

### *Describe Chronic Cystitis.*

As previously mentioned, chronic cystitis is a frequent complication of the acute variety. Some cases, however, are chronic from the first; they are generally caused by an enlarged prostate, an organic stricture of the urethra, or by tubercular diseases. Pyuria is a constant sign, being found at all times of the day, and when tested by the "*two-glass*" method, the pus is more abundant in the second portion of urine passed. Chronic cystitis is a dangerous condition, as infection may spread to the kidney, and cause septic infection of that organ.

The treatment consists in removing the cause, keeping the urine bland with Contrexèville water, and by administering urotropin. Locally, the bladder can be irrigated twice daily with some dilute  $\text{AgNO}_3$ . In intractable cases suprapubic drainage for some weeks may effect a cure.

### *Describe Tubercular Disease of the Bladder.*

The disease is usually secondary to that of some other section of the genito-urinary tract, especially the epididymis and the kidney. It is most commonly found in adolescents. The leading signs are—

1. Pyuria, containing tubercle bacilli; they are often exceedingly difficult to detect.
2. Hæmorrhage.
3. Frequent and painful micturition, the pain being referred to the end of the penis on the conclusion of the act. This symptom is especially distressing during the night.
4. In early cases the cystoscope will reveal the small, irregular ulcers characteristic of the disease.



*What is the Treatment?*

Remove the primary focus of the disease; the bladder tuberculosis generally heals afterwards without treatment.

*Describe Stone of the Bladder.*

Vesical calculi are divided into two classes, primary and secondary.

A PRIMARY stone occurs in **acid** urine; it is an oxalate or a urate.

A SECONDARY stone forms in **alkaline** urine; it is composed of phosphates.

Bladder stones are usually discoid in shape, and when multiple, present facets. Hour-glass stones stick partly in the bladder and partly in the prostatic urethra. Although vesical calculi may form at any age, they are most common in the old and in young boys. Females are rarely subject to bladder stone.

Often a stone consists of alternate strata of uric acid, calcium oxalate, and phosphates (an ALTERNATING CALCULUS).

*Give the Cardinal Symptoms of a Vesical Calculus.*

1. Hæmaturia.
2. Frequency of micturition.
3. Pain, worst after micturition, owing to the sensitive mucous membrane coming in contact with the stone.
4. Sudden stoppage of the flow of urine during micturition.

In advanced cases the urine is ammoniacal and contains muco-pus. Remember that the first three symptoms in the list are **increased** after exercise.

*What Measures can be adopted in order to verify a Diagnosis of Stone?*

Examination with the—

1. X-rays.
2. Cystoscope.
3. Sound.

### *What is the Treatment of Vesical Calculus?*

The operation of choice is known as *litholapaxy*, i.e. crushing the stone with a lithotrite. The instrument is introduced into the bladder by way of the urethra, the stone is split into minute fragments, and the latter are removed by means of an evacuator. The supreme advantage of this method of treatment is that the patient can get about again within a few days of the operation. When litholapaxy cannot be carried out, **suprapubic lithotomy** should be performed. If the stone, however, is impacted in the neck of the bladder, **perineal lithotomy** is indicated.

### *How is the Stone caught in the Lithotrite?*

Make the stone *come to* the lithotrite. Rest the lithotrite in the middle line, depressing the floor of the bladder; open the blades and the stone will usually roll into its grasp, as the lithotrite (lower blade) is lying in the floor of a hollow. *The stone must not be crushed in this position*; the lithotrite must be raised to make sure that no mucous membrane is grasped between its blades.

### *What are the Indications for Suprapubic Lithotomy?*

1. An enlarged prostate.
2. A small irritable bladder; this generally results from chronic cystitis.
3. An encysted stone.
4. Organic stricture of the urethra.

### *What are the Chief Tumours of the Bladder?*

|           |   |                                           |
|-----------|---|-------------------------------------------|
| INNOCENT  | { | A papilloma—                              |
|           |   | (a) Villous.                              |
|           |   | (b) Warty.                                |
| MALIGNANT | { | A sarcoma or a squamous-celled carcinoma; |
|           |   | the latter is the commoner of the two.    |

### *Describe a Vesical Papilloma.*

Papillomata of the bladder are derived from the mucous membrane, most commonly in the region of the internal



trigone. They may either assume a soft, villous form, resembling sea-weed, or a hard warty, sessile appearance. The warty appearance is very apt to become malignant. Papillomata generally occur in young males. They are painless, but give rise to profuse hæmaturia, which at first is intermittent, but later practically continuous, the hæmorrhage is most marked towards the end of micturition. The blood is bright scarlet in colour. Sometimes fragments of the tumour are detached and passed in the urine. In early cases, the cystoscope will materially aid the diagnosis; in advanced cases, it is impossible to illuminate the bladder.

### *What is the Treatment?*

In early cases Nitze's operating cystoscope may be tried; otherwise the bladder is opened suprapubically, and the affected mucous membrane dissected away. More recently, treatment by high frequency currents have proved successful in many instances. The bladder is filled with distilled water, and a Nitze's double catheter-cystoscope introduced. The electrodes pass through one catheter and the operator looks through the other one. The electrodes are plunged into the tumour for half a minute at different parts. The tumour blackens and chars, while the healthy adjacent mucosa becomes blanched. Four or five sittings are necessary to effect a cure.

### *Give the Clinical Features of Cancer of the Bladder.*

Cancer of the bladder usually originates in the mucosa of the internal trigone. It is most commonly found in individuals over forty years of age. The leading signs are—

- (a) Frequent attacks of hæmaturia; the blood is altered in character.
- (b) Agonising spasms on micturition.
- (c) Pyuria.
- (d) Cachexia.

### *What is the Treatment?*

Partial or total extirpation of the bladder affords the only prospect of a cure. In the majority of cases, however, this



is impracticable. Failing operation, superpubic drainage should be carried out; such drugs as morphia, belladonna, and hyoscyamus are urgently called for. Urotropin or helmitol thrice daily is necessary to relieve the cystitis.

*Give the Surgical Causes of Hæmaturia.*

|                                                           |                                                                                                                                                          |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| A. Upper Urinary Tract<br>—KIDNEY AND<br>URETER . . .     | { (a) Trauma.<br>(b) Calculi.<br>(c) Tuberculosis.<br>(d) Neoplasms, especially<br>hypernephroma.<br>(e) <i>Bilharzia hæmatobia</i> .                    |
| B. Middle Urinary Tract<br>—BLADDER AND<br>PROSTATE . . . | { (a) Trauma.<br>(b) Calculi.<br>(c) Tuberculosis.<br>(d) Carcinoma.<br>(e) Papillomata.<br>(f) Acute cystitis or prostatitis.<br>(g) Enlarged prostate. |
| C. Lower Urinary Tract<br>—URETHRA . . .                  | { (a) Trauma.<br>(b) Calculi.<br>(c) Rupture of corpus spongi-<br>osum.                                                                                  |

*How would you Diagnose the Site of the Hæmorrhage?*

|                                           |                                                                                                                                                                                 |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A. From UPPER Urinary<br>Tract . . . . .  | { It is intimately mixed with the<br>urine (smoky urine). Blood-<br>casts may be present.                                                                                       |
| B. From MIDDLE Urinary<br>Tract . . . . . | { The blood usually appears after<br>the urine, or in the last por-<br>tion of the urine. It is often<br>coagulated from having col-<br>lected for some time in the<br>bladder. |
| C. From LOWER Urinary<br>Tract . . . . .  | { The blood comes before, or with<br>the first portion of urine. It<br>may flow during the intervals<br>between micturition.                                                    |



## THE PROSTATE.

*Give the Etiology of Acute Prostatitis.*

1. Gonorrhœa, usually towards the end of the third week.
2. Urethral stricture.
3. Trauma of the posterior urethra.
4. Cystitis.
5. Impacted calculus.

*What are the Symptoms?*

Frequent micturition, with pain at the end of the act. Pain during defecation, and a constant throbbing sensation in the perineum. Constitutional disturbance may be severe. Sometimes blood is passed in the urine.

On rectal examination, the prostate is found hot, tender, and swollen.

If an abscess forms, fluctuation may be detected *per rectum*, and on pressing against the prostate, pus escapes into the urethra.

*Indicate the Treatment.*

Place the patient in bed, and raise the foot of the bed in order to diminish the pelvic congestion. Apply hot fomentations to the perineum. Open the bowels, and stop all solid food for a time. If retention of urine occurs, place the patient in a hot bath, or do suprapubic aspiration. **If possible, avoid passing a catheter.** When an abscess forms, open it from the perineum by an incision in the middle line.

*Describe Tuberculosis of the Prostate.*

This disease is mainly found in young adults, being usually secondary to tuberculosis of the epididymis or seminal vesicle. It may affect either the periurethral or the peripheral area of the organ. Caseous nodules are formed in the gland which can often be recognised on rectal examination. Subsequently, irregular abscesses develop, which usually discharge into the urethra.



*What are the Symptoms ?*

1. Frequent and painful micturition ; the pain is referred to the end of the penis.
2. Hæmaturia, usually intermittent.
3. Pyuria, often containing tubercle bacilli.

*Give the Treatment.*

Deal with the primary cause. The usual anti-tubercular measures should be employed for the prostatic mischief, *i.e.* fresh air, tuberculin injections, and liberal feeding. When an abscess can be detected, open it by a perineal incision.

*Describe the Pathology of Senile Prostate.*

This condition usually occurs in individuals over fifty years of age. Many theories have been suggested to account for the condition (*a*) senile fibrosis ; (*b*) sexual excess ; (*c*) ungratified sexual desire ; (*d*) a chronic inflammatory process often following gonorrhoea ; (*e*) a neoplasm ; (*f*) following some alteration in a normal internal secretion. *We are still absolutely in the dark regarding its etiology.* The disease is "a senile hyperplasia with a pronounced liability to become carcinoma" (Wade). There are three forms of senile prostate.

1. Chronic lobular prostatitis—the common senile enlargement.
2. Chronic interstitial prostatitis, or fibrosis.
3. Carcinomatous.

The middle lobe is the commonest one to be involved, frequently also the lateral lobes.

*What are the Special Features of the Lobular Form ?*

The gland is irregularly enlarged and surrounded by a thin film of condensed prostatic tissue, the *false capsule*, which can be readily separated from the diseased area along the *plane of cleavage*. A section of the affected prostate shows little masses of acinar hyperplasia, spheroids, each of which is bounded by a wall of healthy glandular tissue. In course of time the enlarged middle lobe erupts through the internal vesical sphincter to project beneath the vesical

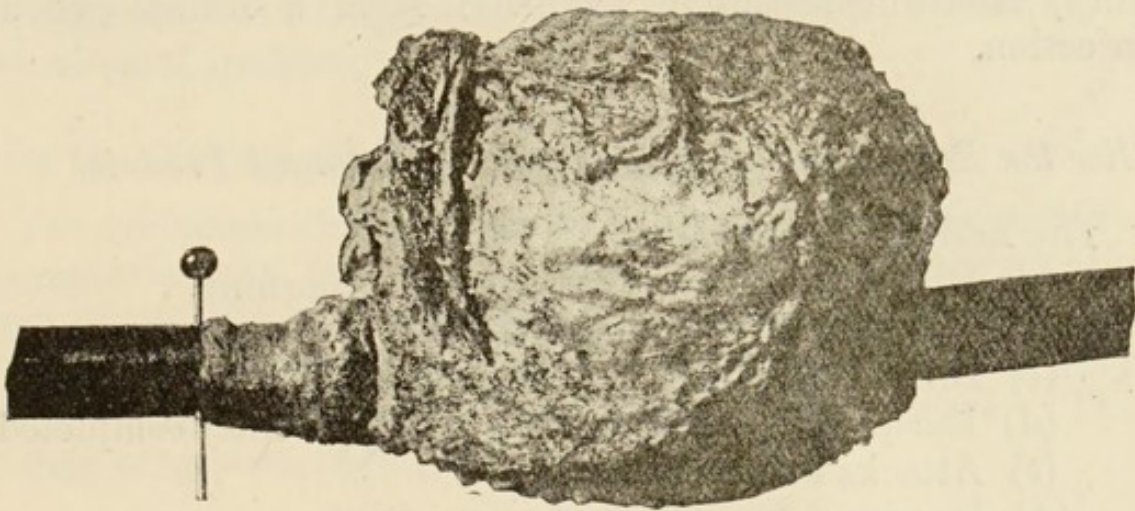


mucosa, immediately behind the internal meatus. In this situation it acts like a ball valve to the urethra.

*Define Prostatic Fibrosis.*

Prostatic fibrosis is caused by a hyperplasia of the stroma of the organ, and results in a small, hard prostate, the middle lobe often forming a firm mass which causes considerable obstruction to the urinary outflow.

Fig. 53. HYPERTROPHIED PROSTATE REMOVED BY SUPRAPUBIC METHOD (after Skirving).



This specimen is of interest since it shows not only the prostatic urethra removed entire, but also a portion of the membranous urethra. The pin, passed through the catheter, indicates where the urethra was torn away. A stricture developed later which, however, yielded to treatment by bougies. The specimen, which was of the fibrous variety, weighed two ounces, and was taken from a man aged sixty-two years.

*What are the Results of Senile Enlargement?*

1. An alteration in the length, calibre, and direction of the urethra.

2. When the middle lobe is chiefly affected, a retroprostatic pouch is formed; in this pouch urine collects and stagnates. Ammoniacal decomposition occurs, and a phosphatic calculus is frequently produced.

3. The projecting middle lobe may overlap the urethral orifice like a ball valve.

4. When the lateral lobes of the gland are involved, the prostatic urethra becomes dilated, elongated, and pushed away from the mesial plane.



*What are the Chief Complications of Senile Enlargement?*

- (a) Hypertrophy and fasciculation of the bladder.
- (b) Dilatation of the bladder.
- (c) Diverticula of the bladder, the common sites being just external to the ureteral orifices.
- (d) Stagnation of the residual urine, leading to septic cystitis and stone formation.
- (e) Chronic interstitial nephritis may develop in old-standing cases.
- (f) Acute retention of urine may occur from sexual excesses, alcohol, or exposure to cold.
- (g) Acute consecutive nephritis from a hæmatogenous infection.

*Give the Early Signs and Symptoms of Enlarged Prostate.*

The leading features are—

- (a) Rising to micturate in the early morning.
- (b) Difficulty in beginning the act.
- (c) Diminished force of the stream.
- (d) Escape of urine after the act is apparently completed.
- (e) Attacks of hæmaturia.
- (f) Increased frequency of micturition.

The diagnosis is verified by examination *per rectum*, by the catheter, and in early cases by cystoscopy.

*What is the Treatment?*

When the patient is still vigorous and mainly concerned about the urinary obstruction, the radical operation should be undertaken. Two methods of removing the prostate are in vogue, suprapubic (Freyer) and perineal (Young).

Cases unsuitable for a radical operation have to be carefully treated. Sexual excitement, alcohol, and red meats should be strictly forbidden. Doses of urotropin should be occasionally given. Every four hours during the day, and twice during the night, the patient should empty his bladder. In many cases this can only be done with the aid of a catheter. The patient must be instructed in the use of the instrument, and the necessity of strict asepsis



thoroughly impressed upon him. A soft rubber catheter or a bi-coudé should be chosen.

*Describe Carcinoma of the Prostate.*

Pathologically, three varieties of cancer can occur in the prostate, (a) scirrhus, (b) encephaloid, and (c) adeno-cancer. It most commonly originates in a spheroid of chronic lobular prostate and affects old men. The disease spreads to the surrounding tissues, especially that around the base of the bladder. *Per rectum*, the gland is hard and irregular, and in some cases adherent to the bowel. The secondary deposits are most frequently found in bones, thus leading to pathological fracture.

*Give the Clinical Features.*

The symptoms closely resemble those of senile enlargement. Hæmaturia may be present; when it occurs independently from micturition, and apart from the passage of an instrument, it is a valuable diagnostic sign. Referred pains are very common, especially along the great sciatic nerve. The disease progresses rapidly.

*What is the Treatment?*

With the exception of the earliest stages, "the radical treatment of cancer of the prostate is beyond surgical art" (Bland-Sutton). Measures must be adopted to relieve the intense suffering; they are identical with those recommended for malignant disease of the bladder (*see ante*).

## THE PENIS.

*What is Phimosis?*

A condition in which the prepuce is incapable of retraction so as to expose the glans penis. The prepuce is long, and its orifice contracted. Phimosis may be either congenital or acquired. The treatment is to perform circumcision.



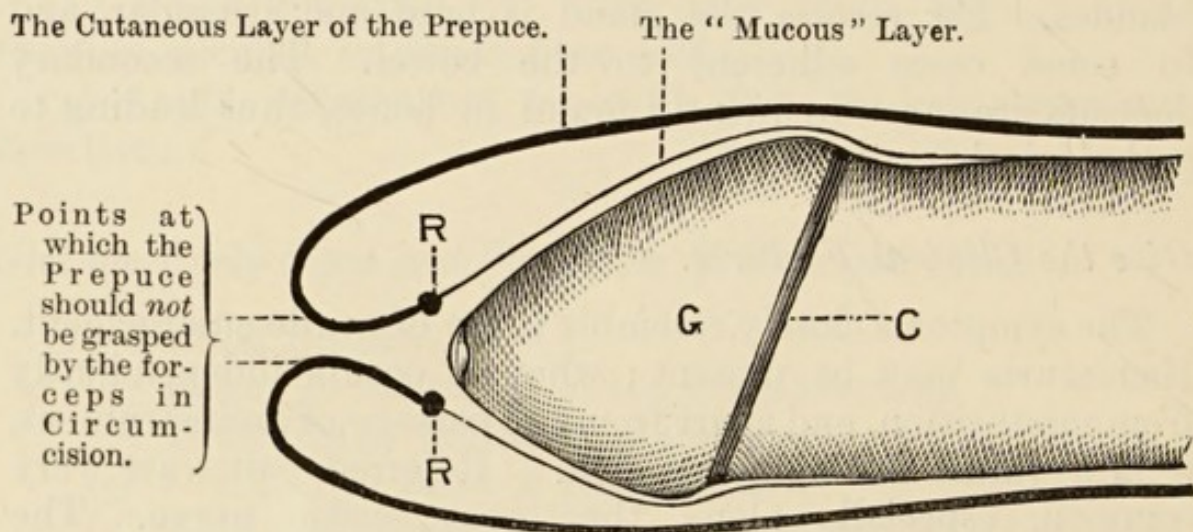
### *What are the Results of Phimosis?*

(a) Retention of the sebaceous secretion, setting up irritation and balanitis.

(b) Interference with micturition; this may lead to backward pressure and partial retention with their sequelæ.

(c) The constant straining may result in prolapse of the rectum, hernia, etc.

Fig. 54. PHIMOSIS.



R. R. The Contracted Ring that prevents the Prepuce from being pulled back.  
G. The Glans Penis. C. The Corona Glandis.

### *Describe Paraphimosis.*

In this condition the prepuce has been forcibly drawn back, and the contracted ring slips into the sulcus behind the corona, thus preventing the return of the prepuce to its original position. The result is congestion and great œdema, forming a large round collar-like swelling in front of the constricting ring. Behind this, the skin and subcutaneous tissues are also swollen: therefore we notice two swellings separated by a deep, narrow sulcus, in the floor of which is the tight ring of the prepuce. Later, the glans penis becomes swollen. Chordee is a troublesome symptom.

### *Give the the Treatment.*

Elevate the penis; protect the glans with a thick layer of lint, and apply a small elastic bandage firmly round the



organ. Wait for a quarter of an hour, then anoint the glans with lanolin or vaseline, and pull the prepuce forwards. When manipulation fails, slit the prepuce, and subsequently, when all œdema has disappeared, perform circumcision.

*Describe Cancer of the Penis.*

Cancer of the penis is always a squamous epithelioma. It usually originates on the dorsum of the glans, and is most common after the age of fifty. Commencing as a small hard wart, the cancer quickly forms a rough fissured cauliflower-like tumour, which ulcerates, leading to hæmorrhage and an offensive discharge. In time the body of the penis is infiltrated; the urethra however usually escapes. The inguinal glands are the first to become involved, and then the glands along the external iliac artery. If seen early, partial amputation of the penis, with free removal of both sets of inguinal glands should be carried out. In advanced cases the whole penis must be removed, together with the inguinal and the iliac glands; the urethra is stitched to the skin in the middle line of the perineum.

## THE TESTIS AND SPERMATIC CORD.

*What are the Abnormalities in the Descent of the Testis?*

- (1) Retention within the abdominal cavity = CRYPTORCHISM.
- (2) Retention within the inguinal canal = IMPERFECTLY DESCENDED TESTIS.
- (3) Descent into some part other than the scrotum = ECTOPIA TESTIS.

The varieties of ectopia testis are—(a) Pubic. (b) Perineal. (c) Abdominal. (d) Saphenous or crural.

*Give the Signs and Symptoms of Abnormal Descent.*

Abnormal descent is often complicated with either a congenital hernia, a congenital hydrocele, or torsion of the spermatic cord. When situated in the inguinal canal,



or in some abnormal position, the testis is exposed to injury, and acute orchitis may be set up. Acute orchitis in such cases is frequently followed by sarcoma.

Abnormal descent is usually found on the right side. The scrotum is small, and the corresponding testicle absent. The testicle can be palpated when imperfectly descended or misplaced, and testicular sensation elicited. Dragging or neuralgic pains along the spermatic cord may prove a troublesome symptom.

When both testicles have failed to descend, the patient usually presents a marked feminine appearance, and has a falsetto voice.

#### *What is the Treatment?*

- (a) When unilateral and a hernia present—excise the testicle and deal with the hernia.
- (b) When the condition is one of ectopia testis—endeavour to implant the testis in the scrotum; if this is found to be impossible, return the testis to the abdomen.
- (c) When the testicle is in the inguinal canal and no hernia is present—try gentle traction and massage; when this fails to stimulate descent, open the inguinal canal and fix the testicle into the scrotum. This operation is called orchidopexy.

#### *Describe Acute Epididymitis.*

Acute epididymitis is secondary to some septic infection of the urethra, the organisms reaching the epididymis *via* the vas deferens. The disease most commonly follows gonorrhœa; other causes are, the passage of septic urethral instruments and urethral calculi. The gonorrhœal form occurs when the infection has invaded the posterior urethra. It is generally unilateral. Only in rare instances does suppuration occur, or atrophy of the testis result from an attack.

#### *What are the Signs and Symptoms?*

1. Elevation of the temperature, often with a preliminary rigor.



2. Nausea, vomiting, and constipation.
3. Great pain, leading to insomnia.
4. Disappearance of the urethral discharge.
5. On examination *per rectum*, the corresponding seminal vesicle and the prostate, are often felt to be swollen and extremely tender.

Locally notice the

- (a) Edematous red scrotum.
- (b) Swollen and thickened spermatic cord.
- (c) Swollen and tender epididymis.
- (d) Often an acute hydrocele between the epididymis and the testicle.

#### *Give the Treatment.*

Keep the patient in bed supporting the genitals by a pillow; administer a brisk purge. Apply dressings of ichthyol and glycerine. The hydrocele may require tapping. When the acute symptoms have passed off, gently rub the parts with oleate of mercury ointment, and advise the patient to wear a suspensory bandage.

#### *Describe Acute Orchitis.*

In acute orchitis the infection reaches the testicle through the blood stream. The disease is generally secondary to either mumps, influenza, scarlet-fever, malaria, or gout. An attack of mumps is frequently followed by acute orchitis, the testicular affection occurring at the end of the first week. Like acute epididymitis, testicular inflammation is usually unilateral (except in the gouty form), and does not end in suppuration, but is **often followed by atrophy**.

#### *What are the Signs and Symptoms of Acute Orchitis?*

The constitutional symptoms are usually masked by those of the causal agent; the local features are—

1. Edematous red scrotum.
2. Swollen and painful testicle.
3. Normal epididymis and tunica vaginalis (except in the gouty variety).
4. Often a muco-purulent discharge from the urethra.

The treatment is similar to that of acute epididymitis.



*Describe Malignant Disease of the Testis.*

Malignant disease of the testis is usually either an encephaloid cancer or a lympho- or round-celled sarcoma. The most common age is between twenty-five and forty. The lumbar lymphatic glands are affected, and, when the scrotum becomes involved in the disease, the superficial inguinal glands in addition. Early removal of the testicle and the affected glands is the only feasible treatment.

*What are the Clinical Features?*

1. There is frequently a distinct history of trauma.
2. A testicular swelling which is not painful.
3. Absence of testicular sensation.
4. Rapid rate of growth, the epididymis being early involved in the disease.
5. An acute hydrocele or even a hæmatocele may develop.
6. Engorgement of the spermatic cord.
7. Later, the scrotum becomes adherent to the testicle, and ultimately gives way—**fungus testis**.

*Describe Syphilitic Disease of the Testis.*

Syphilitic disease of the testis may occur in either the acquired or the congenital variety. It is a tertiary manifestation. Pathologically, two conditions are commonly present, namely, gummata and diffuse interstitial sclerosis. In congenital syphilis, sclerosis is the chief feature: in acquired syphilis both gummata and sclerosis are present.

The usual anti-syphilitic measures should be adopted as the treatment.

*What are the Clinical Features?*

1. A history of syphilis, or the presence of syphilitic lesions elsewhere.
2. A slowly growing painless swelling in the scrotum.
3. The swelling affects the testicle, not the epididymis, the latter becoming adherent to the testis.
4. On palpation, the testicle feels hard, like a piece of wood.



5. The spermatic cord is not thickened.
6. A hydrocele forms in the early stages ; it is subsequently absorbed.
7. Testicular sensation is lost.

*Describe Tubercular Disease of the Epididymis and Testis.*

The disease commences in the epididymis, and later implicates the testicle. It is usually of the bovine type, and secondary to tubercular cervical adenitis. The bacilli reach the testis by the blood-stream. Pathologically, as in tubercle of other organs, small nodules are formed, which subsequently caseate. Tubercular disease of this organ is usually found in young adults. It is a very insidious complaint, as there are practically no constitutional symptoms. The treatment adopted should be—

- (a) Bier's congestion. The rubber band is applied round the base of the scrotum.
- (b) Injection of tuberculin.
- (c) Open-air life ; and
- (d) Generous feeding.

When, however, the condition is in an advanced stage, excision of the epididymis or even of the testicle will be necessary.

*What are the Clinical Features ?*

1. A small hard lump develops in the epididymis ; it slowly increases in size.
2. The swelling is not painful.
3. Testicular sensation is retained.
4. A dragging sensation along the spermatic cord.
5. A small hydrocele often forms.
6. The testicle, epididymis, and scrotum adhere to each other in advanced cases ; **fungus testis** may occur.
7. The spermatic cord is thickened, and the vas deferens feels especially hard.
8. On rectal examination tubercular changes are frequently found in the prostate, and the corresponding seminal vesicle.



*What is a Varicocele?*

A dilated varicose condition of the internal spermatic veins or pampiniform plexus. It is more frequent on the left than on the right side, and tends to disappear in adult life.

Several reasons have been urged as an explanation of its greater frequency on the left; they are—

- (a) The relative lengths of the internal spermatic veins—the left being the longer.
- (b) The mode of termination of the veins—the right **obliquely** into the inferior vena cava; the left at **right angles** into the left renal vein.
- (c) The presence of a valve at the terminal orifice of the right vein; no valve in connection with the left vein.
- (d) The pressure of the faecal contents of the iliac colon on the left veins.
- (e) The anastomosis of the left veins with the hæmorrhoidal veins.

*Give the Signs and Symptoms.*

1. A feeling of fulness in the scrotum and dragging pains along the spermatic cord; these are generally relieved on the patient assuming a recumbent position.

2. The right testicle often hangs at a lower level than the left testicle.

3. A thrill is felt in the veins when the patient coughs.

4. The swelling disappears when the scrotum is elevated, and the patient lies down. Place the finger on the external abdominal ring, and direct the patient to stand up—the veins refill.

5. On palpation the scrotum and its veins feel like a *bag of worms*.

6. Frequent nocturnal seminal emissions.

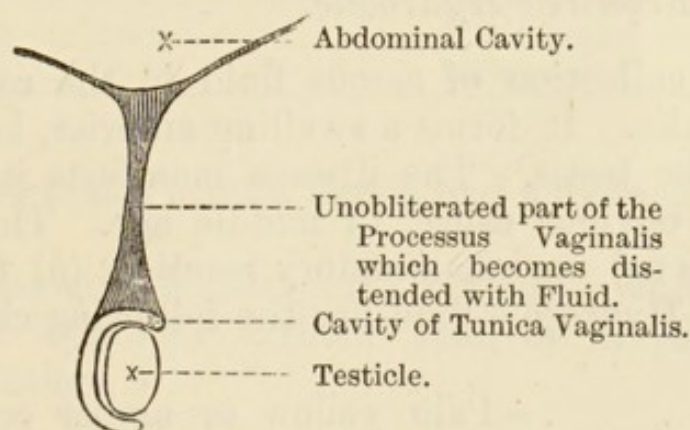


### *What is the Treatment?*

The palliative measures to be employed are cold sponging, and the wearing of a suspensory bandage. The radical operation should be performed: (a) if the patient desires to enter the public services or to reside abroad; (b) if there is marked pain; or (c) if he is mentally perturbed. "Hypochondriasis tends to fix the patient's attention upon these veins. He accuses himself of having caused it by early sexual excitation, which is quite incorrect. He fears it may result in impotence, which it does not. He dreads sterility, for which there is likewise no solid grounds." (Walsham.)

The operation consists in exposing the internal spermatic veins by an incision over the external abdominal ring, and resecting an inch or more of the plexus. **Be careful not to injure the vas deferens and its accompanying vessels.**

Fig. 55.—ENCYSTED HYDROCELE OF CORD.



To show the condition of the Processus Vaginalis in Encysted Hydrocele of the Cord.

### *Describe Encysted Hydrocele of the Cord.*

Encysted hydrocele of the cord results from a partial failure of the processus vaginalis to become obliterated. Only the upper and lower segments are occluded; the intervening portion is patent. A serous effusion occurs into this space, which may give rise to a circumscribed or an elongated, smooth, elastic swelling occupying the inguinal canal. The condition is more frequently met with on the right than on

the left side. This variety of hydrocele usually disappears during infancy.

*Give the Varieties of Hydrocele of the Tunica Vaginalis.*

A. ACUTE

B. CHRONIC

- |   |                                                                                                                  |
|---|------------------------------------------------------------------------------------------------------------------|
| { | <i>Congenital.</i> —Processus vaginalis is entirely open, and therefore communicates with the peritoneal cavity. |
|   | <i>Acquired.</i> —Processus vaginalis is entirely obliterated.                                                   |
|   | <i>Infantile.</i> —Processus vaginalis is entirely obliterated at its upper end.                                 |
|   | <i>Inguinal.</i> —A hydrocele associated with an undescended testicle.                                           |

*Describe an Acquired Hydrocele.*

This is a collection of serous fluid in the cavity of the tunica vaginalis. It forms a swelling anterior, lateral, above and below the testis. The disease manifests itself, usually without any obvious cause, in middle age. There are two chief theories (*a*) an inflammatory reaction, (*b*) from passive congestion. Hydrocele fluid has the following characters—

COLOUR. . . . = Pale yellow or amber coloured. In old cases it often has a glistening or sparkling appearance, due to the presence of cholesterin crystals, the result of fatty changes.

REACTION . . . = Neutral, or faintly alkaline.

SPECIFIC GRAVITY = 1024.

COMPOSITION . . . = Contains a little fibrinogen, and about 6 per cent. of albumin, and a small amount of NaCl. The fluid does not coagulate spontaneously.



*How is it distinguished from a Scrotal Hernia?*

| SCROTAL HERNIA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ACQUIRED HYDROCELE.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> <li>1. The tumour is oblique in shape and direction.</li> <li>2. The protrusion lies in front of, and covers the spermatic cord, and the testicle can be felt at the bottom of the scrotum. The scrotum cannot be folded up on the abdomen as in a hydrocele.</li> <li>3. An impulse is imparted to the tumour if the patient coughs: a gurgling sound is heard on attempts at reduction; on percussion the note is clear if intestine, but dull if omentum.</li> <li>4. No transparency on examination by transmitted light, except in children.</li> </ol> | <ol style="list-style-type: none"> <li>1. The tumour is oval or pyriform, and <i>begins at the bottom of the scrotum.</i></li> <li>2. The constituents of the cord can be felt free in the inguinal canal at the external ring. The testicle cannot be felt at the bottom of the scrotum, for it is situated behind the swelling.</li> <li>3. No impulse on coughing; no gurgling on attempts at reduction; the percussion note is dull. It is possible to feel the rounded <i>upper end</i> of the tumour.</li> <li>4. It is usually transparent when thus examined; a thick tunica vaginalis is not transparent.</li> </ol> |

Remember that a scrotal hernia and a hydrocele frequently co-exist.

The treatment consists in tapping, with subsequent injection of iodine or carbolic acid, or in performing the radical operation.

*Give the Chief Points in connection with Tapping.*

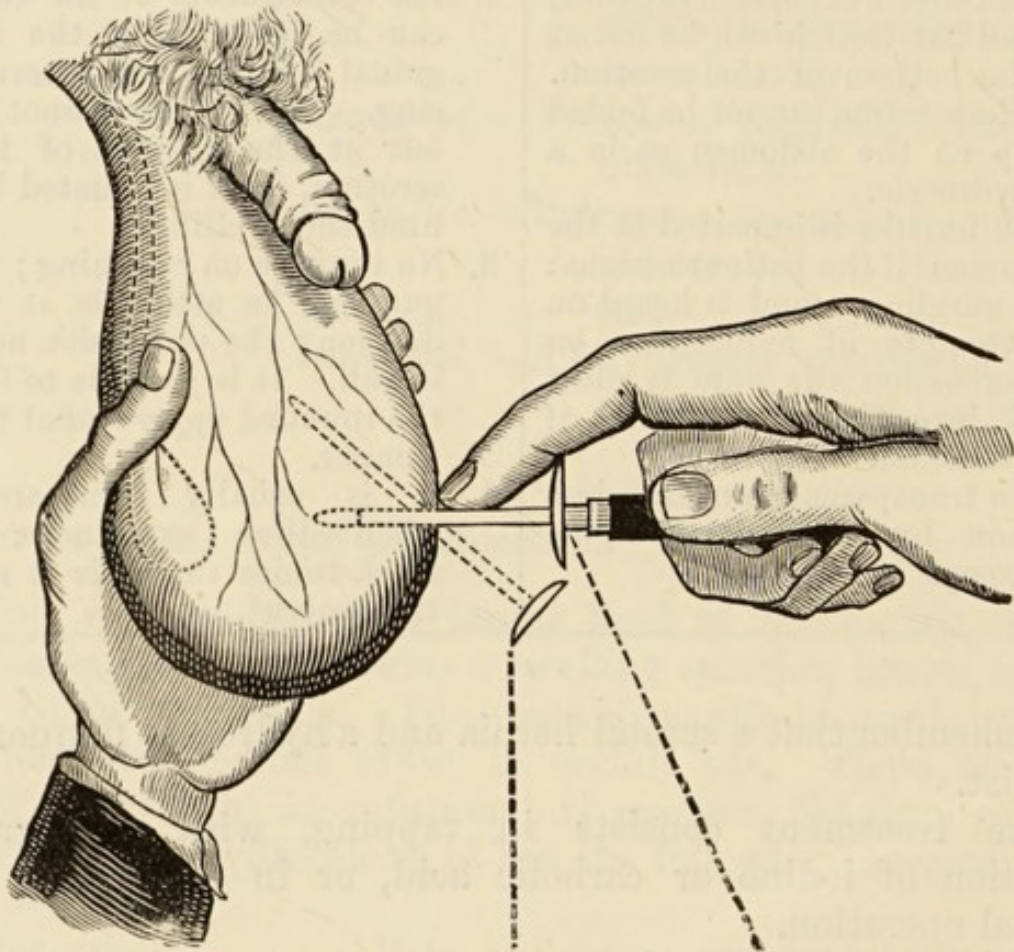
Grasp the swelling with the left hand, so that the testicle lies in the centre of the palm. Hold the trocar in the right hand, with the index finger about three-quarters of an inch from its tip (to prevent it entering too far) and with the thumb on the flange to press the cannula home; plunge it with a sudden thrust into the most prominent part of the *front* of the scrotum. It is first introduced at right angles, and then made to pass up obliquely after entering the sac (Fig. 56).



*What are the Precautions?*

1. Avoid any obvious large veins.
2. Make sure it is not a case of *inversion of the testicle*—*i.e.* the testicle lying in front, instead of at the back. The position of the testicle is made out by the “testicular sensation” produced by gently squeezing the organ.

Fig. 56. TAPPING AN ACQUIRED HYDROCELE.



Cannula to be passed up obliquely. Trocar to pass in at Right Angles.  
The Surgeon's thumb ought to have been placed on the flange of the Cannula.

*What is the After-treatment?*

Cover the puncture wound with a little collodion, fix a pad of wool over the scrotum, and support the genitals with a bandage. Let the patient rest for a few hours after the operation.

*Describe the Treatment by Iodine and Carbolic Injections.*

**IODINE.**—Tap the hydrocele and allow all the fluid to drain away. Inject one drachm of a 1 per cent. solution



of cocaine into the empty sac, leave for ten minutes, then inject one or two drachms of the Edinburgh tincture of iodine. Shake the scrotum thoroughly and keep the patient in bed for four days.

**CARBOLIC ACID.**—Tap and empty the hydrocele as before, then inject one drachm of a solution of carbolic acid crystals in glycerine. Keep the patient in bed for two days.

The advantages of carbolic acid are—

- (a) There is less pain.
- (b) A more certain cure.
- (c) Less risk of sloughing of the testis.

*Describe the Radical Operation.*

Make a transverse incision over the external abdominal ring, divide the superficial structures and expose the spermatic cord. By gentle pressure squeeze the upper end of the swelling out of the wound, and tap the hydrocele. The testicle and the collapsed tunica vaginalis are withdrawn from the scrotum, and the parietal layer of the tunica vaginalis is dissected off.

*Describe Hæmatocele.*

This is an effusion of blood into the cavity of the tunica vaginalis. It may be caused by—

- (a) Trauma to the testis.
- (b) Chronic inflammation of the tunica vaginalis.
- (c) Puncture of a small vein in tapping a hydrocele.
- (d) Malignant disease of the testis.

When the effusion coagulates, it is deposited upon the walls of the cavity. There is no transparency on examination by transmitted light.

*How would you distinguish between Hæmatocele and Malignant Disease of the Testis?*

Hæmatocele (a) appears suddenly; (b) does not involve lymphatic glands; (c) does not lead to thickening of the spermatic cord; and (d) does not cause a loss of testicular sensation.



*Give the Treatment for Hæmatocele.*

In recent cases the patient should be placed in bed, the scrotum supported upon a pillow, and an ice-bag applied to the parts. After a few days have elapsed the radical operation for hydrocele should be performed. The latter treatment is likewise indicated in cases of old standing.

*Describe Spermatoceles.*

Spermatoceles arise in the vicinity of the epididymis, either between the caput (globus major) and the testis, or above the caput outside the tunica vaginalis. They are usually unilocular. Their gradual development separates the testis and epididymis. They have a fibrous wall lined by epithelium and contain a milky fluid in which motile spermatozoa may be found. There are two theories to explain their origin, (a) they are retention cysts of the vasa efferentia, and (b) they arise from certain foetal relics called Kobelts' tubules. They grow slowly and painlessly.

The treatment is to excise the spermatocoele.

*What is the Etiology of Torsion of the Cord?*

Cases of torsion result from mal-development of the cord; the testicle hangs free in the cavity of the tunica vaginalis, and the constituents of the cord are separated instead of being connected into a bundle. Exciting causes are (a) the venous hypertrophy which occurs at puberty, (b) a sudden contraction of the cremaster muscle, (c) lifting heavy weights, and (d) violent expiratory efforts such as coughing or the blowing of wind instruments.

*Give the Clinical Features of Torsion of the Cord.*

There are two varieties of torsion, (a) acute, and (b) recurring. The symptoms are those of an epididymo-orchitis, i.e. pain, swelling, extreme tenderness, and slight fever. *Exclude gonorrhœa and mumps before diagnosing torsion.*

The treatment consists in opening up the tunica vaginalis



and undoing the twist. In recurrent cases, after getting rid of the torsion, the parietal layer of the tunica vaginalis should be dissected away, and the tunica albuginea united by a few catgut stitches to the scrotum.

## THE URETHRA.

For Gonorrhœal Urethritis—see Part I.

### *Classify Urethral Strictures.*

#### A.—MODE OF ORIGIN.

- (1) *Cicatricial* { (a) Traumatic.  
                          (b) Inflammatory.
- (2) *Spasmodic*.
- (3) *Congestive*.

*Traumatic* strictures result from rupture of the urethra, by falling upon a hard substance with the thighs abducted, kicks on the perineum, and fractures of the pelvis. The urethra usually tears at the junction of the bulbous and membranous portions.

*Inflammatory* strictures are usually gonorrhœal in nature, but may follow a non-specific urethritis.

*Spasmodic* and *Congestive* strictures affect the membranous urethra. The former is occasioned by spasm of the compressor urethræ muscle. They cause retention of urine.

#### B.—SHAPE.

- (1) *Annular*.
- (2) *Bridle*, when the stricture forms a band across the urethral channel.
- (3) *Tubular*.

#### C.—NATURE.

- (1) *Callous*.
- (2) *Resilient*. This is a variety of stricture which dilates very easily up to full size, then quickly contracts again, like a piece of india-rubber.

#### D.—ABILITY TO ADMIT A BOUGIE.

- (1) *Permeable*.
- (2) *Impermeable*.



*What are the Results of a Urethral Stricture?*

- A. In the urethra behind the stricture.**—Dilatation of the tube occurs, the mucous membrane becomes inflamed and often ulcerates. Peri-urethral abscesses and fistulæ may follow. The urethra may rupture owing to the patient straining during micturition.
- B. In the bladder.**—Hypertrophy of the muscular coat; diverticula of the mucous membrane may form. Cystitis often occurs.
- C. In the ureters.**—These become dilated, and thickened.
- D. In the kidneys.**—Chronic interstitial nephritis is often brought about; pyelo-nephritis and pyo-nephrosis are frequent sequelæ of a urethral stricture.

*Give the Signs and Symptoms of a Urethral Stricture.*

One of the earliest symptoms is a difficulty in beginning to pass water, and the flow is less vigorous than normal. Increased frequency of micturition may be complained of. There may be a gleet discharge, and a dribbling at the end of the act. Sometimes there are changes in the size, shape, and direction of the stream—it is forked and twisted. Then from some slight cause, as exposure to cold or indulgence in alcohol, complete retention comes on from the superadded inflammation or spasm. The chief point in diagnosis is the inability to pass an ordinary-sized catheter.

*What Methods of Treatment may be adopted?*

1. Intermittent dilatation.
2. Continuous dilatation.
3. Excision of the stricture.
4. Internal urethrotomy.
5. External urethrotomy by the method of Syme or Wheelhouse; the latter is used when the stricture is impermeable.

*Describe the Method of Intermittent Dilatation.*

Introduce a metal bougie along the urethra until the instrument is felt to engage in the stricture. Work very



cautiously, especially when near the triangular ligament, or a "false passage" will be formed, and the bougie pass between the rectum and the prostate.

It is often an advantage to control the bougie by keeping the left forefinger in the rectum. A larger size is next introduced, and so on until a No. 12 or 13 can be passed. The patient rests for two or three days, and on his next visit the surgeon begins with the size *below* the largest one passed previously; then the same size, and the one above it. Never omit a size.

See that the patient empties his bladder before any instruments are introduced into the urethra. Also give him a drink of hot water and ten grains of antipyrin in order to prevent "urethral" fever.

#### *Describe the Method of Continuous Dilatation.*

This mode of treatment is inferior to that of intermittent dilatation, and may result in peri-urethral cellulitis. Catheters are used instead of bougies. Introduce the largest catheter possible, tie it in position and leave it for a day. At the next sitting it will be found that the stricture will allow a larger size to be passed. Leave this in for twenty-four hours, and so on, until the stricture is fully dilated.

#### *What is Internal Urethrotomy?*

This operation consists in dividing the stricture with a urethrotome. It is a useful method for resilient and bridle strictures. It is contra-indicated when any peri-urethral cellulitis is present. The subsequent treatment is to pass a full-sized bougie every six weeks.

#### *Give the Indications for External Urethrotomy.*

1. Impermeable stricture.
2. Peri-urethral sepsis.
3. Urinary fistulæ.
4. Traumatic strictures.
5. Callous strictures.
6. When internal urethrotomy has failed.



*Describe Syme's Method of External Urethrotomy.*

Syme's staff is passed, and the patient placed in the lithotomy position. The anterior half of the staff is slender and grooved, but the posterior half is of full size, and the shoulder, *i.e.* the place where the two parts meet, rests firmly against the face of the stricture. The slender portion passes through the stricture into the bladder.

An assistant holds the staff with his right hand, and draws up the scrotum with his left.

The operator makes an incision in the median line of the perineum, from above downwards, about two inches long, and continues the dissection until he can distinguish the shoulder of the instrument. He then enters the point of the knife into the groove in the staff, at the posterior part of the wound, about an inch below the shoulder, and cuts *upwards* through the stricture. If the stricture is completely divided, the broad part of the staff can be passed through it. A full-sized rubber catheter is passed from the meatus into the bladder. Any sinuses or fistulæ present should be slit up and packed with iodoform worsted. If there are no such septic complications stitch up the urethral wound.

*Describe Wheelhouse's Method of External Urethrotomy.*

Introduce Wheelhouse's staff, the groove being directed towards the surgeon, and the hook away from him. Place the patient in the lithotomy position, the assistant holding the staff and the scrotum as in Syme's operation.

Open the urethra upon the groove, turn the staff round until the hook catches in the upper angle of the wound. With artery forceps hold the lateral margins of the urethral wound aside. Examine the face of the stricture with a probe-pointed director, and endeavour to locate the opening. Pass the director through the opening of the stricture and divide the stricture upon the director, from *before backwards* (compare with Syme's method). The subsequent treatment is similar to that in Syme's operation.



*What are the Complications of Stricture?*

1. Acute retention.
2. Periurethral cellulitis or abscess.
3. Urinary extravasation.
4. Urinary fistulæ.

*Give the Treatment of Acute Retention.*

NON-OPERATIVE.—Place the patient in a hot bath, and give him a morphia and belladonna suppository. Failing this, the urethra should be gently dilated with a small bougie until it will admit a No. 5 catheter.

OPERATIVE.—Supra-pubic aspiration should be performed.

*Describe Urinary Extravasation.*

Urinary extravasation may either result from a traumatic rupture of the urethra or as a complication of a stricture, and can involve either the anterior or the posterior urethra.

When the anterior urethra is the seat of rupture the urine escapes into the superficial perineal pouch, where its subsequent course is influenced by the attachments of the fascia of Colles. In rupture of the posterior urethra, the urine may either pass forward into the superficial perineal pouch or collect round the neck of the bladder and the space of Retzius.

*Describe the Fascia of Colles.*

This is the deep or membranous layer of the superficial fascia of the perineum. It is fixed **behind** to the base of the triangular ligament; **laterally** to the conjoined ischial and pubic rami; **anteriorly** it is free, and is continued upwards as part of the scrotum on to the anterior abdominal wall, where it becomes continuous with the fascia of Scarpa. The fascia of Scarpa descends over the inguinal (Poupart's) ligament to blend with the fascia lata of the thigh about half an inch below the ligament. As will be seen from the above description the urine must travel upwards, and collect in the loose cellular tissue of the scrotum and lie superficial to the muscles of the anterior abdominal wall.



*Give the Signs and Symptoms of Urinary Extravasation.*

1. A burning or pricking sensation in the perineum,
2. Later, the anterior part of the perineum, the scrotum, and root of the penis swell.
3. The skin of the affected region assumes a dusky-red tint and sloughing occurs.
4. Constitutional disturbances due to the absorption of septic materials.

*What is the Treatment?*

Make an incision in the middle line of the perineum so as to open the membranous urethra. Free incisions are made throughout the swollen area, and drainage tubes inserted. Frequent irrigation of the damaged tissues is carried out through the tubes,  $H_2O_2$  being the solution employed. The damaged urethra is repaired at a subsequent period.

## THE LIVER.

*Describe Rupture of the Liver.*

Rupture of the liver often results from severe violence applied to the anterior abdominal wall, or from falling from a height. Both Glisson's capsule and the glandular tissue are torn. Owing to the profuse hæmorrhage into the peritoneal cavity, the injury is usually fatal.

*Give the Signs and Symptoms.*

1. Marked tenderness in the right hypochondrium and epigastrium.
2. Frequent attacks of pain shooting to the right infra-scapular region.
3. Rigidity of the right rectus muscle.
4. Signs of shock and internal hæmorrhage.



*What is the Treatment?*

Make a vertical incision in the middle line above the umbilicus, and expose the liver. Grasp the hepato-duodenal ligament between the finger and thumb, and endeavour to control the hæmorrhage. Tie any visible bleeding vessels, and suture the rent with thick catgut stitches.

*Describe Abscess of the Liver.*

Abscesses of the liver may be divided into two groups, pyogenic and tropical. The former may arise from the penetration of a gastric ulcer, or as part of a general pyæmia. In pyæmia the portal vein becomes inflamed (suppurative pyelo-phlebitis); several septic emboli are detached and lodge in the liver. Tropical abscess is secondary to amœbic dysentery, the amœba coli travelling along the radicles of the portal system to the liver. Hepatic abscesses are usually situated in the right lobe.

A tropical abscess consists of three zones—

A. OUTER = Hyperæmic liver tissue.

B. MIDDLE = Necrotic liver tissue.

C. INNER = Pus, somewhat resembling anchovy paste.

When untreated, the abscess often bursts into the right lung.

*Give the Clinical Features of Tropical Abscess.*

1. Pain in the right hypochondrium, radiating towards the right shoulder.

2. Febrile disturbances, with frequent rigors and profuse sweating.

3. Enlargement of the liver, often bulging the thoracic wall, and displacing the diaphragm upwards.

4. Progressive loss of weight.

5. Jaundice is usually absent.

6. Ascites may develop.

7. The abscess may burst into (a) the hepatic flexure of the colon, (b) the stomach, or (c) the right bronchus, and thus the characteristic pus may be passed with the stools, or vomited, or expectorated.



### *What is the Treatment?*

The abscess can be reached either by an incision through the right rectus, or by means of the procedure known as trans-pleural or trans-thoracic laparotomy. The latter operation is the better. Make an incision three inches long along the eighth or ninth intercostal space, in either the mid, or posterior axillary line. Resect subperiosteally about  $2\frac{1}{2}$  inches of the ribs bounding the space chosen, and expose the costal pleura. Stitch together the costal and diaphragmatic pleura, shutting off an area about the size of a crown piece. Make a crucial incision through this area, thus reaching the diaphragm. Incise the diaphragm carefully, and the abscess will be found bulging the liver. Isolate the operation field with gauze-pads, and aspirate the abscess. Leave a drainage tube *in situ*, and stitch the diaphragm up to the skin wound. Emetine is given internally.

### *Describe Manson's Method of Treatment.*

Tap the abscess with a large trocar and cannula; pass a long rubber tube along the cannula and fix it to a suction apparatus.

### *What is Hydatid Disease of the Liver?*

A condition caused by the cystic development of a small tapeworm, the *taenia echinococcus*. Man and the sheep serve as the intermediate hosts for the parasite, the final hosts being the dog and the wolf. The disease is most frequently met with in Australia and in Iceland.

### *Give a Short Account of this Parasite.*

It is  $\frac{1}{4}$ -inch in length, and consists of a head (bearing about thirty hooklets and four suckers), supported on a rostellum, and three or four segments. The last segment is the sexually mature part of the organism, and is shed by the dog and wolf. New segments are always formed at the cephalic extremity. The segments are known as *proglottides*, while the head is termed a *scolex*.



The ripe proglottides, after being discharged by the host, burst, and the embryos are liberated. This phase usually occurs in drinking water or on vegetables, and in this manner they reach the alimentary canal of man or the sheep. Here they perforate the walls of the small intestine, and are carried by the portal circulation to the liver, or more rarely to some other organ, where they become encysted.

*Describe a Hydatid Cyst.*

Three layers can be distinguished—

- A. OUTER or FALSE CYST—formed by the liver.
- B. MIDDLE or ECTOCYST—a laminated, glistening membrane of a gelatinous consistency.
- C. INNER or ENDOCYST, or germinal layer—an opaque membrane studded with minute whitish spots called *brood-capsules*.

In the brood-capsules the scolices develop. Hydatid fluid has the following characters—

- (a) Colourless or slightly opalescent.
- (b) Neutral reaction to litmus.
- (c) Specific gravity of about 1004.
- (d) **Absence of albumin.**
- (e) Presence of a small quantity of sodium chloride.

*Give the Clinical Features of Hydatids of the Liver.*

The cyst is usually situated in the right lobe, and may lead to bulging of the parietes. The swelling is smooth, painless, elastic, and more or less globular in outline. A "hydatid thrill" can sometimes be elicited. Urticaria and pain in the right shoulder may be early symptoms; the former is produced by leakage of the cyst wall, leading to the absorption of some toxic material of the hydatid fluid. A right-sided pleurisy often develops. Unless treated, the cyst will rupture and the contents escape into the peritoneal cavity. Eosinophilia is more often absent than present. Never make an exploratory puncture to confirm the diagnosis,



it is too dangerous. If doubtful of the diagnosis make an exploratory incision.

*What is the Treatment of Hydatids of the Liver?*

When the contents of the cyst are aseptic the fluid should be aspirated, and a one per cent. solution of formalin injected. If this fails, open the cyst, after carefully packing it off from the surrounding peritoneum, allow the contents to escape, and dissect out the endocyst. Pack the cavity left with gauze soaked in adrenalin. When septic, the cyst should be freely incised and drained.

*Describe Cancer of the Liver.*

Primary cancer of the liver is rare. It is usually difficult to diagnose, and its surgical treatment is impossible. The chief signs and symptoms are—

- (a) Irregular and rapid enlargement of the liver.
- (b) The liver is nodular to the touch.
- (c) Rapid deterioration of health.
- (d) Absence of fever and rigors.
- (e) Jaundice.
- (f) No attacks of biliary colic.
- (g) Absence of a pancreatic (Cammidge) reaction.

Secondary cancer mainly follows disease of the mamma, stomach, and rectum.

## THE GALL BLADDER AND BILE DUCTS.

*What is the Pathology of Gall-Stones?*

Gall-stones are more frequent in females than in males, and usually result from a catarrh of the epithelium of the gall-bladder and bile-ducts. This inflammation is due to bacterial infection derived from the alimentary canal, the organisms reaching the biliary apparatus through the portal system, or, in some cases, by way of the common bile-duct. The calculi are formed in the gall-bladder, and then pass into the ducts. The catarrh leads to the detachment of a few epithelial cells, and these form a nidus, around which the stone develops.



*Give the Physical and Chemical Characters of a Typical Gall-Stone.*

COLOUR—Whitish (when an excess of calcium salts), greenish (when an excess of biliverdin), or reddish brown (when an excess of bilirubin).

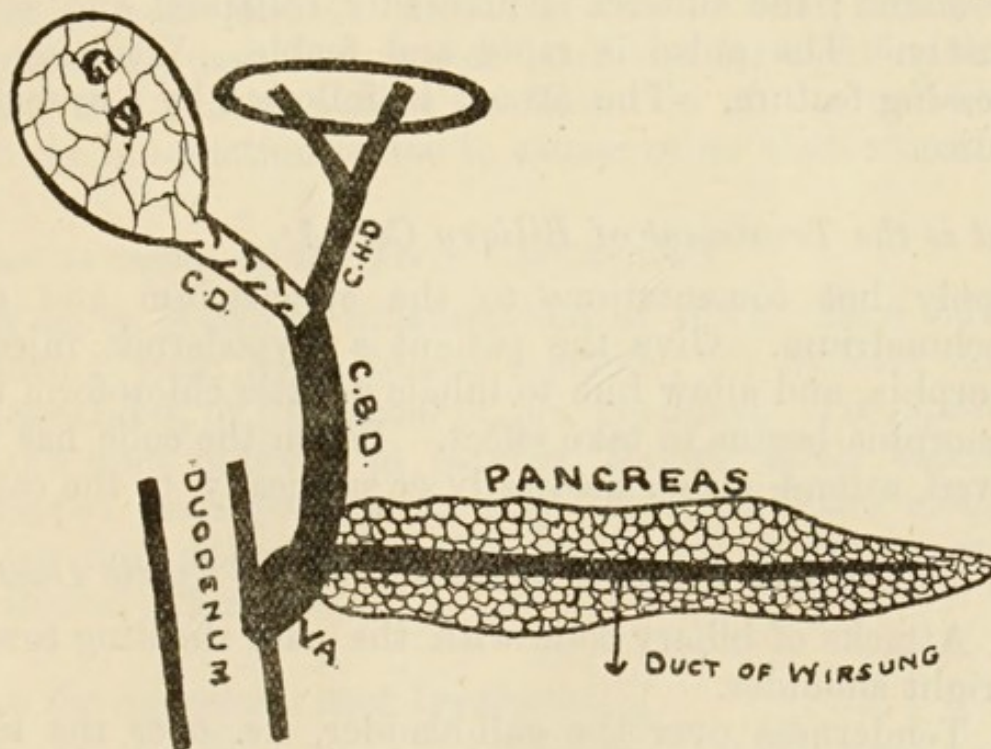
CONSISTENCE—Usually hard.

SHAPE—Ovoid when single; angular and faceted when multiple.

X-RAYS—Usually no shadow.

COMPOSITION—Cholesterin, lime salts, and bile pigments; single gall-stones frequently consist of pure cholesterin. These stones are semi-translucent, and have a granular surface. Multiple stones are stratified on section.

Fig. 57.—DIAGRAM OF BILIARY DUCTS (after Whittaker).



G.B. Gall Bladder.  
C.D. Cystic Duct.  
C.H.D. Common Hepatic Duct.

C.B.D. Common Bile Duct.  
V.A. Vater's Ampulla,

*Describe briefly the Arrangement of the Bile-Ducts.*

The right and left hepatic ducts unite as the common hepatic duct (1-1 $\frac{1}{4}$  inches long), which in turn is joined by

*Surgery, Part IV., 3rd Ed.*



the cystic duct ( $1\frac{1}{2}$  inches) from the gall-bladder, to form the common bile-duct ( $3\frac{1}{4}$  inches). The common bile-duct is divided into (a) supra-duodenal; (b) retro-duodenal; (c) pancreatic; and (d) interstitial portions. It runs along the right free margin of the hepato-duodenal ligament, anterior to the foramen of Winslow, accompanied by the portal vein and the hepatic artery. It passes behind the first part of the duodenum, then burrows through the posterior aspect of the head of the pancreas, and descends behind the second part of the duodenum. Lastly, the duct unites with the main pancreatic duct to form the ampulla of Vater, the latter opening on the summit of a small papilla in the second part of the duodenum.

*Describe an Attack of Biliary Colic.*

The patient is seized with sharp pains in the hepatic region; these radiate towards the right shoulder. Rigors are common; the sufferer is markedly collapsed and sweats profusely. The pulse is rapid and feeble. Vomiting is a distressing feature. The attack is followed by a transitory jaundice.

*What is the Treatment of Biliary Colic?*

Apply hot fomentations to the epigastrium and right hypochondrium. Give the patient a hypodermic injection of morphia, and allow him to inhale a little chloroform until the morphia begins to take effect. When the colic has been relieved, attend, either medically or surgically, to the calculi.

*Give the Clinical Features of a Stone in the Cystic Duct.*

1. Attacks of biliary colic with the pain shooting towards the right shoulder.
2. Tenderness over the gall-bladder, *i.e.* over the tip of the ninth rib on the right side.
3. Naunyn's sign is present. To elicit this, press the fingers over the gall-bladder, and ask the patient to take a deep breath—inspiration is suddenly checked.
4. Transient and slight attacks of jaundice.
5. Distended gall-bladder; in old-standing cases the gall-bladder is often contracted.



*What are the Clinical Features of a Stone in the Common Bile Duct?*

1. Attacks of biliary colic, with the pain shooting through to the back.
2. Tenderness over an area midway between the umbilicus and the ensiform cartilage.
3. Absence of Naunyn's sign.
4. Persistent jaundice, intensified after each attack of colic.
5. Contracted gall-bladder.
6. Intermittent feverish attacks with rigors, and loss of weight and strength.
7. The "pancreatic reaction" is often present.
8. An excess of total unabsorbed fat in the stools.
9. Stercobilin is present in the fæces.

*What is Courvoisier's Law?*

In cases of chronic jaundice, due to obstruction of the common bile-duct, a contracted gall-bladder signifies that the obstruction is due to stone; a dilatation of the gall-bladder, that the obstruction is due to causes other than stone.

*What is meant by the Term Cholangitis?*

A septic catarrhal inflammation of the common bile-duct, resulting from (a) a biliary calculus; (b) hydatid disease; (c) ascarides, or (d) cancer of the bile-ducts. The epithelium of the duct necroses in patches, leaving small ulcers. In advanced cases perforation may occur, and the stone may escape into either the peritoneal cavity, or into a mass of peritoneal adhesions.

*Give the Symptoms and Treatment.*

1. Progressive enlargement of the whole liver—smooth and tender.
2. Persistent jaundice.
3. Ague-like attacks (rigors, sweating, etc.).
4. Rapid loss of flesh and strength.

The cause should be treated if possible. Urotropin is a useful drug.



*What are the Clinical Features of a Stone impacted in Vater's Ampulla?*

In this case, in addition to the obstruction of the flow of bile, there will be an absence of pancreatic juice. The fæces will be—

- (a) Acid in reaction.
- (b) Bulky, greasy, and offensive in odour.
- (c) Contain a large quantity of undigested fat.
- (d) Contain fragments of undigested muscle fibre (recognised by microscope).

*Describe Cancer of the Gall-Bladder.*

Cancer of the gall-bladder usually follows the prolonged irritation of biliary calculi. It is a columnar-celled carcinoma. The chief clinical features are—

- (a) A rapidly-growing swelling beneath the right costal margin.
- (b) Paroxysmal pain radiating towards the right scapular region; the pain is usually much worse during the night.
- (c) The tumour descends when the patient takes a deep inspiration.
- (d) The swelling feels intensely hard; it is **not tender on palpation**.
- (e) Stercobilin is present in the fæces.
- (f) Ascites may develop in advanced stages.

*Give the Features of a Distended Gall-Bladder.*

Distension of the gall-bladder leads to the formation of a smooth rounded swelling in the right hypochondrium, in the vicinity of the ninth costal cartilage, and along the outer edge of the right rectus muscle. It accompanies the liver in its respiratory movements. The distension may be due to either (a) pus, (b) mucus, (c) bile, (d) calculi, or (e) malignant disease. If untreated, distension may result in ulceration or perforation of the gall-bladder, the contents escaping into the peritoneal cavity. In such a case, unless the bile is sterile septic peritonitis will follow. When the contents of the



gall-bladder are purulent, the term **empyema of the gall-bladder** is used. The treatment is either to drain the bladder, **CHOLECYSTOSTOMY**, or to excise it entirely, **CHOLECYSTECTOMY**.

*What have Tumours of the Gall-Bladder to be distinguished from ?*

1. Movable right kidney.
2. A right renal or suprarenal tumour.
3. Tumour of hepatic flexure or transverse colon.
4. Tumour of liver.
5. Tumour of pylorus.
6. An abnormal lobe of the liver.

*Describe Catarrh of the Gall-Bladder, not due to Calculi.*

This may follow either, (a) chronic constipation and accumulation of fæces in the hepatic flexure of the colon, or (b) a movable right kidney causing kinking of the bile-ducts. It is diagnosed from calculous disease because—

1. Biliary colic is very slight.
2. The gall-bladder is only slightly distended, and is *not tender on palpation*.
3. No stones are passed after the attacks of biliary colic.

## THE PANCREAS.

*Describe Inflammation of the Pancreas.*

Three varieties of pancreatitis may be met with—acute, sub-acute, and chronic. They are all due to some septic process, the bacteria reaching the pancreas by extension along the duct of Wirsung, or through the blood-stream, or directly from the penetration of a gastric ulcer. Cholecystitis (inflammation of the gall-bladder) and cholangitis (inflammation of the common bile-duct), or gastro-duodenal catarrh, usually precede the pancreatitis.



*Give the Clinical Features of Acute Pancreatitis.*

The signs and symptoms of acute pancreatitis closely resemble those of a perforated gastric or duodenal ulcer, or of acute intestinal obstruction.

1. Sudden attack of agonising pain in the epigastric region.
2. Marked tenderness in the epigastrium.
3. Persistent vomiting.
4. Elevated temperature.
5. Distension of the abdomen above the umbilicus.
6. Collapse.
7. Often rigidity of the upper segments of the recti muscles.

Death commonly occurs on the third or fourth day. On post-mortem examination **fat necrosis** is usually found.

“Acute pancreatitis is to be suspected when a previously healthy person or sufferer from occasional attacks of indigestion is suddenly seized with violent pain in the epigastrium, followed by vomiting and collapse, and in the course of twenty-four hours, by a circumscribed epigastric swelling, tympanitic or resistant, with slight rise of temperature” (Fitz).

*Describe the Pathology of Fat Necrosis.*

Fat necrosis mainly occurs in the sub-peritoneal fat in the neighbourhood of the pancreas. The inflammation of the pancreas leads to a certain amount of leakage of the fat-splitting ferment, *steapsin*, which converts the fat into crystalline fatty acids and glycerin. Calcium salts unite with the fatty acids to form white, opaque, glistening areas. The glycerin is ultimately absorbed.

*What are the Symptoms and Signs of Sub-Acute Pancreatitis?*

After an illness of two or three days' duration, suppuration occurs in the gland, and one or more abscesses form. The features are—

1. Irregular temperature.
2. Fever of a hectic type.



3. Asthenia and loss of weight.
4. Marked diarrhoea.
5. Fœtid stools containing pus.

*Give the Treatment of Sub-Acute Pancreatitis.*

Expose the pancreas by an incision in the middle line above the umbilicus, afterwards incising the gastro-colic omentum. As far as possible, remove all necrotic tissue, draining through the loin with a tube and gauze. Drainage of the biliary passages, by means of cholecystostomy, is a very useful adjunct.

*What is the Pathology of Chronic Pancreatitis?*

Chronic pancreatitis is brought about by a hyperplasia of the interlobular or the periacinar connective tissue of the organ. The disease may terminate in cirrhosis. The head of the gland is the part most frequently affected. It is swollen, hard to the touch, and distinctly lobulated. Chronic pancreatitis is usually secondary to a biliary calculus obstructing the outflow of the pancreatic juice. It may, however, follow gastric and duodenal catarrh or ulceration.

*Mention the Clinical Features.*

1. Anorexia.
  2. Progressive loss of weight.
  3. Gastric derangements, *e.g.* flatulence, heartburn, etc.
  4. Fæces are bulky, greasy ("butter") stools, and offensive in the late stages.
  5. Fæces are **acid** in reaction.
  6. Absence of trypsin in the stools.
  7. Fulness in upper part of abdomen.
- And when following gall-stones—**
8. Jaundice.
  9. Contracted gall-bladder.
  10. Tenderness in epigastrium.
  11. Attacks of pain shooting towards the **left** side.

*Give the Treatment of Chronic Pancreatitis.*

The palliative measures are—

- (a) Daily small doses of calomel.
- (b) Milk-curdling ferments along with the food.
- (c) A course of Carlsbad treatment.

Surgically, the operation of cholecystostomy is indicated. Any calculi present must be removed.

*Describe Malignant Disease of the Pancreas.*

Malignant disease of the pancreas usually affects the head of the viscus. It is a carcinoma arising from either (a) the glandular epithelium, (b) the epithelium of the pancreatic ducts, or (c) the islets of Langerhans. The cancer begins after the age of forty, and grows very insidiously.

*Give the Clinical Features.*

Robson and Cammidge describe the following symptoms:—

- (1) The onset is gradual and painless, and is preceded by a general failure of health.
- (2) When jaundice comes on it is absolute and unvarying.
- (3) The gall-bladder is usually distended.
- (4) The liver is enlarged from biliary stasis; it is **not nodular**.
- (5) The fæces are acid in reaction.
- (6) The fæces contain a large quantity of unabsorbed fat.
- (7) Absence of stercobilin.
- (8) Often occult blood in the stools.
- (9) The “pancreatic-reaction” is usually negative.
- (10) A rapid loss of weight.
- (11) Progressive anæmia.
- (12) A sub-normal temperature, and a slow, feeble pulse.
- (13) In later stages, ascites and œdema of the feet.

*Classify Cysts of the Pancreas.*

A.—FALSE OR TRAUMATIC.

B.—TRUE. { (a) Retention.  
(b) Inflammatory.  
(c) Adenomatous.



*Describe False Cysts.*

False cysts follow trauma of the upper part of the abdomen. They are collections of fluid in the lesser peritoneal sac. The contents are turbid, brownish in colour, and give an alkaline reaction.

*Describe True Cysts.*

True cysts are either unilocular or multilocular. They may rupture into the lesser sac, and thus simulate false cysts.

*Mention the Clinical Features of Pancreatic Cysts.*

1. A rounded, fluctuating swelling, which is slightly movable.

2. It is situated immediately above the umbilicus, to one or other side of the middle line.

3. On percussion, a central area of dulness, with a zone of resonance around. This feature is only present when the cyst is between the stomach and the transverse colon.

4. The cyst may be found in one of three positions—

(a) Between the stomach and the transverse colon.

(b) Between the stomach and the liver.

(c) Behind the transverse colon.

5. Pressure symptoms on stomach, diaphragm, transverse colon, or common bile-duct.

6. Marked loss of weight.

*What is the Treatment?*

Expose the cyst by a vertical incision in the middle line above the umbilicus. Suture the cyst wall to the parietal peritoneum. Remove the contents with a trocar and cannula. Drain the cyst through an incision in the left loin.

## THE SPLEEN.

### *Describe Rupture of the Spleen.*

The spleen is frequently ruptured from severe violence applied to the left hypochondrium; often the stomach and the adjacent costal wall are damaged at the same time. In individuals who have suffered from malaria, the spleen may be ruptured from very slight violence.

### *Give the Signs and Symptoms of Rupture.*

The clinical features will be those of any ruptured viscus—

- (a) Marked shock.
- (b) Cramp-like abdominal pains.
- (c) Signs of internal hæmorrhage.
- (d) Dulness gradually developing on the left side of the abdomen.
- (e) An increase in the splenic dulness.

### *What is the Treatment?*

An immediate laparotomy should be undertaken. Control the hæmorrhage by digitally compressing the splenic pedicle. In simple rupture, close the rent by deep catgut sutures; in extensive lacerations, remove the spleen.—SPLENECTOMY.

### *Describe a Movable Spleen.*

A movable or displaced spleen generally occurs in women suffering from enteroptosis (Glenard's disease). The organ is usually completely prolapsed below the costal margin; in advanced cases it has been recognised in the pelvis, and mistaken for an ovarian tumour. In the majority of instances the spleen is enlarged. Attacks of perisplenitis may fix the viscus in an abnormal situation.

### *What are the Clinical Features?*

Usually the patient complains of—

- (a) Dragging, uneasy pains on the left side.
- (b) Neurasthenic symptoms.



- (c) Violent pain, swelling of the left flank, and marked rise of temperature indicate torsion of the pedicle. Necrosis then generally results.

The spleen can be identified by its shape, and by its notched anterior margin.

*Give the Treatment.*

When the symptoms of torsion of the pedicle arise, a laparotomy should be performed, and the organ excised. In mild cases, with vague neurasthenic symptoms, a suitable belt can be worn. Failing this, splenopexy, or even splenectomy should be performed.

*Describe Abscess of the Spleen.*

Abscess of the spleen is the result of a septic infarction following either (a) ulcerative endocarditis, (b) typhoid fever, or (c) pyæmia. The patient complains of pain in the left hypochondrium and epigastrium, slight enlargement of the spleen, and tenderness on pressure over the organ. A well-marked peritoneal friction-rub may be heard (Osler). The spleen should be exposed and removed.





# SURGERY.

## PART V.

---

### DISEASES OF MUSCLES.

#### *Describe Rupture of Muscle.*

A muscle usually ruptures at the junction of its muscular and tendinous elements. The accident follows a sudden movement of the antagonistic muscles, these contracting before the muscle which undergoes injury has finished its movement. In such long muscles as the biceps and sartorius, a considerable gap may form between the torn ends. The ruptured muscle is generally repaired by fibrous tissue, if, however, the ends are brought together, new muscular fibres form the bond of union. It is interesting to note that the severe muscular spasms accompanying tetanus and epilepsy are rarely followed by rupture.

#### *Mention the Commonest Muscles Ruptured.*

1. The *abdominal muscles* in vomiting.
2. The *tendo Achilles* in jumping.
3. The *biceps flexor cubiti* in fencing.
4. The *adductor longus* in riding, when the horse swerves.
5. The *plantaris* in boxing or dancing.

#### *Give the Signs and Symptoms of a Ruptured Muscle.*

The following will be noticed:—

- (a) A distinct history of something having suddenly snapped and accompanied by severe pain.

- (b) Inability to use the limb.
- (c) Swelling and marked tenderness at the site of injury.
- (d) Ecchymosis may be present.
- (e) As the exudate is absorbed, a gap may be distinguished between the torn extremities of the muscle.

### *What is the Treatment?*

Endeavour to secure approximation of the divided ends by relaxing the muscle, and by supporting the limb in such a fashion that no strain is put upon the muscle. Get rid of the swelling by daily gentle massage.

In severe cases it will be necessary to make an incision over the muscle, and stitch the ends together with catgut.

### *Describe Atrophy of Muscle.*

Two separate varieties are found, (a) atrophy from loss of nerve-control (neuropathic atrophy), and (b) muscular atrophy in joint disease. In the former case the atrophy is associated with a certain amount of fatty degeneration. As the muscle fibres shrink the intermuscular connective tissue increases. The reaction of degeneration occurs in the muscle.

In the muscular atrophy associated with joint disease the extensors are more involved than the flexors. They exhibit a diminished excitability to the faradic current.

### *Describe Fibrositis.*

Fibrositis (formerly called "muscular rheumatism") affects the sheaths of muscles, aponeuroses of muscles, ligaments, periosteum, and nerve sheaths. It most commonly occurs in those subject to gout and rheumatism. The chief varieties are—

CERVICAL—or "stiff-neck."

LUMBO-SACRAL—or "lumbago."

INTERCOSTAL—or "pleurodynia."

In all these varieties the patient complains of marked pain on attempting to move the affected muscle, and of tenderness over the diseased area.



*How is Fibrositis treated?*

Correct any disorders of the stomach, bowels, or kidneys. The chief drugs to be relied upon for the fibrositis are aspirin, followed by large doses of potassium iodide. Active hyperæmia and massage will prove beneficial.

*Describe Myositis Ossificans.*

Ossification in muscle may follow either disease or trauma. The diseases associated with this condition are anthritis deformans and Charcot's affection of joints. The chief muscles which ossify from trauma are—(a) the quadriceps extensor; (b) the brachialis anticus; (c) the origin of the adductor longus ("rider's bone"); the insertion of the iliopsoas, and the pectoralis major ("drill-bone").

A rare disease, *progressive ossifying myositis*, sometimes occurs in young males. Usually commencing in the muscles of the back, the morbid process gradually involves all the muscles of the body. Hallux valgus generally accompanies the condition.

*Describe Ischæmic Contracture.*

Ischæmic or Volkmann's contracture is brought about by any interference with the vascular supply to the muscles and usually follows fractures in the vicinity of the elbow, when the joint has been acutely flexed. It is an acute interstitial myositis resulting in sclerosis, which has for a sequel, contraction of the flexors of the forearm and hand. At first the fingers are slightly flexed, and venous congestion is noticed; the affected muscles have a stone-like hardness. Later, a claw-hand deformity often develops, and the hand may be pronated. The muscles are shrunk and wasted, and often show the reaction of degeneration. Ischæmic neuritis of the ulnar and median nerves may accompany the condition.

The treatment should be massage, galvanism, and correction of the deformity by means of suitable splints.



*What are the Varieties of Myositis?*

- (a) Pyogenic.
- (b) Typhoidal—often go on to abscess formation.
- (c) Gonorrhœal—rarely suppurates.
- (d) Syphilitic—secondary or tertiary.
- (e) Tubercular—primary, secondary, or extension from adjacent parts.

## RECTUM AND ANAL CANAL.

*Describe Pruritis Ani.*

Pruritis of the anus is brought about by local irritation, especially eczema, pediculi, oxyuris vermicularis, and hæmorrhoids. It may also be secondary to pruritis vulvæ.

The condition causes great discomfort and annoyance, especially at night.

The treatment consists in removing any local cause, keeping the parts clean, and applying soothing and astringent ointments. If these measures fail, Ball's operation should be performed. This consists in severing the cutaneous nerves supplying the perianal integument.

*Give the Etiology of Acute Proctitis.*

1. The presence of a foreign body.
2. Hæmorrhoids.
3. Stricture.
4. Dysentery.
5. Trauma, either from within or without.
6. Gonorrhœa, especially in females.
7. Syphilis.

*What are the Signs and Symptoms?*

- (a) Severe burning pain and tenesmus.
- (b) Acrid discharge from the anus.
- (c) Passage of bloody stools containing a large quantity of mucus.



- (d) Reflex irritation of the bladder.
- (e) On digital examination, the lower part of the bowel is greatly injected and hot to the touch.
- (f) Marked constitutional symptoms.

*Give the Treatment.*

Deal with the cause as far as is possible. If dysentery is present, large doses of ipecacuanha or emetine will be beneficial. The gonorrhœal variety should be treated like gonorrhœal vaginitis. In all cases hot hip-baths and enemata of hot boracic lotion give considerable relief. Morphia suppositories may be necessary. Locally the mucous membrane should be swabbed with a 2 per cent. solution of  $\text{AgNO}_3$ .

Keep the patient in bed with the pelvis elevated so as to lessen the venous congestion, and give slop food in small quantities.

*Describe Anal Fissure.*

An anal fissure is a small crack in the mucous membrane partially concealed within the anal folds. It may only implicate the mucous membrane, or may burrow so deeply as to involve the external sphincter. The fissure occurs in the lower part of the anal canal, rarely extending upwards beyond the white line of Hilton. The condition is more common in females than in males, and is usually found in adults. In outline the ulcer is pear-shaped with the base downwards, and the lower end is generally guarded by an œdematous fleshy tag resulting from a torn anal valve—the sentinel pile of Brodie. When recent, the fissure is of a florid colour and elastic; in old cases it is grey and indurated.

*What is the Etiology?*

1. The fissure may follow polypi or hæmorrhoids.
2. Chronic constipation (Ball's theory)—a hard fæcal mass tearing one of the anal valves.
3. Parturition—the ulcer is situated upon the anterior wall of the bowel.
4. In children it is due to congenital syphilis.



*Give the Signs and Symptoms.*

The patient complains of agonising pain *during* defæcation and *after* the act. The pain may be reflected down the thighs, simulating sciatica; reflex increase of micturition often occurs. A little blood is usually passed with the motions. The general health deteriorates.

On examination, it will be found that the anal orifice is firmly closed and puckered (a very suggestive sign), and an anæsthetic will be necessary previous to any digital exploration. The edges of the ulcer are raised and hard, the fissure feeling like a "button-hole."

An aching, long-continued pain indicates that the external sphincter muscle has been eroded by the ulcer.

*How would you treat Anal Fissure?*

In slight cases the introduction of an emollient previous to defæcation, together with the taking of laxatives, will cure the patient. When, however, the fissure has been neglected, operative measures are necessary. The anal orifice is fully dilated by stretching the external sphincter; the sentinel pile is removed, the ulcer scraped with a sharp spoon, and the external sphincter divided by an incision through the base of the ulcer. Subsequently the bowels should be kept at rest for a few days, by means of morphia suppositories.

*Describe Prolapse of the Rectum.*

Two varieties occur, namely (a) *incomplete*, where only the mucous membrane is protruded, and (b) *complete* (**Procidentia Recti**), where all the coats of the bowel take part in the prolapse.

Normally during defæcation the anal mucous membrane is everted, and when this becomes exaggerated, prolapse is induced. Rectal prolapse is most apt to take place at the extremes of life, as at these periods the pelvic diaphragm is naturally weak and lax. In children, the protrusion is generally of the incomplete variety; in adults, procidentia is the commoner condition.



In order to bring about prolapse, two factors are necessary, (a) long-continued straining, and (b) weakness of the pelvic floor.

*Give the Common Causes of Prolapse.*

1. Constipation or diarrhoea.
2. Phimosi.
3. Vesical or urethral calculus.
4. Enlarged prostate.
5. Stricture of urethra.
6. *Oxyuris vermicularis*.
7. Rectal polypi.
8. Hæmorrhoids.

In females, repeated pregnancies may materially weaken the pelvic floor, and thus act as an important predisposing cause.

*What are the Clinical Features of Prolapse?*

At first the prolapse is only slight, occurs during defæcation, and returns spontaneously. Later, as it becomes larger, it may protrude independently of defæcation and require digital reduction.

The anal orifice is patulous owing to the stretching of the external sphincter. In old-standing cases the protruded segment becomes covered with stratified epithelium, and is very liable to undergo ulceration.

*What must a Rectal Prolapse be diagnosed from?*

An intussusception protruding from the anus must not be confused with prolapse. The chief points of difference are (a) in prolapse the mucous membrane of the swelling is continuous with the perianal skin; and (b) in intussusception the surgeon's finger can be introduced along the side of the swelling into the cavity of the rectum.

The clinical features of intussusception are such that no confusion should arise in differentiating between the two conditions.



*Give the Treatment of Prolapse in Children.*

The condition usually yields to non-operative treatment. Return the prolapse by gently pushing it back. In large swellings reduce the central part first. To prevent re-displacement, strap together the nates with a broad piece of adhesive plaster.

With regard to the after-treatment, it is essential to avoid constipation, and to persuade the child to defæcate when lying upon the back or side.

After reduction seek the cause of the prolapse and deal with it.

*What is the Treatment in Adults?*

Operative measures are necessary in adult patients. The following operations are practised :—

1. Removal of a wedge-shaped area from the posterior part of the prolapse. The resulting gap is obliterated with catgut stiches.
2. Amputation of the prolapse.
3. Colopexy, *i.e.* anchoring the pelvic colon to the parietal wall of the pelvis.
4. Proctorraphy, followed by proctopexy. The rectum is first narrowed by a series of tucks, and is then stitched to the sacro-sciatic ligaments.

(For details of these procedures, see *Operative Surgery*, Part III).

## HÆMORRHOIDS OR PILES.

*Why are the Hæmorrhoidal Veins so liable to become Varicose?*

The main anatomical facts leading to the production of hæmorrhoids are :—

- (a) The stagnant circulation in the hæmorrhoidal plexus.
- (b) The dependent position of the veins.
- (c) The absence of valves in the portal system, hence any congestion causes distention of the hæmorrhoidal veins.



- (d) The veins are embedded in a lax submucous tissue.
- (e) The passage of the superior hæmorrhoidal veins through the muscular layer of the rectum.
- (f) The frequent distention of the ampulla with fæcal contents materially retards the venous return.

*Describe the Morbid Anatomy of an Internal Pile.*

An internal pile consists of a number of dilated venules, matted together by a variable amount of connective tissue, and covered by mucous membrane. In many cases small arteries can be detected coursing through the connective tissue.

*Give the Morbid Anatomy of an External Pile.*

External piles are either (a) hypertrophied tags of integument, "dog-ear" piles, or (b) dilated perianal veins (tributaries of the inferior hæmorrhoidal), or (c) small hæmatoma in the perianal connective tissue; the latter are caused by the rupture of a small perianal vein. All external piles are covered by skin.

*What are the Clinical Features of Internal Piles?*

1. Hæmorrhage, during or after defæcation.
2. Pain and discomfort; the pain is not very severe unless the pile undergoes strangulation.
3. Reflex aching pains in the lumbar region and down the back of the thighs—this may simulate sciatica.
4. Tenesmus may be present.
5. The piles are frequently protruded during defæcation, and the patient suffers considerable pain until they are returned to the bowel.

*What are the Clinical Features of External Piles?*

Unless a perianal vein ruptures or thromboses, external piles merely lead to discomfort. The thrombosis is preceded by phlebitis, probably due to the bacillus coli communis entering through a small skin abrasion. Acute



symptoms arise which the patient describes as an "attack of the piles." The pile becomes swollen, hard, and extremely tender; sitting or defæcation is almost impossible. The temperature is usually elevated, and general malaise complained of. Suppuration often results, causing a perianal abscess.

*How may Internal Piles be Treated?*

Either palliative or operative measures can be adopted. Palliative treatment consists in—

- (a) Endeavouring to remove the cause of the hæmorrhoidal varicosity; in the majority of cases a torpid liver or chronic constipation will need attention.
- (b) Teaching the patient to train his bowels to move every evening before retiring to bed.
- (c) Avoiding alcohol.
- (d) Keeping the anal integument clean by frequent sponging with cold water and non-irritating soap.
- (e) Applying soothing and astringent ointments. Ball's formula is :—

R Morph. acetat., gr. v.  
 Tannin  
 Ext. Belladon, āā. ʒ ss.  
 Vaseline  
 Lanolin, āā. ʒ ss.

*Mention the Chief Operations for Internal Piles.*

- 1. Ligature.
- 2. Excision.
- 3. Clamp and cautery.
- 4. Removal of the pile-bearing area — Whitehead's operation.

*Describe the Method of Ligature.*

After placing the patient in the lithotomy position and digitally dilating his anal sphincters, seize each pile with strong crushing forceps and pull it inwards towards the centre of the bowel. With scissors snip through the



mucous membrane of the base of the pile. Pass a strong catgut ligature round the groove where the mucous membrane has been divided, and tie the ligature tightly. When the pedicle is broad an alternative to this procedure is to transfix the base of the pile with the ligature and apply a "Staffordshire" knot. Tie all the piles in a like fashion, then cut away the distal portions of the piles. Dust the field of operation with iodoform, introduce a  $\frac{1}{4}$ -grain morphia and bismuth suppository into the bowel, and fix a gauze dressing smeared with vaselin.

*Describe the Method of Excision.*

This is known as Mitchell's operation. Dilate the anal sphincters as before, then seize the base of each pile with a pair of Kocher's artery forceps applied in the long axis of the bowel, and cut away the distal segment of the pile. Now pass a continuous catgut ligature through the connective tissue round the base of the pile, and as it is tightened, the forceps are removed. The subsequent treatment is the same as that after ligature.

*Describe the Method of Clamp and Cautery.*

This operation can be adopted when the piles are very inflamed and friable. With forceps pull each pile gently downwards, and apply the clamp to the base of the pile. Crush the pile by screwing up the clamp, and scar the redundant portion with the cautery (heated to dull red). The after-treatment is similar to that mentioned above.

*Describe Whitehead's Operation.*

In Whitehead's operation the whole of the pile-bearing area of mucous membrane is excised. The main objections to it are: (a) it is a very severe operation owing to the abundant hæmorrhage, and (b) it is apt to lead to stricture of the anal canal. The chief advantage of Whitehead's method is, that there is no possible chance of recurrence of the condition.

As before, place the patient in the lithotomy position and dilate the anal canal. Divide the muco-cutaneous junction



throughout half the circumference of the bowel, and by blunt dissection separate the varicose tissue. Gradually draw down the mucous membrane, and divide the corresponding half transversely immediately above the pile-bearing area. Next it is fixed with interrupted chromic gut stitches to the anal margin. Lastly perform the same operation upon the remaining half of the circumference of the bowel. The after-treatment is similar to that described for the other hæmorrhoid operations.

*What is the Treatment for External Piles.*

Palliative measures consist in placing the patient in bed, administering a gentle purge, and applying hot fomentations, or soothing ointments, as the case may be, to the anal region.

Operative procedures may be required, such as snipping off any hypertrophied tags of skin, or making incisions over thrombotic piles and removing the clots.

## ABSCESSSES OF THE RECTUM.

*How may Abscesses of the Rectum be Classified?*

1. Ischio-rectal.
2. Pelvi-rectal.
3. Submucous.
4. Perianal { Follicular.  
Marginal.

*Describe an Ischio-rectal Abscess.*

Abscess in this region generally follows trauma or ulceration of the rectal mucosa. It may result from direct puncture of the bowel or may be secondary to suppuration. In the latter case pus reaches the ischio-rectal fossa by passing between the levator ani and the sphincters. Sometimes the abscess is due to tears of the perianal skin which have become septic. A chronic form of ischio-rectal abscess is caused by tubercle bacilli, the organisms lodging in the anal crypts. Suppuration occurs in the crypts, the resulting pus travelling into the ischio-rectal fossa.



*Give the Clinical Features of Ischio-rectal Abscess.*

1. Pyrexia, more or less severe.
2. Great pain, increased on defæcation.
3. Bladder trouble, such as irritability, strangury, or even retention.
4. A tense swelling on the lateral aspect of the anus.
5. Fluctuation can be detected in the swelling.

*In what Directions can Pus spread from an Ischio-rectal Abscess?*

1. Into the rectum, causing an **internal rectal sinus**, the opening being near the muco-cutaneous junction.
2. On to the skin surface, leading to an **external rectal sinus**.
3. Into the rectum and also on to the skin surface—a **fistula-in-ano**.
4. Round to the opposite ischio-rectal fossa—a **horse-shoe sinus**.

*What is the Treatment of an Ischio-rectal Abscess?*

Give a general anæsthetic and make an incision over the most prominent part of the swelling; the incision should radiate from the anal orifice. Open up the abscess thoroughly and curette it. Dust with iodoform and introduce a gauze dressing. Dress the wound twice daily until it granulates. Avoid urinary and faecal contamination.

*Describe Pelvi-rectal Abscesses.*

Pelvi-rectal abscesses occupy the space between the levator ani muscle and the longitudinal muscular tunic of the rectum. They may result from suppuration in—

- (a) Bladder or prostate.
- (b) Broad ligament, uterus, or Fallopian tubes.
- (c) Pott's disease in lower part of spine.
- (d) Vermiform appendix.
- (e) Sacro-iliac disease.
- (f) Inflammation in anterior wall of rectum.
- (g) Psoas abscesses.



The clinical features resemble those of pelvic cellulitis or of an ischio-rectal abscess.

*Describe a Submucous Abscess.*

A submucous abscess generally follows small abrasions of the rectal mucous membrane, such foreign bodies as fish bones being specially liable to tear the mucosa. The symptoms are very similar to those of an ischio-rectal abscess. On making a digital examination the situation of the abscess can be readily identified.

*Describe Perianal Abscesses.*

The term "subcutaneous" is often applied to these abscesses. The follicular variety arises in the sebaceous glands which are so numerous in the perianal region. Clinically, follicular abscesses resemble boils. Marginal abscesses occur as a complication of rectal sinuses or of hæmorrhoids; they are single, and often burrow towards the bowel.

*Give the Clinical Features of Perianal Abscesses.*

1. Slight rise of temperature, but no rigor.
2. Throbbing pain in the vicinity of the abscess.
3. Pain on defæcation (the follicular variety are an exception).
4. Pain on walking or sitting.
5. The presence of a red, tender swelling.

*What is the Treatment?*

Superficial abscesses are best treated by the injection of pure carbolic acid or ichthyol. This treatment should not be applied to marginal abscesses. Open a marginal abscess early or a sinus may result.

## FISTULA-IN-ANO.

*Describe Fistula-in-ano.*

Fistula-in-ano, either complete or incomplete, arises from a chronic abscess in the region of the rectum. It is fre-



quently of tubercular origin. The complete fistula most commonly follows an ischio-rectal abscess which has burrowed through the rectal mucosa and also opened upon the skin surface. Incomplete varieties are two in number: (a) *internal rectal sinus* (blind internal fistula), and (b) *external rectal sinus* (blind external fistula).

*What Factors prevent a Fistula-in-Ano from closing spontaneously?*

- (a) Want of rest.
- (b) Infection from the abscess or bowel.
- (c) Epithelialisation of the fistula.
- (d) Tortuosity of the narrow track ; hence—
- (e) Imperfect drainage.
- (f) A more or less constant discharge.

*Give the Clinical Features.*

The patient frequently complains of piles. He has pain and discomfort in the perineum, the pain being specially bad during defæcation. A slightly blood-stained discharge, often with a fæcal odour, escapes from the external orifice of the fistula. On examination, the external opening will be found near the anus. It is commonly surrounded with one or two reddish granulations. Carefully introduce a probe into the orifice, and, with the aid of a rectal speculum, search for the internal or mucous opening. It is usually situated a little more than an inch from the anal margin.

*What is the Treatment?*

A. INTERNAL RECTAL SINUS.—(a) *If below the internal sphincter.*—Pass a probe along its track on to the skin surface, *i.e.* convert the sinus into a complete fistula ; then slit it up.

(b) *If through or above the internal sphincter.*—Complete the fistula, but do NOT slit it up.

In each case subsequently pack the external orifice with gauze.



*B. EXTERNAL RECTAL SINUS.*—(a) *When superficial to the internal sphincter.*—Convert into a complete fistula.

(b) *When it passes above the internal sphincter.*—Enlarge the external opening, scrape thoroughly and pack with gauze.

*C. COMPLETE FISTULA.*—Pass a probe along the fistula from the external orifice; bend the probe so that the end can be withdrawn through the anus. Take a curved probe-pointed bistoury, and divide the tissues between the probe and the surface. Scrape thoroughly, apply pure carbolic acid, and pack with iodoform gauze or worsted.

## TUMOURS.

*Classify Tumours of the Rectum and Anus.*

|                     |   |                   |   |                  |
|---------------------|---|-------------------|---|------------------|
| <i>A. Benign</i>    | { | Adenoma           | { | Single.          |
|                     |   | Fibroma.          |   | Multiple (rare). |
|                     |   | Papilloma.        |   |                  |
| <i>B. Malignant</i> | { | Rectal sarcoma.   |   |                  |
|                     |   | Rectal carcinoma. |   |                  |
|                     |   | Anal epithelioma. |   |                  |

*Describe Adenoma of the Rectum.*

This is the most common innocent tumour which occurs in the bowel. It arises from the epithelium of the glands of the rectal mucosa. It is soft in consistence, and with a colour and appearance like a raspberry. When it first originates, the tumour is sessile, then because of the constant rectal straining, a pedicle develops (**rectal polypus**).

*Describe Fibroma of the Rectum.*

A fibroma arises from the organisation of a thrombosed internal pile; in reality, therefore, it is a localised fibro-



matosis, not a tumour. Somewhat pear-shaped in outline, it is about the size of a hen's egg.

*Describe Papilloma of the Rectum.*

A sessile tumour, red in colour and covered with villous processes; it often resembles a villous papilloma of the bladder.

*Give the Clinical Features of Benign Tumours of the Rectum.*

- (a) Rectal irritability.
- (b) Tenesmus.
- (c) A discharge of blood-stained mucus.
- (d) Rarely actual pain, unless an anal fissure is also present.

Examine the rectum digitally and also with the speculum.

*What is the Treatment?*

First stretch the sphincters, and then for—

POLYPUS OR FIBROMA . . . . . Ligate the pedicle and remove the tumour.

MULTIPLE ADENOMATA . . . . . Curette the affected portion of the bowel.

PAPILLOMATA . . . . . Excise the tumour along with its mucous membrane.

*Describe Sarcoma of the Rectum.*

A rare tumour springing from the submucous tissue of the anal canal, and extending upwards to the rectal ampulla. Clinically it closely resembles carcinoma. The glands are early affected—inguinal, sacral, and lumbar.

The treatment is similar to that for rectal carcinoma.

*Describe Epithelioma of the Anus.*

It arises in the vicinity of the white line of Hilton as a warty thickening of the epithelium. It is covered with dry crusts of mucus and debris. The tumour grows slowly and



affects the inguinal and subinguinal glands. Agonising pain is complained of; hæmorrhage is scanty but offensive. The treatment consists in excising the anal canal freely, and subsequently (the perineal operation of Lisfranc), dissecting away the glands in the inguinal region.

*Give the Pathology of Rectal Carcinoma.*

The tumour is of the columnar-celled or malignant adenoma variety, and generally occurs after middle life. At first it is covered with normal mucous membrane, but subsequently this is destroyed by ulceration, and the cancer presents a fungating mass projecting into the interior of the rectum. Sometimes the tumour extends round the circumference of the bowel, infiltrating all the coats and forming adhesions to neighbouring viscera, *e.g.* to the bladder, prostate, vesiculæ seminales, uterus and vagina. The ano-rectal lymph glands are affected, then the sacral and meso-colic, ultimately reaching the left lumbar chain of glands. Secondary growths are most commonly found in the liver.

*Give the Clinical Features.*

It is highly important to remember that at first the disease is very insidious. Perhaps a complaint of flatulency and a little uneasiness about the rectum and anus. As the cancer progresses the sacral nerves are involved, and sciatica results. Pain during defæcation, blood in the stools, constipation alternately with diarrhœa, and a slimy, mucous, blood-stained discharge are generally present. Pipe-stem-like stools are often found. When the cancer is situated low down in the bowel, multiple fistulæ frequently form.

The rectum must be examined digitally and also with a speculum.

*What is the Treatment?*

Unless treated the disease usually kills the patient within two years of its commencement. The radical operation (see *Operative Surgery*, Part III.) should be performed, unless—

1. The rectum is firmly attached to the surrounding viscera.



2. Secondary growths have formed in the liver or elsewhere.

3. The carcinoma has spread beyond the bowel.

If the radical operation be contra-indicated, a colostomy should be done in the left inguinal region.

## STRICTURE OF THE RECTUM.

*What are the varieties of Stricture of the Rectum?*

- |                  |   |                                                                                       |
|------------------|---|---------------------------------------------------------------------------------------|
| A. NON-MALIGNANT | { | 1. Traumatic.<br>2. Gonorrhœal.<br>3. Tubercular.<br>4. Dysenteric.<br>5. Syphilitic. |
|------------------|---|---------------------------------------------------------------------------------------|

B.—MALIGNANT.

*What are the Pathological Changes in Non-malignant Stricture?*

The stricture is usually within three inches of the anal margin. It may assume any shape, though in the majority of cases tubercular and dysenteric strictures are irregular, while the syphilitic variety is annular, that is, it involves a narrow ring-like portion. Above the stricture, the bowel is laden with fæces, its mucous membrane studded with small ulcers, and its muscular tunic hypertrophied. Fistulæ often form below the stricture, and hæmorrhoids are a common complication. When the stricture occurs high up in the bowel, the muscular coat below is paralysed; gas and fæces collect, leading to "ballooning."

*Give the Clinical Features.*

Females are more commonly affected than males, and the young more frequently than the old. Difficulty in passing a motion combined with a little pain is generally the first sign. Later, attacks of obstinate constipation alternating with diarrhœa. A blood-stained mucous discharge may occur. The stools often become ribbon-shaped.

*How would you treat Stricture?*

- (a) Regulate the bowels and diminish the amount of solid food.
- (b) Gradual dilatation with bougies.
- (c) External proctotomy may be employed in large tubular strictures.
- (d) Excision of the affected portion of the rectum with end-to-end anastomosis is sometimes necessary.
- (e) Inguinal colostomy in old-standing cases complicated with cellulitis and fistulæ.

## ULCERS OF THE RECTUM.

*Describe Ulcers of the Rectum.*

Ulcers of the rectum are classified in a similar manner to strictures. The usual situations for the non-malignant varieties are:—

- A. TRAUMATIC . Posterior wall of anal canal and rectal ampulla.
- B. DYSENTERIC . Pelvic colon and upper part of rectum.
- C. TUBERCULAR . Anal crypts, *i.e.* just above the white line of Hilton.
- D. SYPHILITIC . Lower part of ampulla of rectum.

*Give the Clinical Features of Non-malignant Ulcer.*

Rectal ulcers, like strictures, are most commonly met with in women. The main features are—

1. Morning diarrhœa with passage of—
2. Thin, muco-purulent “coffee-ground” fæces.
3. Tenesmus and rectal discomfort.
4. Dull, aching pain in the sacral region.
5. Colicky pains in the abdomen.
6. Symptoms of stricture gradually supervene.



*What is the Treatment?*

1. Treat the cause constitutionally.
2. Keep the patient in bed.
3. Regulate the bowels with laxatives.
4. Forbid alcohol.
5. Scrape the ulcer and apply  $\text{AgNO}_3$ .
6. If these measures fail, forcibly stretch the external sphincter and excise the ulcer.

*What are the Chief Congenital Malformations of the Rectum and Anal Canal?*

The rectum and the upper part of the anal canal develop from the caudal portion of the hind-gut, *i.e.* the entodermal cloaca, while the lower area of the anal canal arises from the proctodæum or ectodermal cloaca, a shallow pit immediately in front of the tail-fold. The cloacal membrane separates the proctodæum from the hind-gut; normally it breaks down during the third month. By the subsequent ingrowth and fusion of two lateral folds, the entodermal cloaca is divided into two compartments:—a ventral one, the urogenital sinus, and a dorsal one, the rectum. The urogenital sinus forms the bladder and the upper part of the urethra in the male; in females it becomes the bladder, urethra, and vestibule of the vagina.

The main congenital malformations of the rectum and anal canal are:—

- (a) Absence of the anal canal.
- (b) Persistence of the cloaca membrane leading to imperforate anus.
- (c) Fistulæ between the rectum and some portion of the urogenital sinus.
- (d) Absence of the rectum, the pelvic colon ending blindly.

## HERNIA.

*What is an External Hernia ?*

An external hernia may be defined as being the protrusion of any of the contents of the abdomino-pelvic cavity through one of the walls bounding that cavity.

*Give the Chief Varieties of External Hernia.*

1. Inguinal.
2. Femoral.
3. Umbilical.
4. Ventral.
5. Lumbar.
6. Obturator.

*What are the Various Parts of a Hernia ?*

- A. SAC { *Upper end* = Neck.  
           { *Lower end* = Fundus.
- B. COVERINGS.
- C. CONTENTS.

The sac is formed from the parietal peritoneum, while the coverings consist of the remaining strata of the abdominal wall or thigh.

*Mention the Contents of a Hernia.*

1. Intestine (an **enterocele**).
2. Omentum (an **epiplocele**).
3. Bladder (a **cystocele**).
4. Meckel's diverticulum (a **Littre's hernia**).
5. Cæcum.
6. Testicle or ovary.

*What is a Richter's Hernia ?*

A Richter's hernia is an incomplete enterocele, *i.e.* only a portion of the circumference of the bowel is found in the sac.



*What is the Etiology of Hernia ?*

A hernia may be either congenital or acquired. The femoral, ventral, lumbar, and obturator varieties are always acquired. Two factors are always present in the etiology of a hernia, namely, a loss of tone of the abdominal musculature, and an increase in the intra-abdominal tension. Habitual constipation, phimosis, enlarged prostate, whooping-cough, chronic bronchitis, and the lifting of heavy weights are common exciting causes of hernia. In old people the enteric mesentery may prolapse and thus predispose to hernia.

Congenital inguinal hernia occurs into a patent processus vaginalis ; in females into a corresponding peritoneal diverticulum termed the canal of Nuck.

Hernia is more commonly found in males than females.

*What are the Signs and Symptoms of a Hernia ?*

1. A swelling in the region of a hernial orifice.
2. On coughing a characteristic "impulse" is imparted to the swelling.
3. Vague colicky pains in the vicinity of the swelling.
4. Inability to perform severe manual labour.
5. In inguinal hernia male subjects suffer from pain shooting along the spermatic cord towards the testis.

*Give the Clinical Features of an Enterocoele.*

1. A smooth elastic swelling, which is—
2. Resonant on percussion, and which has—
3. A gurgling sound during reduction.
4. The *first* portion of the bowel is *more difficult* to reduce than the *last* portion.

*Give the Clinical Features of an Epiplocele.*

1. An uneven doughy swelling, which is—
2. Dull on percussion ; there is an—
3. Absence of gurgling sound during reduction.
4. The *first* portion is *less difficult* to reduce than the *last* portion.



*What are the Clinical Conditions of a Hernia?*

A hernia is either—

- (a) Reducible,
- (b) Irreducible,
- (c) Strangulated, or
- (d) Obstructed.

*Mention the Chief Causes of Irreducibility.*

- (a) The formation of adhesions between the sac and its contents.
- (b) Fatty accumulations in epiploceles.
- (c) A great increase in the bulk of the contents.

*Describe Obstruction of a Hernia.*

Obstruction or incarceration is brought about by the impaction of fæces in an irreducible enterocele. It usually occurs in connection with the umbilical herniæ of adults, especially in middle-aged females.

The hernia increases in size and becomes painful. Unless promptly treated, symptoms of strangulation ensue.

In order to relieve the obstruction, the patient should be placed in a reclining posture with the pelvis raised; then by means of enemata and massage the herniated portion of the bowel must be emptied.

*What is meant by Strangulation of a Hernia?*

Strangulation occurs when there is any interference with the circulation through the portion of intestine contained in the sac. It leads to obstruction of the bowels. It is more common in small, recent herniæ, than in large, old-standing cases.

*Give its Pathology and Morbid Anatomy.*

The early changes result from the venous congestion of the strangulated bowel, the later ones from the action of the bacillus coli communis. At the seat of constriction a pale furrow is produced, the *constriction groove*; on its mucous



surface small ulcers often form. The interior of the bowel is full of blood-stained material. Naked eye, the bowel is swollen, hard, and of a deep claret colour. The peritoneal coat loses its lustre and is covered with flakes of fibrin. Areas of gangrene may be noticed; they are greyish and sodden, like wet blotting-paper. Above the constriction the bowel is distended, while below it is empty and firmly contracted.

*What are the Clinical Features of Strangulation.*

Pain and tenderness in the hernia; no impulse on coughing; dragging pain, nausea, vomiting, absolute constipation, quick pulse and furred tongue. The vomited material at first consists of the contents of the stomach, then bile, and lastly it is faecal or stercoraceous. By this time the pain in the hernia may have disappeared (a sign that probably gangrene has ensued).

*What is the Treatment of Strangulation?*

There must be **no delay** in this case.

- (a) Try taxis, but if it fail, at once proceed to—
- (b) The operation for strangulated hernia—*i.e.* to divide the constricting agent and perform the radical cure at the same time. **When in doubt, operate.**

*Sometimes, in cases where "Taxis" has been apparently successful the Symptoms of Strangulation still persist; why is this?*

1. The hernia may have been reduced *en masse*—*i.e.* the sac with its contents, *still in a state of strangulation*, has been pushed into the extra-peritoneal fat or between the fascia transversalis and the muscles, or some modification of these conditions. But in this case there will be no *gurgle* on reduction; the canal is open, and neither sac nor tumour can be felt.
2. A strangulation may have existed within the sac (*e.g.* a kink of the bowel through a hole in the omentum), while taxis only overcame the external strangulating cause.



3. The bowel may remain in a state of paralysis.
4. Reduction *en bissac*—*i.e.* where an intra-parietal sac exists as a diverticulum from the ordinary sac, and the hernia is displaced into it instead of into the abdomen.
5. A second strangulated hernia may exist at some other aperture.
6. The gut may have ruptured and set up peritonitis.

*Give a Short Account of the Operation for Strangulated Hernia, with the Radical Cure.*

Wash out the stomach and give a general anæsthetic (spinal or local anæsthesia will often be necessary in the old or in diabetics).

Fig. 58.—TREATMENT OF SAC.



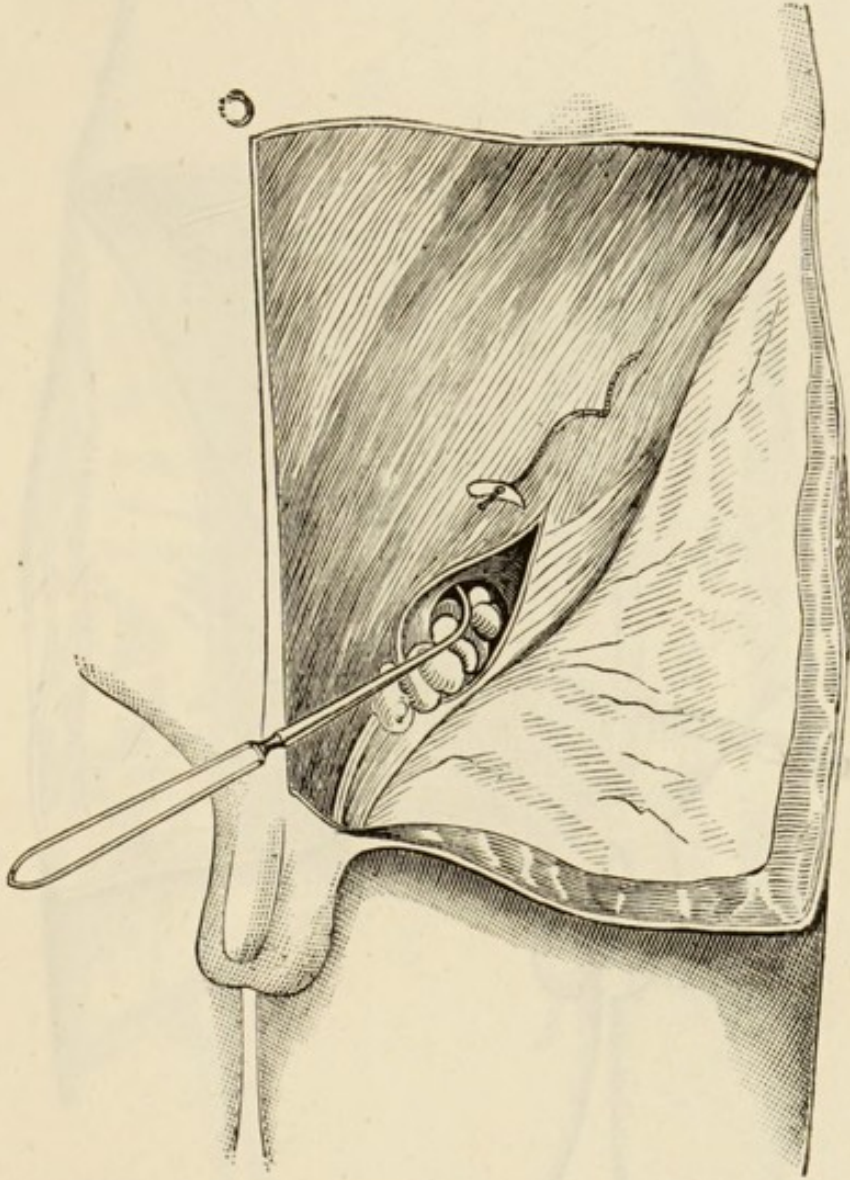
The Sac transfixed and drawn into a series of Folds.

Make an incision of sufficient length to expose the neck of the sac; an oblique one over the superficial (external) abdominal ring (Macewan's) will prove satisfactory. Dissect carefully through the tissues as they are often œdematous and matted together. When the sac is opened and the contents are foul smelling, irrigate it with hot saline solution. Divide the constricting material, directing the knife away from the inferior (deep) epigastric vessels. Draw down the affected segment of bowel; test its viability. If living, return to the abdomen after washing with hot saline. If



gangrenous, or if we are at all doubtful of its vitality, resect it. Join the ends either by end-to-end suture, or by a lateral anastomosis. Now proceed to the radical operation—Macewan's will be described.

Fig. 59.—THREAD INTRODUCED TO PULL UP SAC.



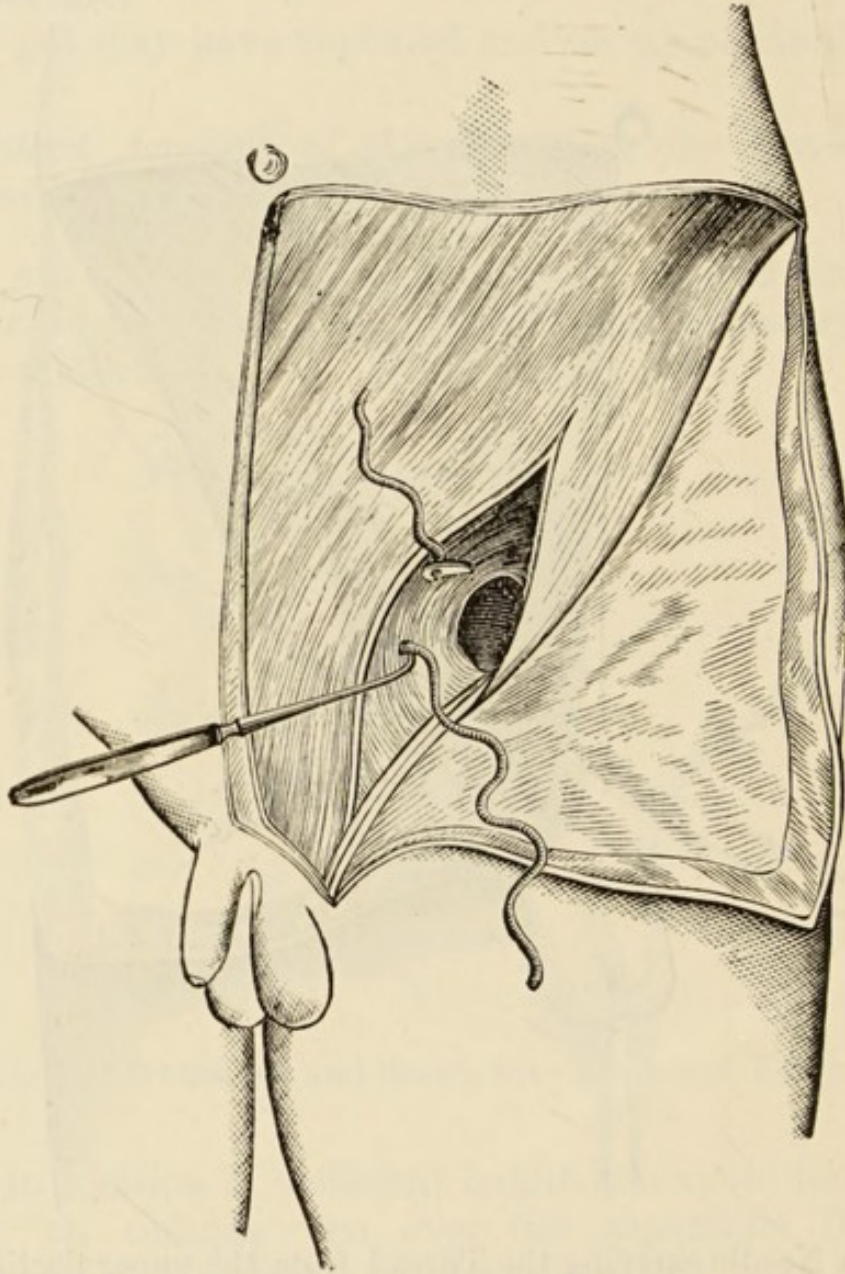
The Hernia Needle carrying the Thread from the upper portion of the Sac through the Abdominal Muscles from behind forward, about an inch above the Internal Ring.

The operation can be divided into two parts (*a*) the establishment of a pad on the abdominal aspect of the deep (internal) ring; (*b*) the closure of the inguinal canal.

(*a*).—(1) Free and elevate the distal extremity of the sac;

when this is done, pull down the sac, and, while maintaining tension upon it, introduce the index finger into the inguinal canal, separating the sac from the cord and from the parietes of the canal. (2) Insert the index finger out-

Fig. 60.—CONJOINED TENDON.



The threaded Hernia Needle making double penetration of Conjoined Tendon.

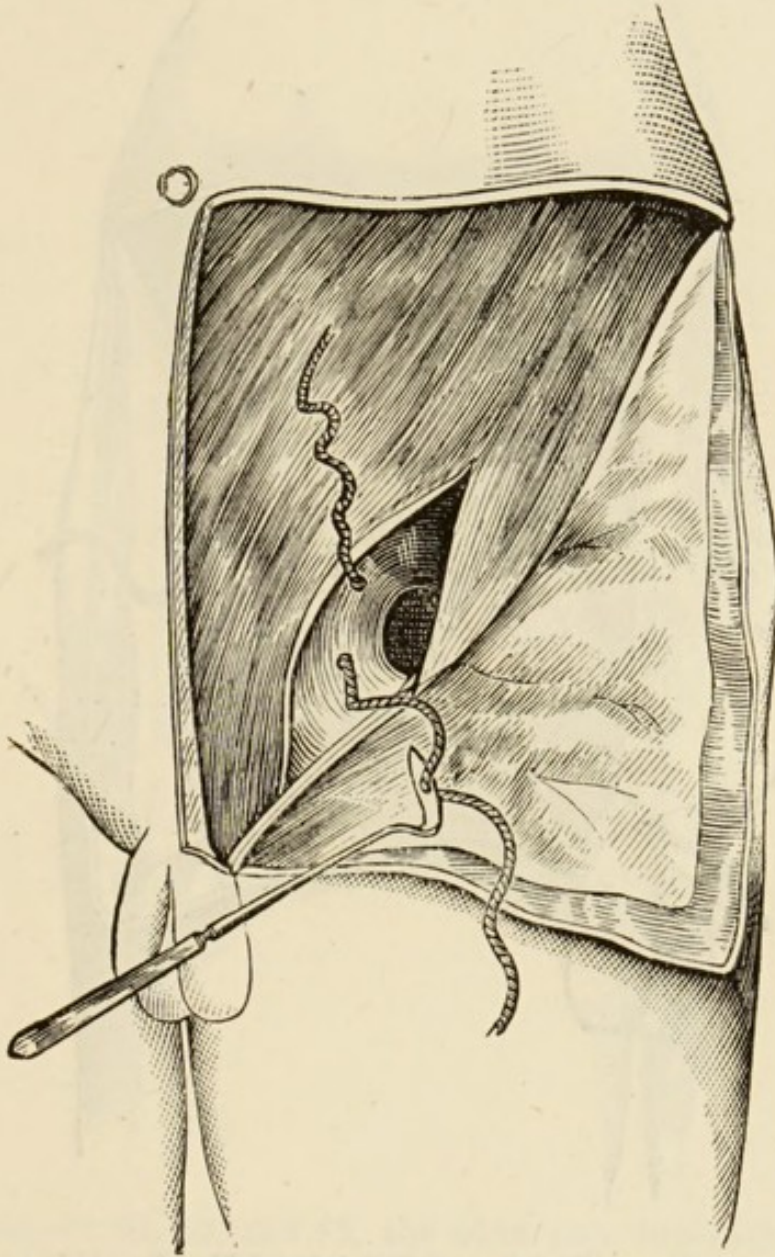
side the sac till it reaches the internal ring ; there separate with its tip the peritoneum for about half-an-inch round the whole abdominal aspect of the circumference of the ring. (3) A stitch is secured firmly to the distal extremity of the



sac. The end of the thread is then passed in a proximal direction several times through the sac, so that when pulled upon, the sac becomes folded upon itself like a curtain (Fig. 58).

The free end of this stitch, threaded on a hernia needle,

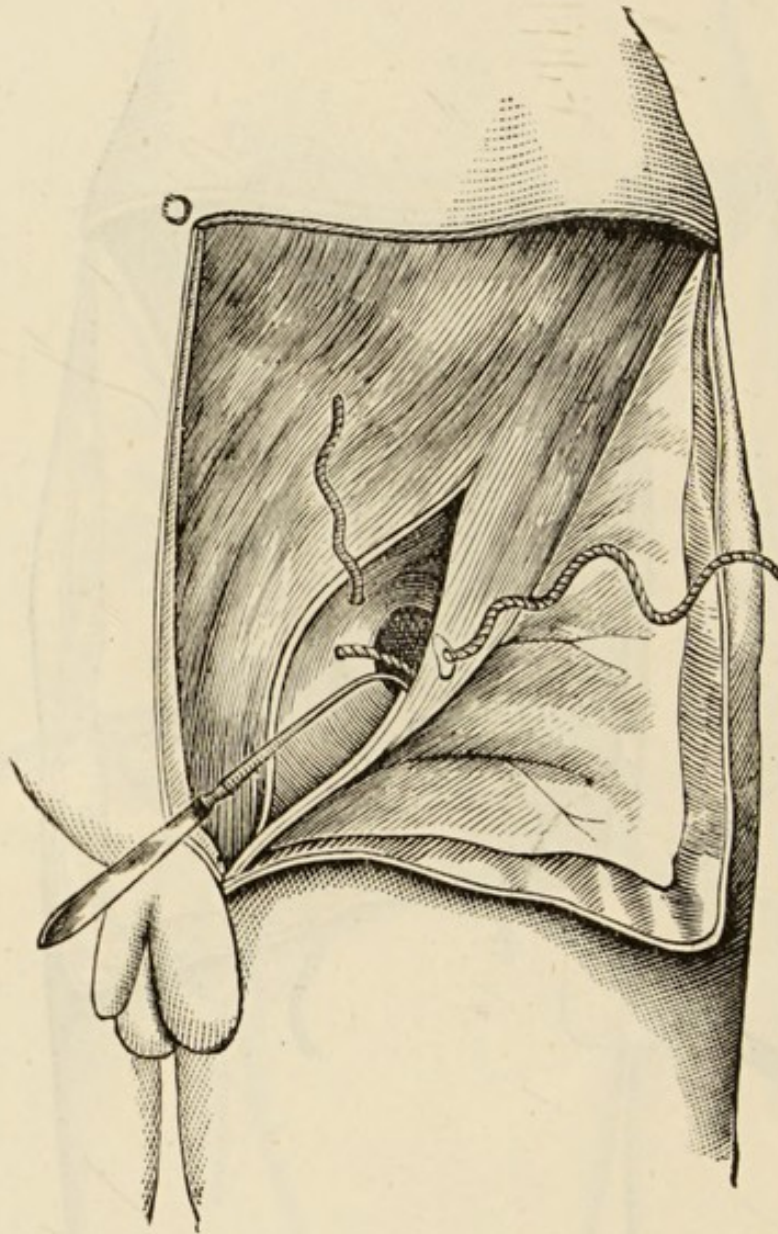
Fig. 61.—LOOP IN CONJOINED TENDON.



is introduced through the canal to the abdominal aspect of the fascia transversalis, and there penetrates the anterior abdominal wall, about an inch above the upper border of the internal ring. The wound in the skin is pulled upwards, so as to allow the point of the needle to project through the abdominal muscles without penetrating the skin (Fig 59).

The thread is relieved from the extremity of the needle, when the latter is withdrawn. The thread is pulled through the abdominal wall, and when traction is made upon it, the sac, wrinkling upon itself, is thrown into a series of folds.

Fig. 62.—EXTERNAL PILLAR.



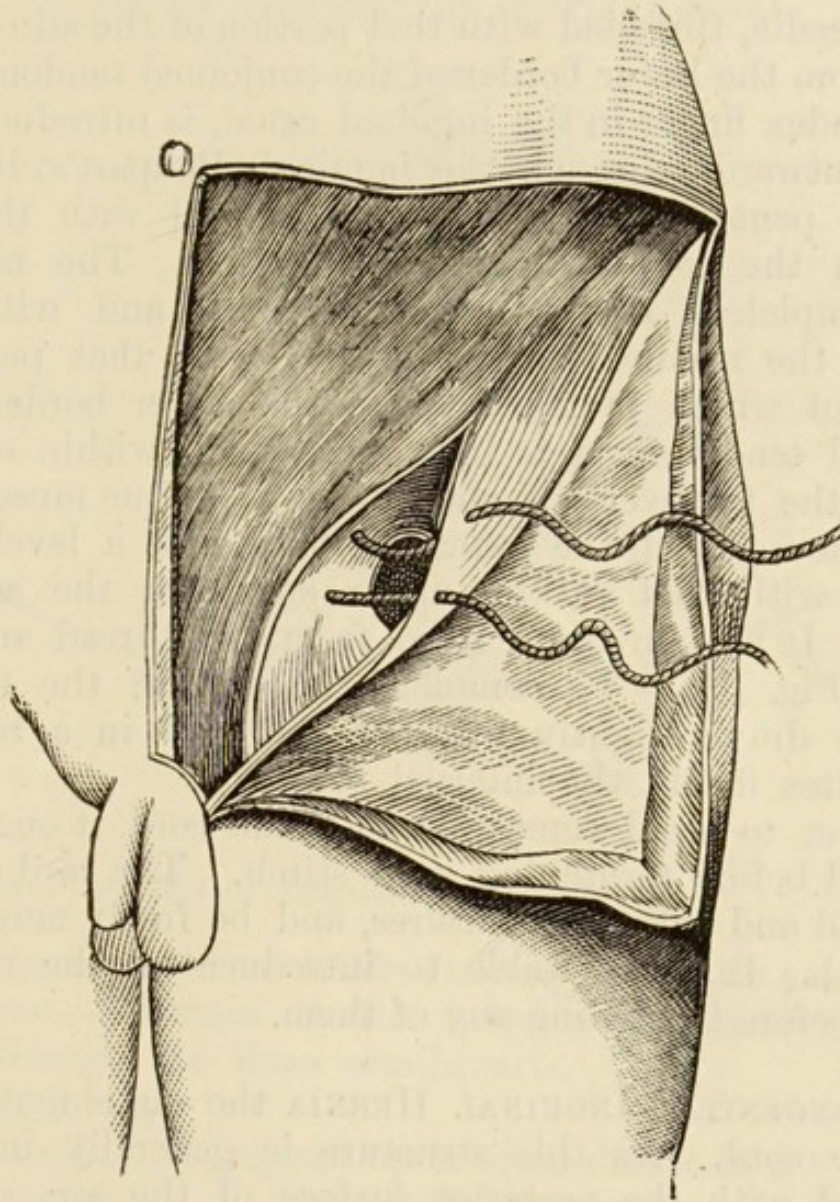
Thread from Lower Border of Conjoined Tendon being carried through Outer Pillar of Internal Ring.

After the sutures have been introduced into the inguinal canal, the end of the stitch is secured by introducing its free extremity several times through the superficial layers of the external oblique muscles.



(b).—The finger is introduced into the canal, and lies between the inner and lower borders of the internal ring, in front of and above the cord. It makes out the position of the inferior epigastric artery, so as to avoid it. The

Fig. 63.—THREAD READY FOR TYING.



In Figs. 59, 60, 61, 62, and 63, the Skin and Superficial Tissues are reflected in a flap, and the External Oblique is opened up in such a way as to expose the interior of the Canal and the Internal Ring.

threaded hernia needle is then introduced, and, guided by the index finger, is made to penetrate the conjoined tendon in two places; first, from without inwards, near the lower border of the conjoined tendon; second, from within



outwards, as high up as possible on the inner aspects of the canal. This double penetration of the conjoined tendon is accomplished by a single screw-like turn of the instrument (Fig. 60). One single thread is then withdrawn from the point of the needle by the index finger, and when this is accomplished, the needle, along with the other extremity of the thread, is removed. Secondly, the other hernia needle, threaded with that portion of the stitch which comes from the lower border of the conjoined tendon, guided by the index finger in the inguinal canal, is introduced from within outwards, through the inguinal (Poupart's) ligament, which it penetrates at a point on a level with the lower stitch in the conjoined tendon (Fig. 62). The needle is then completely freed from the thread and withdrawn. Thirdly, the needle is now threaded with that portion of the catgut which protrudes from the upper border of the conjoined tendon, and is introduced from within outwards through the transversalis and internal oblique muscles, and the aponeurosis of the external oblique, at a level corresponding with that of the upper stitch in the conjoined tendon. It is then quite freed from the thread and withdrawn (Fig. 63). To complete the suture, the two free ends are drawn tightly together and tied in a reef-knot. This unites firmly the internal ring.

In order to avoid compression of the cord, it ought to be examined before tightening each stitch. The cord ought to lie behind and below the sutures, and be freely moveable in the canal. It is advisable to introduce all the necessary sutures before tightening any of them.

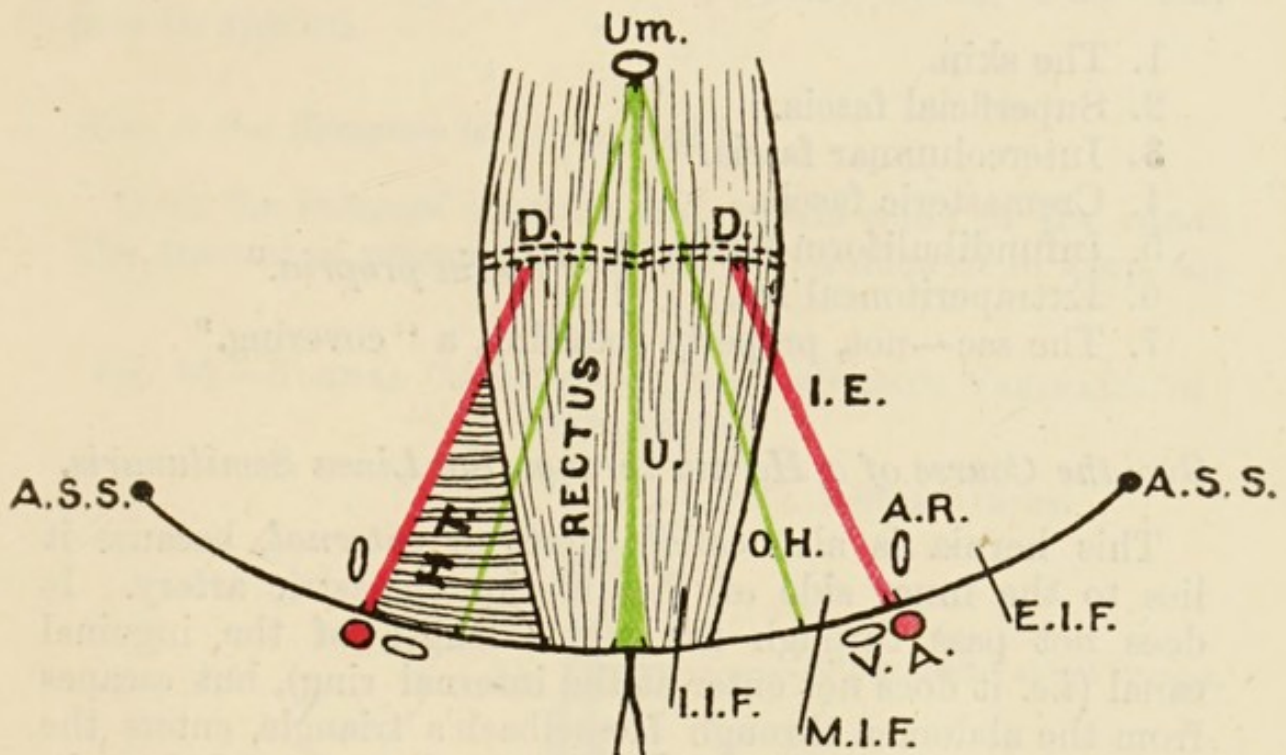
IN CONGENITAL INGUINAL HERNIA the sac is first isolated from the cord. As this structure is generally intimately connected with the posterior surface of the sac, often by firm adhesions, the sac should be divided longitudinally by two parallel incisions, one on each side of the cord, and the latter permitted to lie behind clear of the sac. The isolated sac should then be divided transversely about an inch above the testicle. The lower part is formed into a tunica vaginalis. The upper is pulled down as far as possible, and dealt with quite as the sac of an acquired hernia, additional precautions being necessary to clear the cord at the internal abdominal



ring. It is freed from its connections, and placed as a pad on the abdominal aspect of the circumference of the internal ring.

The details of Bassini's, Kocher's and G. L. Chiene's methods are described in *Operative Surgery*, Part 3.

Fig. 64.—DIAGRAM OF INGUINAL FOSSA.



*Name the Varieties of Inguinal Hernia.*

1. Oblique—*external* to the inferior epigastric artery.
  2. Direct—*internal* to the inferior epigastric artery, or hernia through the linea semilunaris.
  3. Congenital,
  4. Infantile,
  5. Encysted,
  6. Funicular,
- } Depend upon some defect in the obliteration of the *processus vaginalis*.

*Give the Course of the Oblique Form.*

This form is named oblique, or indirect, from the direction it takes, passing through the oblique inguinal canal: it is also called *external*, because it lies to the outer side of the inferior epigastric artery. It follows exactly the same course

as the testicle did, and receives the same coverings—*i.e.* it enters at the internal abdominal ring, and passes through the whole length of the canal. The neck of the hernia lies above the inguinal ligament and to the inner side of the spine of the pubes.

*What are its Coverings?*

1. The skin.
2. Superficial fascia.
3. Intercolumnar fascia.
4. Cremasteric fascia.
5. Infundibuliform fascia, } "*fascia propria.*"
6. Extraperitoneal fat, }
7. The sac—not, properly speaking, a "covering."

*Give the Course of a Hernia through the Linea Semilunaris.*

This hernia is also called direct or *internal*, because it lies to the inner side of the inferior epigastric artery. It does not pass through the whole length of the inguinal canal (*i.e.* it does not enter at the internal ring), but escapes from the abdomen through Hesselbach's triangle, enters the inguinal canal, pushing the conjoined tendon before it, passes through the lower part of the canal, and escapes by the external abdominal ring. At times it passes through that part of Hesselbach's triangle which is *not* covered by the conjoined tendon.

*What are its Coverings?*

In the usual form we have—

1. Skin.
2. Superficial fascia.
3. Intercolumnar fascia.
4. Conjoined tendon (of the transversalis and internal oblique muscles).
5. Fascia transversalis.
6. Extraperitoneal fat.
7. Sac—not really a "covering."



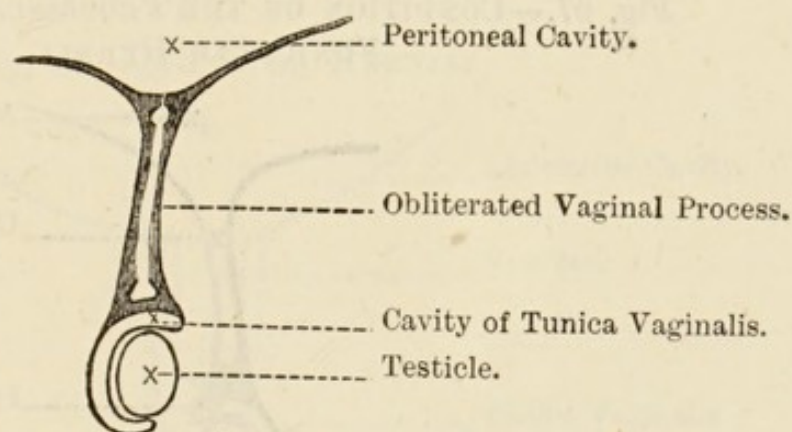
*How is an Inguinal Hernia reduced?*

By *taxis* (i.e. by manipulation). Place the patient in a recumbent posture, with the shoulders and pelvis slightly raised, the lower limbs flexed upon the abdomen. See also that the bladder is empty. Steady the neck of the hernia with one hand, and make gentle pressure in the direction of the canal with the other. A properly fitting truss may now be applied.

*How is the Pressure to be applied?*

Over the *internal* aperture and to the walls of the canal. The amount of pressure should be just sufficient to keep the

Fig. 65.—NORMAL CONDITION OF THE PROCESSUS VAGINALIS IN THE ADULT.



hernia up; too much would cause atrophy of the wall at that point. The pressure must not be nipple-shaped, but flat or curved, like the abdominal wall.

*What Measurements and Directions should be given to an Instrument-maker in regard to a Truss?*

Place the tape over the hernial aperture; pass it upwards in a sloping direction to about two inches below the crest of the ilium, and across the back to a corresponding point on the opposite side, and from thence, sloping down again to the opening. Send the number of inches this indicates. State also the kind of hernia, and the side on which it is

situated. In addition, mention whether the hernia is recent or old-standing (a stronger spring in fitted in the latter case).

Fig. 66.—CONDITION OF THE PROCESSUS VAGINALIS IN CONGENITAL HERNIA.

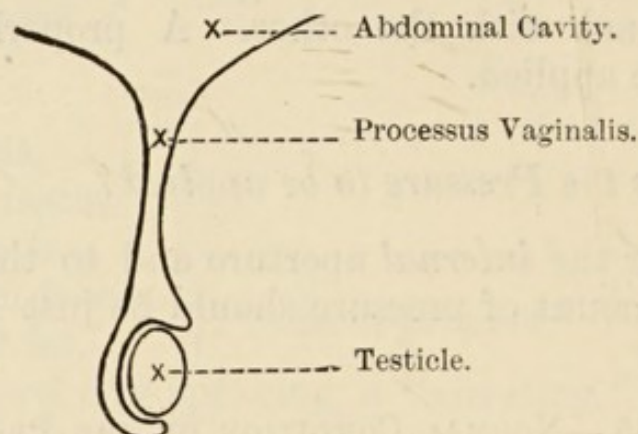
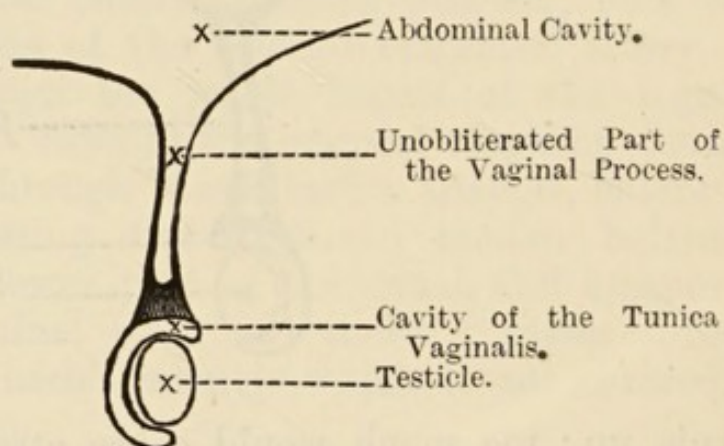


Fig. 67.—CONDITION OF THE PROCESSUS VAGINALIS IN FUNICULAR HERNIA.



*What are the Anatomical Varieties of Oblique Inguinal Hernia?*

1. Congenital.
2. Funicular, or hernia into the funicular process.
3. Infantile.
4. Encysted.

*Describe Congenital Inguinal Hernia?*

In this condition the processus vaginalis has remained patent throughout its whole length, and therefore the hernia



descends into the scrotum and comes into contact with the testicle (Fig. 66). This variety is more common on the right than on the left side.

Fig. 68.—CONDITION OF THE PROCESSUS VAGINALIS PREDISPOSING TO THE INFANTILE AND ENCYSTED FORMS OF HERNIA.

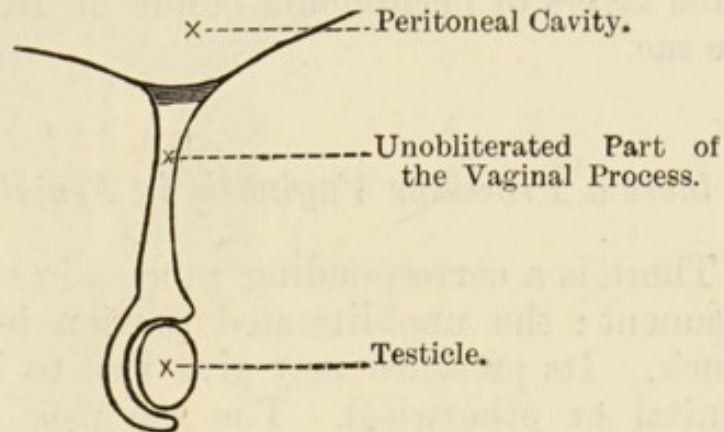
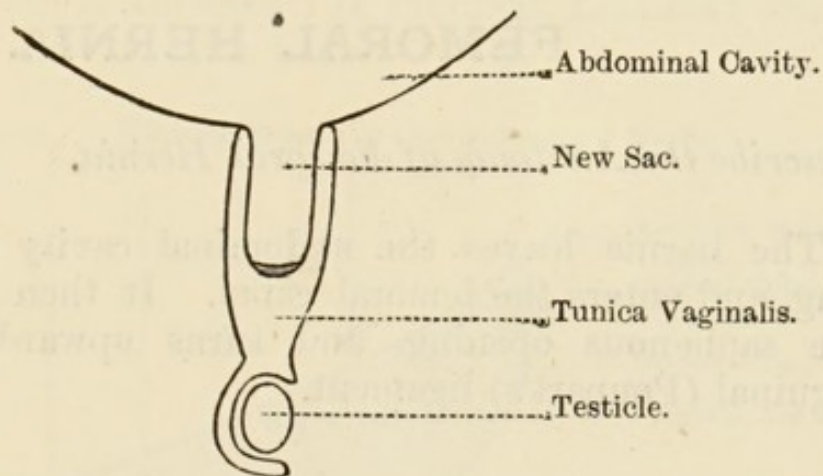


Fig. 69.—ENCYSTED HERNIA.



### *Describe Funicular Hernia.*

Here the processus vaginalis is only obliterated close to the testicle, leaving the whole of the upper part open (Fig. 67), and into this upper part the gut descends.

The hernia only extends to the *top* of the testicle, but does not envelop it; it is always oblique and suddenly produced, and is usually small. Remember that funicular hernia is the commonest form of inguinal hernia.

*What is "Infantile" Hernia?*

A rare form of hernia practically always found in *adult* subjects. In front of the sac is a narrow peritoneal tube extending upwards from the tunica vaginalis. The sac is in reality the unobliterated funicular process. This hernia is recognised during operation by the surgeon encountering three layers of peritoneum before he reaches the contents of the sac.

*Is there a Processus Vaginalis in Females?*

There is a corresponding process in relation to the round ligament; the unobliterated portion is termed the canal of Nuck. Its presence may give rise to inguinal hernia (congenital or otherwise). The sac may contain an ovary or even a Fallopian tube.

## FEMORAL\* HERNIA.

*Describe the Anatomy of Femoral Hernia.*

The hernia leaves the abdominal cavity at the femoral ring, and enters the femoral canal. It then passes through the saphenous opening, and turns upwards towards the inguinal (Poupart's) ligament.

*What are the Boundaries of the Femoral Ring?*

Anterior = The inguinal ligament.

Posterior = Fascia of pectineus, pectineus muscle, and os pubes.

External = Femoral vein.

Internal = Sharp free edge of Gimbernath's ligament.



Fig. 70.—COURSE OF A FEMORAL HERNIA.

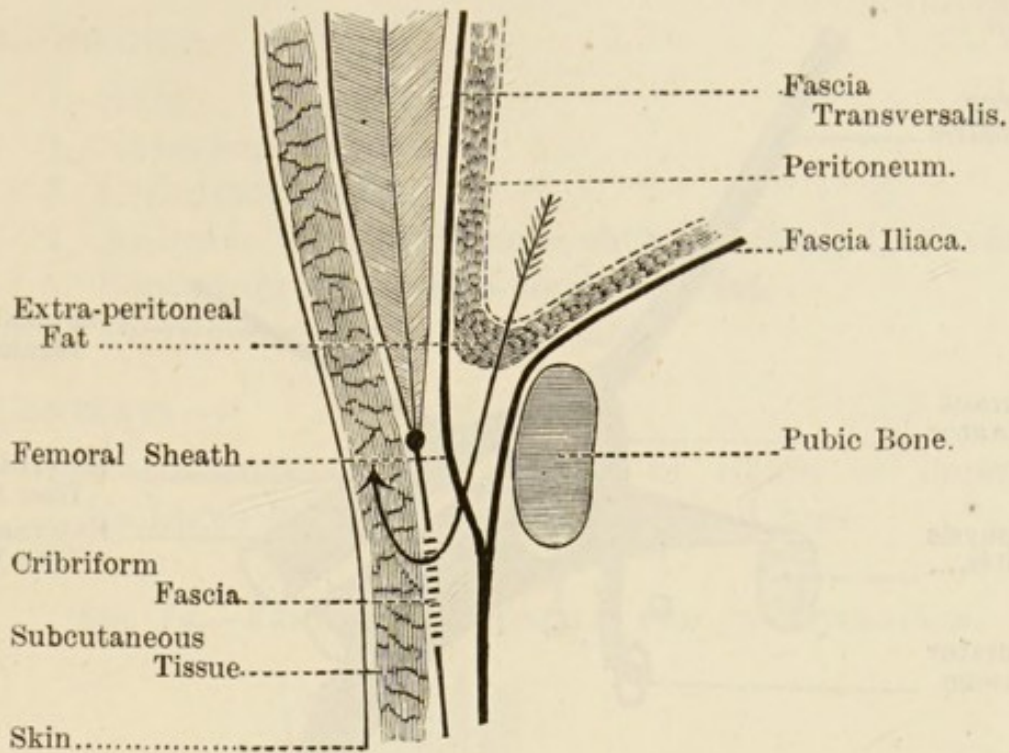
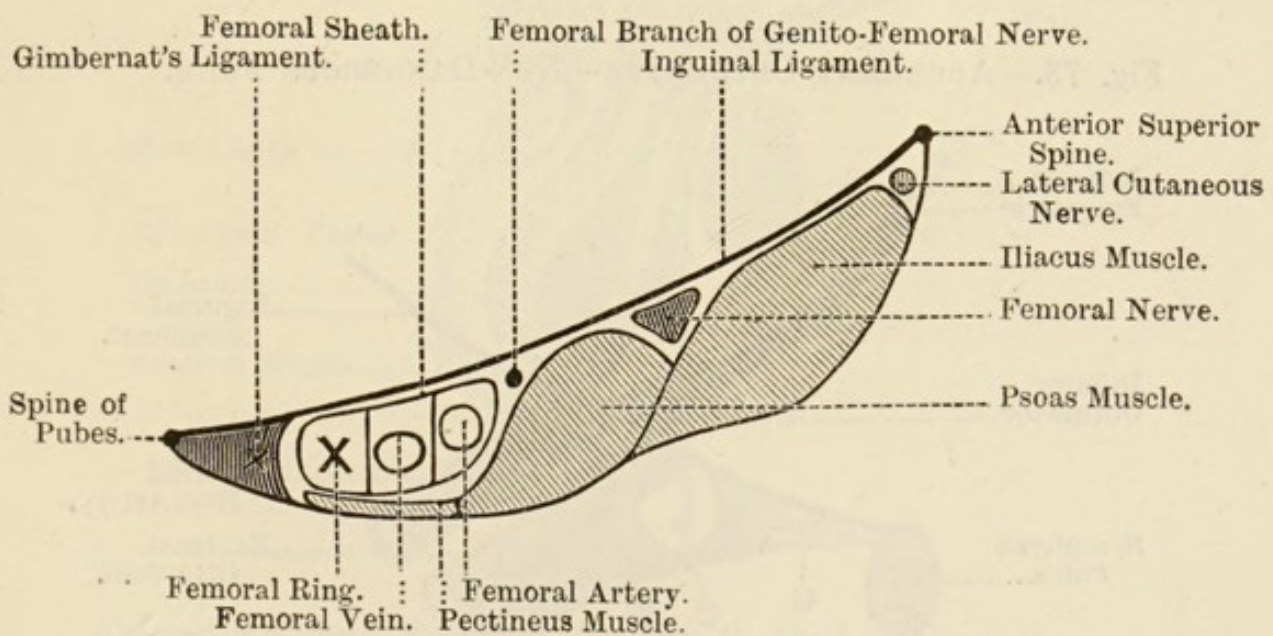


Fig. 71.—STRUCTURES BETWEEN THE INGUINAL LIGAMENT AND THE BONE.



The "dangerous" variety of the aberrant obturator when present forms an internal relation (Fig. 72); the "non-dangerous," variety an additional external relation (Fig. 73).

Fig. 72.—ABERRANT OBTURATOR—DANGEROUS FORM.

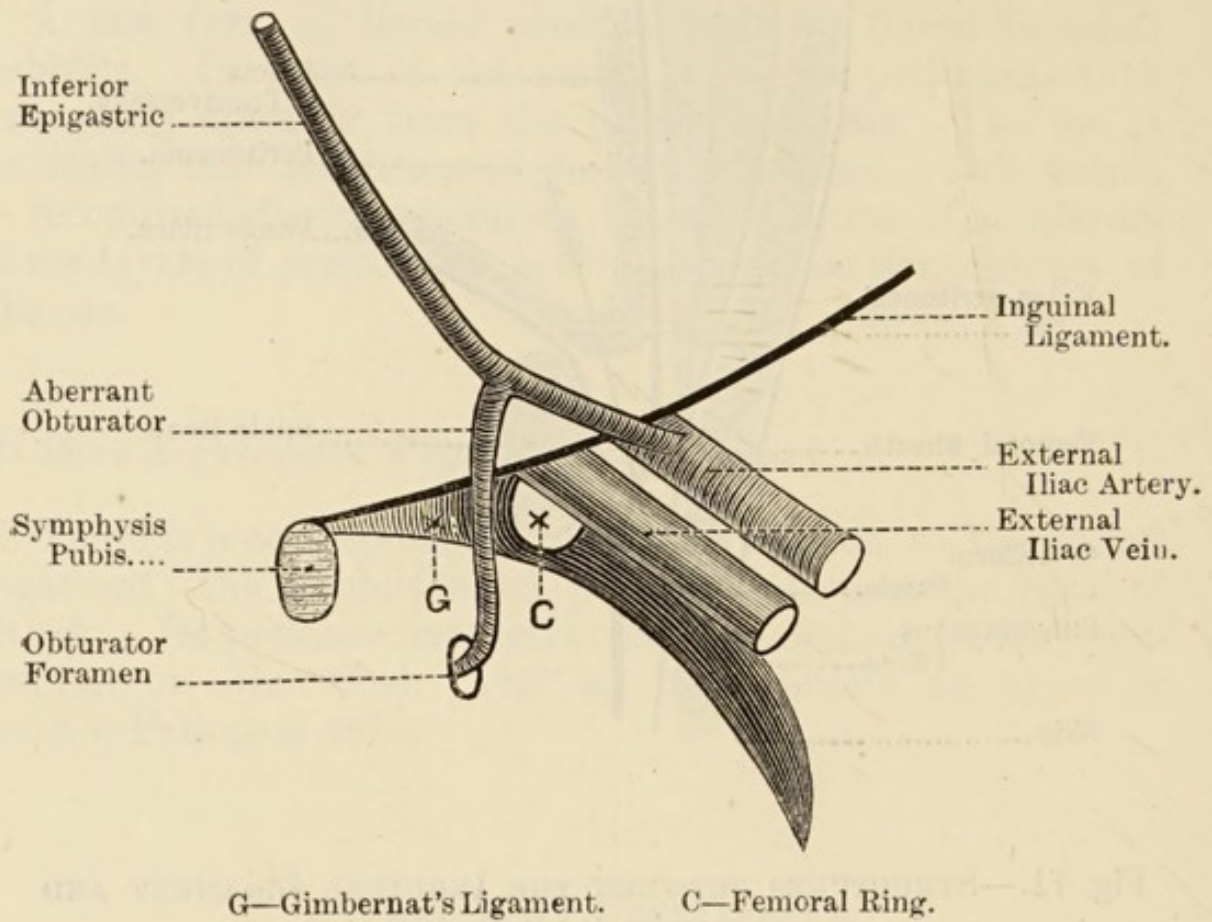
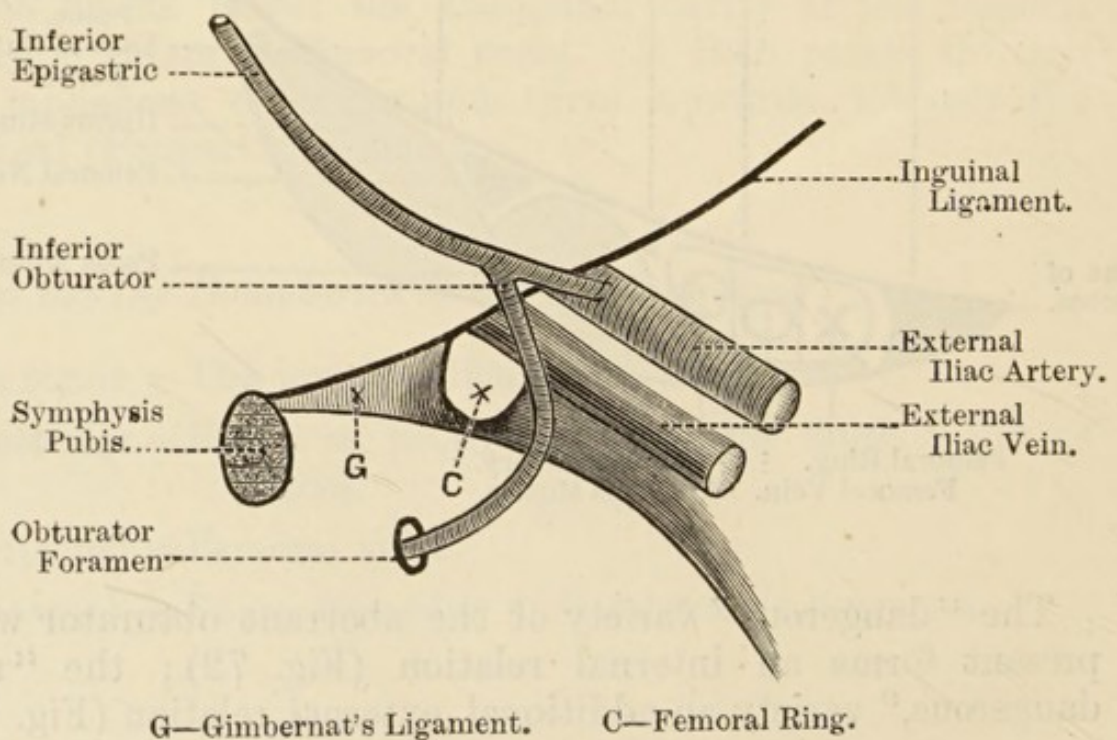


Fig. 73.—ABERRANT OBTURATOR—NON-DANGEROUS FORM.





*What are the Coverings and Contents of a Femoral Hernia?*

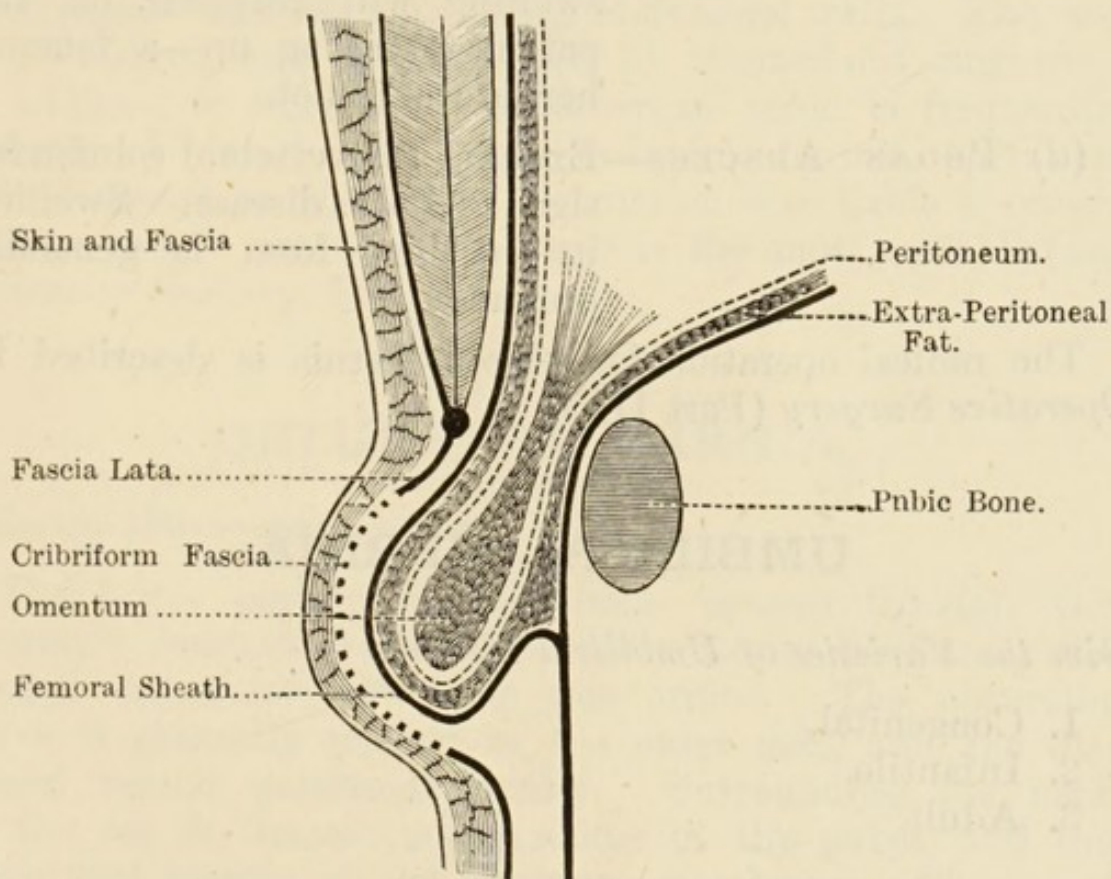
COVERINGS—

1. Skin.
2. Superficial fascia.
3. Cribriform fascia.
4. Anterior layer of femoral sheath = fascia transversalis.
5. Septum crurale = sub-peritoneal fat.
6. Peritoneum forming the sac.

CONTENTS—

The contents usually consist of ileum or omentum.  
Richter's hernia is commonly found here.

Fig. 74.—FEMORAL EPIPLOCELE AND ITS COVERINGS.



*From what has Femoral Hernia to be diagnosed?*

- (a) ENLARGED GLANDS—There is no impulse on coughing ; they can be raised from the deep structures ; some obvious cause for the enlargement is present.

(b) **INGUINAL HERNIA**—Here the neck of the sac lies above the inguinal ligament and internal to the pubic spine; in femoral hernia the neck of the sac is below the inguinal ligament and external to the pubic spine. Lastly, in femoral hernia the inguinal canal can be felt to be empty.

(c) **VARIX OF THE INTERNAL SAPHENA**—The remaining portion of the vein will be found varicose. The varix disappears when the patient lies down, but if the finger be placed over the femoral ring, the swelling will reappear on the patient standing up—a femoral hernia would not.

(d) **PSOAS ABSCESS**—Examine the vertebral column for signs of Pott's disease. Swelling in the iliac fossa is generally present.

The radical operation for femoral hernia is described in *Operative Surgery* (Part III.).

## UMBILICAL HERNIA.

*Give the Varieties of Umbilical Hernia.*

1. Congenital.
2. Infantile.
3. Adult.

*Describe the Congenital Variety.*

This is due to an arrest of the normal closure of the umbilical ring. A small portion of the intestine is protruded into the tissues of the umbilical cord. Strangulation of such a hernia may occur if the cord be tied too near the abdominal wall. Unless strangulation ensues, congenital



herniæ usually undergo spontaneous reduction within four or five weeks.

*Describe Infantile Umbilical Hernia.*

Occurring two or three months after birth, this variety develops in children suffering from phimosis, bronchitis, or any other trouble resulting in an increased intra-abdominal tension. According to Murray, the sac is pre-formed. Infantile umbilical hernia is readily reduced and controlled. The simplest method of preventing its recurrence is to encircle the abdomen with wide strips of adhesive plaster.

*Describe Adult Umbilical Hernia.*

The umbilical hernia of adults is mainly found in stout multiparous matrons with flabby abdominal walls. The sac is pre-formed, and is often lined by thinned-out omentum. In addition to omentum, the transverse colon is frequently present. Unless in very large irreducible herniæ, operation should always be advised as obstruction is so liable to occur. The procedure practised by Mayo is the most suitable (see *Operative Surgery*, Part III.).

## OBTURATOR HERNIA.

*Describe Obturator Hernia.*

The lower portion of the ileum escapes through the obturator foramen, above the pelvic fascia, displacing the normal structures traversing this orifice. The obturator nerve is generally pushed to the outer side, and the displaced vessels postero-externally. Surrounding the neck of the sac is the ascending ramus of the pubes, and the prominent margin of the obturator membrane. Because of this, strangulation is very apt to occur.

After passing through the foramen, the hernia either insinuates itself between the membrane and the obturator externus, or passes above the muscle to lie beneath the pectineus, occupying a position to the inner side of the femoral vessels.



*Give the Clinical Features.*

The hernia is rarely diagnosed previous to strangulation. However, the following signs may be noted—

- (a) A slight bulging in the upper and inner side of Scarpa's triangle.
- (b) Pain on external rotation of the hip.
- (c) Shooting pain along the inner aspect of the thigh, owing to the hernia pressing on the obturator nerve.

**LUMBAR HERNIA.***Describe Lumbar Hernia.*

A rare form of hernia occurring in adult subjects, and usually found on the left side. The hernia generally results from trauma, or is secondary to a lumbar abscess. The protrusion escapes from the triangle of Petit—a small interval between the latissimus dorsi, external oblique, and iliac crest. A lumbar hernia has no tendency to become strangulated, and is readily controlled by a pad and abdominal belt.

**STOMACH AND DUODENUM.***What Methods should be adopted in diagnosing Surgical Conditions of the Stomach?*

- (a) **INSPECTION.**—With the patient in the dorsal decubitus, in atonic dilatation a swelling is noticed, but no peristalsis; in pyloric stenosis there is swelling and peristaltic waves pass from left to right. A tumour may be visible.
- (b) **PALPATION.**—The knees should be drawn up, and the abdomen fully relaxed. In obese patients, or where muscular rigidity is present, an anæsthetic should be employed.
- (c) **PERCUSSION.**
- (d) **AUSCULTATION** is sometimes helpful.



(e) X-RAY EXAMINATION.—Examination after a bismuth meal is of the greatest service. The size and situation of the stomach, the presence of ulcers, foreign bodies, hour-glass constriction, pyloric stenosis, rapidity of gastric peristalsis, etc., are easily recognised.

(f) EXAMINATION WITH THE GASTROSCOPE.

(g) EXAMINATION OF THE GASTRIC CONTENTS.

*How would you proceed to examine the Gastric Contents?*

A test meal is given in the morning. It consists of two slices of dry toast with a cup of unsweetened tea. Pass a stomach tube one hour later, and examine the contents according to the—

- (a) Quantity.
- (b) Physical characters.
- (c) Acidity.
- (d) Ferments.
- (e) Bacteria and fungi.

*Give a Simple Test for Free HCl.*

Methyl-orange paper becomes red, or congo-red paper is turned blue. The *amount* of free HCl can be gauged approximately from the depth of the colour.

*How can the Organic Acids be detected?*

It is not necessary to identify these unless free HCl is absent.

LACTIC ACID—Add a little Uffelmann's reagent (= liq. ferri perchlor, and weak carbolic acid)—a canary-yellow colour is obtained.

ACETIC ACID—Spot by its odour of vinegar.

BUTYRIC ACID—Recognise by the odour of rancid butter.

*How are Bacteria and Fungi recognised?*

Make films from the deposit withdrawn by the stomach-tube, and stain them with dilute gentian-violet. The presence



of yeasts and sarcinae indicate a condition of benign pyloric stenosis; if the Oppler-Boas bacillus is also found, malignant disease should be suspected. These bacilli occur in long, filiform clumps, they are 6-8 $\mu$  in length and Gram-positive.

*In diagnosing Gastric Cases, what additional Points should be investigated?*

1. *PAIN.—Gastric Disease.*—The pain is situated in the epigastrium and rarely radiates, unless the pancreas is involved, when it shoots towards the left side.

*Duodenal or Biliary Disease.*—Although at first epigastric, the pain is soon felt to the right of the middle line.

*Appendicular Gastralgia*—Epigastric, and often radiates towards the right iliac fossa.

2. *FOOD AND PAIN.—Gastric and Duodenal Conditions.*—The pain is considerably relieved (cancer is an exception) by the taking of food.

*Biliary Disease and Appendicular Gastralgia.*—The pain is uninfluenced by the taking of food.

3. *VOMITING.*—This is an important sign in gastric disease. Bright unaltered blood indicates “ulceration,” while a “coffee-ground” appearance of the dejecta is significant of cancer.

*Describe Congenital Stenosis of the Pylorus.*

In this condition the pylorus shows a funnel-shaped, circular thickening surrounding a minute orifice. In some cases the thickening is due to a submucous fibromatosis; in others to a hypertrophy of the pyloric musculature.

*What are the Clinical Features and Treatment?*

The symptoms usually arise within the first month. They are—

1. Violent vomiting immediately after taking food, often accompanied by convulsions.
2. The vomited contents are *not* bile-stained.



3. A considerable amount of mucus is present in the vomit.
4. Constipation.
5. Progressive emaciation.
6. The stomach dilates until it forms a visible swelling.

The best treatment is to perform gastro-jejunostomy, but the outlook is not hopeful.

• *Describe Wounds of the Stomach.*

The stomach may be either ruptured or punctured. Owing to its protected position beneath the costal margin, injury usually only occurs when the organ is distended. Anatomically the wound may affect—

- (a) The MUCOUS COAT only—vomiting of blood occurs.
- (b) The SEROUS COAT only—a perigastric abscess develops.
- (c) ALL THE COATS—the gastric contents (*i.e.*, food, gastric juice, and mucus) escape into the peritoneal cavity, and cause the following signs—**pain, collapse, and hæmatemesis**. The pain is severe, involves the whole anterior abdominal wall, and is often accompanied by a panting respiration. The signs of collapse are—rapid, compressible pulse, and cold, clammy skin. Note the rigid abdominal wall.

*Give the Treatment.*

As early as possible expose the stomach by an incision in the middle line above the umbilicus. Examine the entire viscus, as multiple injuries may be present. Suture the rent carefully, employing an omental graft as an auxiliary if necessary. Drain the pouch of Douglas by an opening above the pubes.

## ULCER OF THE STOMACH.

### *Classify Gastric Ulcers.*

- |                   |                    |               |
|-------------------|--------------------|---------------|
| A. Erosions . . . | { (a) Simple.      |               |
|                   | { (b) Extensive.   |               |
| B. Ulcers . . . . | { (a) Simple . . . | { 1. Acute.   |
|                   |                    | { 2. Chronic. |
|                   | { (b) Malignant.   |               |

### *Describe Acute Ulcer.*

This has a punched-out appearance, the edges being clean-cut. Owing to the gastric mucous membrane suffering more damage than the remaining coats, the ulcer is described as being like a telescope. The edges show no signs of induration. The ulcer is most commonly situated on the posterior wall of the stomach, near the pylorus and the lesser curvature.

### *Describe Chronic Ulcer.*

This is said to be the commonest variety of gastric ulcer. It is irregular in outline with a hard greyish-white base and has indurated edges, hence it is said to be "terraced." The mucous membrane surrounding the ulcer has a large number of varicose veins coursing through it. Chronic ulcers are more frequent in females than in males, and come on between the ages of thirty and fifty. A small superficial ulcer—a "contact" ulcer (Mayo)—often appears on the opposite wall to the main ulcer. Multiple chronic ulcers are very rare.

### *Give the Signs and Symptoms of Gastric Ulcer.*

Three cardinal symptoms are present — (a) pain, (b) vomiting, and (c) hæmorrhage.

The pain has the following characteristics—

1. It comes on between half-an-hour to two hours after food, the latter time applying to an ulcer situated near the pylorus.



2. It may only be a slight discomfort, or it may be agonizing.
3. It is referred to the epigastrium; if the ulcer is near the cardiac end of the stomach, the pain is most complained of a little to the left of the middle line; if in the vicinity of the pylorus, the pain is felt a little to the right of the middle-line.
4. The pain often becomes worse as digestion progresses.
5. The pain is accompanied by flatulence and water-brash.

*Describe the Vomiting in Gastric Ulcer.*

Vomiting is usually associated with the later and not the early stages of gastric ulcer. It frequently relieves the pain. It may be due to one of three causes:—

- “1. In the early stages, vomiting of partially digested food, without much mucus, is reflex — Nature’s effort to get rid of the irritating food.
- “2. In the later stages vomiting of small quantities of ill-digested food, with much mucus, is the result of chronic gastritis.
- “3. Vomiting of large quantities of sour fluid with partially digested food is an indication of pyloric stenosis, or hour-glass stomach.” (Paterson.)

*Describe the Hæmorrhage in Gastric Ulcer.*

The blood may be either vomited or passed in the stools. When vomited immediately it is bright red in colour; if retained in the stomach for some time it will have a “coffee-ground” appearance. In those cases in which the blood passes into the intestinal canal, melæna results.

*What is Mennier’s Test?*

This test can be used in order to differentiate between gastric and duodenal ulcers. First wash out the stomach and then wash out with some 1 per cent. solution of glacial acetic



acid. When this solution comes into contact with the pylorus, the latter closes, and the acetic acid converts the hæmoglobin on the surface of the ulcer into hæmatin. On withdrawing the fluid this can be detected by the usual chemical tests. Obviously duodenal ulcers give a negative reaction.

*Give the other Features of Gastric Ulcer.*

1. Often tenderness over the epigastrium.
2. Signs of anæmia and want of nourishment.
3. A change in the amount of secretion of hydrochloric acid.

ULCERS NEAR THE PYLORUS—**Hyperchloridia.**

ULCERS NEAR THE CARDIA—**Hypochloridia.**

HOURLY GLASS STOMACH—**Free HCl is absent.**

4. The pain and discomfort are usually relieved by the taking of alkalies (*see ante*).
5. X-ray examination.

*What has Gastric Ulcer to be diagnosed from?*

- (a) Duodenal ulcer.
- (b) Gallstones.
- (c) Appendicular gastralgia.
- (d) Gastroparesis.
- (e) Chronic faecal stasis.
- (f) Syphilis of the stomach.

*Give the Treatment of a Gastric Ulcer.*

When rest, dieting, and medical measures have failed, or after apparent cure the patient relapses, gastro-jejunostomy should be carried out. Exceedingly few cases are permanently benefited by medical treatment, while above 90 per cent. are cured by operation.

*Describe Perforation of a Gastric Ulcer.*

Perforation may be either acute, sub-acute, or chronic. In the first variety, the gastric contents usually escape freely into the peritoneal cavity, leading to peritonitis. Chronic



perforation occurs into a mass of previously formed adhesions, and results in a perigastric abscess. Perforation is more common in ulcers situated on the *anterior* wall of the stomach, and especially in those near the *cardiac* and in the region of the *lesser curvature*. The average size of an acute perforation is that of a threepenny piece.

*Mention the Clinical Features.*

1. A sudden intense pain in the epigastrium, which later becomes diffused over the abdominal wall.
2. Signs of collapse, with cold extremities.
3. Rapid but shallow respiration, gradually becoming thoracic in character.
4. Subnormal temperature.
5. Quick feeble pulse.
6. Retracted abdomen.
7. Rigidity of upper part of recti muscles.
8. Tenderness of epigastrium.
9. Often vomiting.

After lasting for three or four hours, a temporary improvement sets in ; it is quickly followed, however, by the signs of septic peritonitis, *i.e.*—

1. Small running pulse.
2. Raised temperature.
3. Distension of abdomen.
4. Tympanitic abdomen.
5. Pinched features.
6. Feeble thoracic respiration.

*Give the Differential Diagnosis of Acute Perforation.*

Acute perforation must be diagnosed from—

- (a) Lobar pneumonia.
- (b) Diaphragmatic pleurisy.
- (c) Acute ptomaine poisoning.
- (d) Acute appendicitis.
- (e) Acute pancreatitis.
- (f) Ruptured ectopic gestation.
- (g) Biliary colic.
- (h) Duodenal perforation.

*In Lobar Pneumonia and Diaphragmatic Pleurisy—*

1. Very quick respiration, with only a slightly increased pulse.
2. Less marked abdominal pain and rigidity.

*In Acute Ptomaine Poisoning—*

1. Diarrhœa.
2. Vomit shows no hyperchloridia, and usually no bile.

*In Acute Pancreatitis and Acute Appendicitis—*

Initial rise of temperature. For other differential points the student is referred to the questions on these diseases.

*In Biliary Colic—*

1. Often an antecedent rigor.
2. Normal temperature.
3. Frequent vomiting.
4. Hiccough.
5. Pain shoots towards right scapular region.

*In Ruptured Ectopic Gestation—*

1. Previous amenorrhœa.
2. Rigidity most marked in lower part of abdominal wall.
3. Marked tenderness below the umbilicus.

*What is the Treatment for Acute Perforation?*

Operate as early as possible. Suture up the rent with two rows of stitches, the first passing through all the coats, the second being sero-muscular. Then perform a gastro-jejunosomy. Lastly, introduce a drainage tube into the pouch of Douglas by a suprapubic incision. After the operation prop the patient up in bed, and treat the shock by pituitarin, and by giving saline fluid per rectum.

*Describe Chronic Perforation.*

Chronic perforation usually occurs from an ulcer situated



upon the posterior wall of the stomach, and, as previously mentioned, generally forms a perigastric abscess. The latter frequently passes upwards beneath the vault of the diaphragm, thus causing a sub-phrenic abscess. (*See Part IV.*)

## CANCER OF THE STOMACH.

### *Describe Carcinoma of the Stomach.*

Carcinoma at the **cardia** is usually an epithelioma; in the **body of the stomach** an adeno-carcinoma, frequently undergoing colloid degeneration; and at the **pylorus** a scirrhus or an encephaloid cancer. The disease is most commonly met with between the ages of forty and sixty, and is more common in males than in females. In 71 per cent. of cases the cancer is grafted upon a previous ulcer—the so-called “ulcer-cancer.” Gastric cancer usually spreads in the direction of the lesser curvature, and so rarely involves the duodenum. The submucous coat of the stomach is specially invaded. The pancreas and liver are very liable to become secondarily involved. The gastro-epiploic and left gastric lymph glands are practically always affected in the disease, and so have to be removed in a radical operation.

### *Give the Clinical Features.*

A cancer situated in the region of either the pyloric or cardiac orifices will give rise to more definite signs and symptoms than one growing in the body of the stomach. Very frequently the features resemble those of a gastric ulcer. In a typical case, however, the following will be noticed:—

1. PAIN . . . More diffuse, more constant, and less acute than in ulcer. **The pain is not relieved when the stomach is empty.**
2. VOMITING . . . Mainly present when the growth is in the pyloric area. The vomited con-



tents have an offensive odour, often contain sarcinæ, usually the Oppler-Boas bacillus, and practically always blood. The hæmorrhage may either be "occult," or cause the "coffee-grounds" appearance.

3. SWELLING . On abdominal palpation a tumour can frequently be recognised in the advanced stages of the disease. The tumour moves with respiration, can be moved laterally, and often has a transmitted pulsation from the aorta.

4. ANÆMIA AND LOSS OF WEIGHT.

5. A SLIGHT LEUCOCYTOSIS.

6. DIMINUTION OR ABSENCE OF FREE HCl.

7. SOMETIMES ASCITES.

8. A LOW BLOOD-PRESSURE AND A SOMEWHAT FEEBLE PULSE.

*Give the Treatment of Gastric Carcinoma.*

(a) When affecting the cardiac orifice—**gastrostomy**.

(b) When affecting the pylorus—**partial gastrectomy** if possible, followed or preceded by **posterior gastro-jejunostomy**.

## CARDIO-SPASM.

*Describe Cardio-Spasm.*

This is a condition in which the cardiac orifice of the stomach is considerably narrowed, and the lower portion of the œsophagus dilated. In the mucous membrane of the dilated œsophagus, numerous ulcers are present. Great muscular hypertrophy is found at the cardiac opening, but **no** ulcers in its mucosa.



*Give the Etiology.*

Many theories have been put forward as an explanation of this condition, the principle ones being :—

1. A defect in the neuro-muscular mechanism of the lower part of the œsophagus.
2. Emotional and hysterical crises, causing spasm of the cardiac sphincter.
3. The spasm is secondary to an inflammation of the adjacent mucous membrane.
4. The disease is due to some developmental anomaly of the lower part of the œsophagus.

*What are the Clinical Features ?*

1. Dysphagia—often intermittent—both for solids and liquids.
2. Sometimes solids can be swallowed more easily than liquids.
3. A feeling of weight in the thorax on attempts at swallowing.
4. Regurgitation of undigested food ; the food showing no evidence of gastric digestion, and no free HCl.
5. With a little pressure a bougie can be passed through the constriction into the stomach.
6. With X-rays a fusiform shadow is seen after a bismuth meal.
7. Examination with the œsophagoscope will reveal the condition.

*Give the Treatment of Cardio-Spasm.*

The prognosis is unfavourable. A Gottstein's dilating sound, or a Brüning's dilator should be used. The former is simpler to use, as the latter is introduced by means of an œsophagoscope. Gottstein's instrument is passed, and the bulb is filled with water, the pressure gradually overcoming the contracted sphincter.



## HOURL-GLASS STOMACH.

### *Describe Hour-Glass Stomach.*

An hour-glass stomach is usually secondary to an ulcer of the lesser curvature which has healed. The cardiac segment of the stomach dilates, and if any pyloric stenosis be present, the pyloric segment of the stomach also dilates. The upper dilatation is the bigger of the two, and is hidden beneath the costal margin.

### *What are the Clinical Features?*

The signs and symptoms of hour-glass stomach closely resemble those of dilatation of the stomach, *i.e.* vomiting, pain, and offensive eructations. The two separate compartments can be demonstrated by any one of the following methods:—

1. Pass a stomach-tube, and introduce a measured quantity of tepid water; empty the stomach, and measure the returned quantity—a loss will be noted.
2. Now press upon the epigastrium, and an extra amount of dirty stomach contents will be passed by the tube.
3. Give the two halves of a Seidlitz powder; the resulting gas can be heard passing through the gastric constriction.
4. Examination by the screen after a bismuth meal will demonstrate the condition. This is the ideal method of examination.

### *Give the Treatment.*

The usual treatment is to perform **gastro-jejunostomy**, the upper or cardiac segment being united to the jejunum. When the cardiac and pyloric compartments are of equal size, and there is no pyloric stenosis, they can be united laterally—**gastro-anastomosis**. In early cases a **gastro-plasty** may be sufficient. In gastropasty, an incision is



made over the constriction in the long axis of the stomach, and the resulting wound is sutured at right angles to the long axis.

## DUODENAL ULCER.

*What are the Varieties of Duodenal Ulcer?*

- (a) From burns.
- (b) Uræmic.
- (c) Tubercular—secondary to phthisis.
- (d) Embolic—
  - 1. Post-operative.
  - 2. In the newly-born, leading to melæna neonatorum.
- (e) Chronic.

*Describe Chronic Duodenal Ulcer.*

This is usually found in the first part of the duodenum, usually within  $1\frac{1}{4}$  in. of the pylorus. A small superficial ulcer is often present on the opposite wall, "the kissing ulcer of Monynihan." The main ulcer has a central depression with indurated margins. Unlike gastric ulcer it rarely becomes malignant. It is more common in males than in females, and occurs between the ages of twenty-five and forty.

*Give the Clinical Features of Duodenal Ulcer.*

1. A feeling of discomfort and bulging in the epigastrium about two hours after meals.
2. Heartburn and eructation of gas.
3. Marked flatulence after eating.
4. Attacks of pain—"hunger-pain"—relieved on eating food or by taking an alkaline mixture. The pain is most acute about 12 a.m. and 2 a.m. Frequently the pain is relieved by pressure.
5. Complete remission of the symptoms for weeks at a time.



6. The attacks are commoner in winter than in summer, and are very apt to come on from overwork or worry.
7. Occult blood in the stools ; sometimes melæna.
8. Slight rigidity of the upper part of the right rectus muscle during an attack.
9. Tenderness in the middle line, and slightly to the right above the umbilicus.
10. A brisk epigastric reflex.
11. Rapid gastric peristalsis as shown by the X-rays.
12. Vomiting is rare ; it usually indicates either hæmorrhage into the stomach, or a commencing pyloric stenosis.
13. A positive Cammidge reaction can often be obtained.
14. A high blood pressure (contrast with gastric cancer).

#### *What is the Treatment ?*

If a first attack, medical measures, combined with rest, may be tried. Sooner or later, however, gastro-jejunostomy will be required. In addition, the ulcer should be infolded.

#### *Describe Perforation of a Duodenal Ulcer.*

Duodenal perforation is more frequent than gastric perforation. The escaping fluid usually collects in the right renal pouch, then passes down the outer border of the ascending colon, and finally gravitates into the pouch of Douglas. The staff of the Royal Infirmary, Edinburgh, investigated two hundred cases of duodenal perforation. The main findings of their report are :—

- (a) A good many cases have no history of indigestion. Previous to the perforation there is no sign or symptom which gives warning that perforation is imminent.
- (b) The commonest time for perforation is  $1\frac{1}{2}$  to 3 hours after a meal.
- (c) The commonest site is on the anterior wall of the first part, within  $1\frac{1}{4}$  inches of the pylorus.



- (d) The pain is very acute, is commonest above the umbilicus and to the right of the middle line, and in the majority of cases, does not radiate.
- (e) Vomiting is a variable feature. Once or twice is common. Frequent vomiting or hæmatemesis is a grave sign.
- (f) In the majority of cases there is an absence of marked reaction. A subnormal temperature together with a comparatively rapid pulse is of grave omen.
- (g) Modification of the liver dulness—when diminished this is a valuable sign, but when it is unaltered, no reliance can be placed upon the sign.

*Give the Treatment of Duodenal Perforation.*

The perforation is sutured, and sometimes reinforced by an omental graft. Often an immediate gastro-jejunostomy is necessary in addition. Swab out all exudates, and introduce a pelvic drain for thirty-six or forty-eight hours. The post-operative complications are :—

- (a) Respiratory trouble, ranging from a slight bronchitis to pneumonia.
- (b) Subphrenic abscess.
- (c) Parotitis.
- (d) Post-operative hæmatemesis.

*Describe Melæna Neonatorum.*

In this condition multiple ulcers or hæmorrhagic infarcts occur in the stomach and upper part of the duodenum. During thrombosis of the umbilical vein, thrombi have been carried into the general circulation, and caused infarction of the stomach and duodenum. These infarcts are digested by the gastric juice, and ulcers result. The child suffers from severe melæna and rapidly becomes blanched. The treatment consists in transfusion of blood ; about six to seven ounces being introduced into the child's circulation. The blood must not be introduced too rapidly, or acute cardiac dilatation will occur.

## ACUTE INTESTINAL OBSTRUCTION.

*What are the Common Causes of Acute Intestinal Obstruction?*

- (a) External hernia.
- (b) Internal hernia.
- (c) Acute intussusception.
- (d) Volvulus.
- (e) Strangulation by peritonitic bands.
- (f) Gall-stone ileus.
- (g) Impaction of a foreign body.
- (h) Strangulation by a long vermiform appendix or a Meckel's diverticulum.
- (i) Embolism and thrombosis of the mesenteric blood vessels.

*Give the Clinical Features.*

Previous to the acute obstruction the individual is usually in good health. The condition comes on suddenly. The main signs and symptoms are :—

1. Acute abdominal pain with attacks of violent colic.
2. Collapse, with a rapid, small, thready pulse.
3. Vomiting: first the contents of the stomach, then bile-stained debris, and lastly vomit with a faecal odour.
4. Nausea and eructations.
5. Absolute constipation, both of faeces and flatus.
6. Shallow, sighing respiration.
7. Clammy, cold skin.
8. Marked thirst.
9. Subnormal temperature.
10. Cramp-like pains in the muscles of the calf.
11. Absence of tenesmus.
12. More or less tympanitic distension of the abdomen.
13. The abdominal wall is *not* rigid and *not* tender.
14. The patient is conscious, but does not realise his dangerous condition.



*What is the Morbid Anatomy?*

At the time of operation it will be noted that the **segment of bowel above the lesion** is:—

- (a) Distended with gas and intestinal fluids; its walls are œdematous, congested, hæmorrhagic, and present small patches of erosion on the mucosa.

The **segment of bowel below the lesion** is:—

- (a) Contracted: empty and hard to the touch, and
- (b) Pale in colour.

*How would you diagnose between Acute Obstruction of the Small Intestine and Acute Obstruction of the Colon?*

In acute obstruction of the colon, the “ladder” pattern may be seen on the abdominal wall; tympanitic distension is *more* marked than in obstruction of the small bowel; the onset is *less* acute, the shock is *less*, the pain *less* and the vomiting *less*.

*Give the Treatment of Acute Obstruction.*

Examine the region of the hernial orifices carefully. If these are normal, give the patient a turpentine enema, wash out the stomach, and empty the bladder (using a catheter if necessary). Now perform an exploratory laparotomy by an incision through one of the recti muscles below the umbilicus. First search for the cæcum; if it is empty examine the small bowel, but if it is distended—trace the colon until the site of obstruction is reached. Open the distended segment of bowel immediately above the lesion, or any distended coil if the cause cannot be immediately found, and fix in a Paul's tube. Two or three days later the cause of the obstruction can be operated upon.

*Describe Gall-stone Ileus.*

Gall-stone ileus most commonly occurs in elderly females who have suffered from cholelithiasis. The impacted stone is usually one from the gall bladder, which has ulcerated



through into the duodenum. The most frequent site of obstruction is in the lower part of the ileum. It is very unusual for the stone to perforate the wall of the ileum. The clinical features of gall-stone ileus resemble those already described, except that the pain, shock, and tympanites are less marked than in other forms of acute obstruction. Vomiting, however, is a very distressing symptom.

## INTUSSUSCEPTION.

### *Describe Intussusception.*

This is a condition in which one part of the intestinal canal is invaginated into the interior of an adjacent part. The receiving tube or sheath is termed the **intussuscipiens**; the entering tube and returning tube together are known as the **intussusceptum**. The junction of the entering and returning layers forms the **apex**, whilst the junction of the returning layer with the sheath is called the **neck**. The mesentery enters between the entering and returning layers on the concave side of the intussusception.

### *What are the Varieties of Intussusception?*

- |                 |   |             |
|-----------------|---|-------------|
| 1. Entero-colic | { | Ileo-cæcal. |
|                 |   | Ileo-colic. |
|                 |   | Cæcal.      |
| 2. Colic.       |   |             |
| 3. Enteric.     |   |             |

### *Give the Pathology and Morbid Anatomy of Intussusception.*

The disease is most common in strong infants suffering from some error in diet or from diarrhœa, and is brought about by exaggerated peristaltic action. Owing to the mesenteric vessels which supply the intussusceptum being twisted, the apex becomes œdematous, and the included bowel greatly congested. Extravasation of blood takes place into the walls of the intestine, and also into the lumen. At a later period bacterial infection of the surrounding parts



occurs. In untreated cases the included segment of bowel becomes gangrenous; the sheath, in exceptional cases, dies. An intussusception increases at the expense of the outer tube, the apex being a fixed point.

*What are the Clinical Features?*

1. Sudden agonising pain, repeated at intervals.
2. The child lies with a pallid face, dilated pupils, and flexed hips.
3. One or two attacks of vomiting; *not* persistent and *not* fæcal.
4. One normal stool, then
5. Tenesmus, with the passage of blood-stained mucus, like red-currant jelly.
6. No distension of the abdomen.
7. Flaccid abdominal wall.
8. After giving an anæsthetic, examine the abdominal wall; a swelling with a sausage-like outline will be found in the region of the transverse or descending colon.
9. The iliac fossa is empty.
10. The intussusception may be recognised on rectal examination; the sphincters are relaxed.

*Give the Treatment.*

Operate as early as possible before toxæmia or peritonitis occurs. Make an incision over the swelling and attempt to reduce it by gently squeezing the sheath. **Never pull upon the entering segment.** Difficulty in reduction is usually due to adhesions between the opposed peritoneal surfaces, or to œdema of the apex. If cautious manipulation fails to reduce the swelling, unite the sheath and intussusceptum at the neck by a continuous stitch. Make a longitudinal incision into the sheath and excise the intussusceptum; lastly, suture the opening in the sheath with two rows of stitches, the first one through all the coats, and the second, sero-muscular.

## VOLVULUS.

### *Describe Volvulus.*

Volvulus, in the great majority of cases, occurs in the pelvic colon, for here a long segment of bowel is attached by a very narrow mesentery. The condition may, however, take place in the region of the cæcum, or even in the small intestine. Volvulus results either from the intestine twisting upon its own axis, or from a twisting of the mesentery. The upper segment of the loop is generally rotated so that it passes in front of the lower segment. The condition usually happens suddenly, and is most common in adult males.

### *What are the Clinical Features?*

1. Sudden violent abdominal pain.
2. Vomiting in the late stages.
3. Distressing hiccough.
4. Absolute constipation.
5. Neither rigidity nor tenderness of the abdominal wall in early cases, but subsequently—
6. Tenderness in the left iliac fossa.
7. Severe tenesmus.
8. Great abdominal distension, embarrassing the heart and respiration.

### *Indicate the Treatment.*

Immediate operation should be recommended. Endeavour to undo the twist; failing this, make an artificial anus, and, later, resect the affected portion of bowel, restoring the continuity of the intestinal tube by end-to-end suture.



## CHRONIC INTESTINAL OBSTRUCTION.

*What are the Causes of Chronic Intestinal Obstruction?*

- |                                                     |   |                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A. From PRESSURE OUTSIDE THE BOWEL.                 | { | <ul style="list-style-type: none"> <li>(a) Tumours.</li> <li>(b) Peritonitic adhesions; most commonly following tubercular peritonitis or appendicitis.</li> <li>(c) Tubercular mesenteric glands.</li> <li>(d) Abnormal "membranes" and "kinks."</li> </ul>                                  |
| B. From DISEASE OF THE WALL OF THE BOWEL . . .      | { | <ul style="list-style-type: none"> <li>(a) Congenital stenosis</li> <li>(b) Non-malignant stricture, secondary to ulceration of the mucous membrane.</li> <li>(c) Malignant disease; most commonly columnar-celled carcinoma (adeno-cancer).</li> <li>(d) Sub-mucous fibromatosis.</li> </ul> |
| C. From CAUSES IN THE INTERIOR OF THE BOWEL . . . . | { | <ul style="list-style-type: none"> <li>(a) Foreign bodies.</li> <li>(b) Enteroliths.</li> <li>(c) Gall-stones.</li> <li>(d) Polypi.</li> </ul>                                                                                                                                                |

*Give the Varieties of Chronic Intestinal Obstruction.*

1. Incomplete obstruction.
2. Complete obstruction.
3. Acute obstruction supervening upon a chronic obstruction.

*Describe the Clinical Features of Chronic Intestinal Obstruction.*

Incomplete obstruction is first complained of, then either the impaction of a scybalous mass, or foreign body, or even congestion of the mucous membrane is sufficient to completely close the lumen of the bowel.

The signs and symptoms of incomplete obstruction are :—

- (a) Loss of appetite.
- (b) Colicky pain after eating.
- (c) Constipation, often alternately with diarrhoea.
- (d) Slight abdominal distension.
- (e) Sometimes visible peristaltic waves.

*When Complete Obstruction arises the Features are :—*

- (a) Tympanites, interfering with the heart and respiration.
- (b) Acute colicky pains.
- (c) Vomiting.
- (d) Complete constipation.

*Give the Treatment.*

If seen before complete obstruction ensues, expose the site of the disease, and deal with it according to its nature. When, however, complete obstruction has set in, a temporary colostomy must be performed, and if the patient recovers, an attempt may be made at a subsequent period to remove the obstructing agent.

*Give the Common Sites for Intestinal “Kinks.”*

- (a) Duodeno-jejunal junction.
- (b) Lower part of ileum. (Lane’s “kink.”)
- (c) Splenic flexures.
- (d) Pelvi-rectal junction, *i.e.* junction of the pelvic colon and the rectum.

*Describe Lane’s “Kink.”*

This is found in the terminal part of the ileum, within the last four inches. It is either V-shaped or  $\Lambda$ -shaped. From the angulation a band (the ileo-pelvic band) proceeds downwards to fuse with the parietal peritoneum. Lane explains this band as occurring from the crystallisation of the lines of force and being Nature’s attempt to correct ptosis of the cæcum. According to Gray and Anderson, the band arises from the fusion of the under aspect of the ileum and its mesentery with the posterior part of the



parietal peritoneum, and during growth these adhesions have become drawn out.

*What is Jackson's Membrane?*

This membrane, which is occasionally found covering the anterior aspect of the ascending colon, commences from just outside the hepatic flexure and spreads over the ascending colon to join the internal surface of the colon about three inches above the capsule of the cæcum. It resembles an oedematous arachnoid. It is thin, and consists of long straight unbranching blood vessels embedded in shining bands of connective tissue. The membrane can be readily stripped from the colon. It tends to fix the colon and produces fæcal stasis.

*Mention the Chief Theories held with regard to this Membrane.*

- (a) *Lane*.—Nature's attempt to correct ptosis of the colon.
- (b) *Jackson*.—The result of a membranous pericolicitis.
- (c) *Jonnesco*.—The adult persistence of a congenital band often found in the foetus—the parieto-colic fold.
- (d) *Gray and Anderson*.—The right margin of the great omentum has, during development, become adherent to the dorsal parietal peritoneum opposite the hepatic flexure, and along the outer side of the ascending colon.

*Give the Clinical Features of Kinks and Membranes.*

The clinical features resulting from chronic fæcal stasis are those of intestinal autointoxication. They are:—

1. Staining and wrinkling of the skin.
2. Excessive sweating.
3. Cold extremities.
4. Loss of flesh and muscular degeneration.
5. Mental torpor.
6. Headache.
7. Constipation.



8. Foul-smelling faeces with excess of mucus.
9. Sensitiveness of the right iliac region.
10. Arthritis deformans often follows.

If the condition is not relieved by dieting, massage, and aperients, operation must be resorted to. In old-standing cases ileo-sigmoidostomy may be necessary.

#### *How is Faecal Stasis demonstrated?*

For two or three days previous to the test, empty the colon by aperients and enemata. On the morning of the test, if the bowels do not open naturally, administer an enema, but during the time when the observation is in progress the bowel function must not be interfered with.

Now give the patient a bismuth breakfast. This consists of porridge or bread and milk, to which has been added two ounces of bismuth oxy-chloride. Observe the patient at stated intervals with the screen, and note where delay occurs.

#### *What is the Normal Rate at which the Intestinal Contents pass?*

They reach the **Cæcum** in  $4\frac{1}{2}$  hours.

„ „ **Hepatic flexure** in  $6\frac{1}{2}$  hours.

„ „ **Splenic flexure** in 9 hours.

„ „ **Junction of descending and iliac colon** in 11 hours.

„ „ **Junction of iliac and pelvic colon** in 12 hours.

„ „ **Junction of pelvic colon and rectum** in 18 hours.

## CANCER OF THE BOWEL.

### *Describe Cancer of the Bowel.*

Cancer of the bowel is usually a columnar-celled carcinoma growing from the epithelium of Lieberkühn's follicles. It quickly infiltrates the submucosa, and in time the muscular and peritoneal tunics. Cancer is the commonest cause of stricture of the large bowel. It does not kill because of its malignancy, but owing to the mechanical obstruction it offers



to the passage of fæces. Metastatic growths are uncommon ; they may, however, be found in the liver, peritoneum, or mesenteric glands. The likely situations for cancer of the bowel are (a) pelvic colon and rectum, (b) cæcum, and (c) descending colon.

The intestine above the stricture is dilated, and its mucous membrane the seat of chronic catarrh and ulcers.

### *What are the Clinical Features ?*

The signs and symptoms are those of chronic obstruction with the addition of—

- (a) Paroxysmal pains shooting to the loins or down the back of the thighs.
- (b) Melæna.
- (c) A large quantity of mucus in the stools owing to the colitis above the seat of the growth.

The treatment will consist in removing the growth widely, and later performing a lateral anastomosis or an end-to-end suture.

## VERMIFORM APPENDIX.

### *Briefly describe the Anatomy of the Vermiform Appendix.*

Normally, the vermiform appendix springs from the postero-internal aspect of the cæcum, its origin being represented on the body surface by Lanz's point. The appendix is a narrow tube about  $3\frac{1}{2}$  inches in length, connected to the enteric mesentery by the meso-appendix. Its blood supply is derived from a branch of the ileo-colic artery. Guarding the orifice of the appendix is a small valve—the valve of Gerlach. In young persons the sub-mucous coat is exceedingly rich in lymphoid tissue. The apex most commonly assumes one of three positions ; (a) retro-cæcal, (b) pelvic, in females forming an anterior relation of the right ovary ; or (c) retro-iliac, passing upwards and to the left behind the terminal portion of the ileum.



*What are the Varieties of Appendicitis?*

1. Acute.
2. Recurrent.
3. Chronic.

*Give the Pathology of Appendicitis.*

Appendicitis is caused by the action of the bacillus coli communis upon the mucous and submucous coats of the organ. The colon bacillus is often accompanied by the streptococcus, and the staphylococcus pyogenes aureus. Habitual constipation and attacks of colitis predispose to the disease. Males are more frequently attacked than females, and the condition is most common between the ages of twelve and thirty.

During the attack, the appendix is swollen, acutely inflamed, and filled with muco-pus and desquamated epithelium. Very often appendicular concretions, the so-called "date stones" form. They consist of epithelial debris, lime salts and faeces. Ulcers and erosions are frequently produced. The extension of such an ulcer may cause perforation. Perforation may also arise from necrosis, or from the bursting of an appendicular abscess.

A certain amount of peritonitis always co-exists with appendicitis, and this may lead to the formation of localised adhesions, into which the contents of the appendix may perforate and cause a peri-appendicular abscess. Such an abscess will be generally found internal, posterior, or external to the cæcum, or in the pelvis. In grave cases, diffuse instead of localised peritonitis occurs. If the areolar tissue in the iliac fossa is involved, perityphilitis results.

*Give the Clinical Features.*

The signs and symptoms about to be described hold good when the appendix is in its usual situation.

- (a) Vague abdominal pain referred to the umbilicus, gradually becoming more severe.
- (b) Nausea, and often vomiting.



- (c) Rigidity of the abdominal wall below the umbilicus.
- (d) Tenderness over the right iliac fossa; most marked over M'Burney's point (*i.e.* the junction of the outer and middle thirds of a line joining the right anterior superior iliac spine to the umbilicus).
- (e) Elevated temperature— $100^{\circ}$ — $101^{\circ}$  F.
- (f) Rapid pulse.
- (g) Obstruction of the bowels, both for fæces and flatus.

If only the appendix is inflamed, these symptoms practically subside in twelve to twenty hours.

When the appendix is retro-cæcal, flexion of the right hip will be noticed, pain in the loin is often complained of, and the abdominal wall continues to move with respiration.

*What are the Clinical Features when the Appendix is hanging in the Pelvis?*

1. Less marked abdominal signs.
2. An abscess can be detected in the pouch of Douglas on rectal or vaginal examination.
3. Frequent micturition, with pain at the end of the act.
4. Rectal tenesmus.
5. Often pain shooting down the inner side of the right leg, from irritation of the obturator nerve.

*From what other Conditions must Appendicitis be diagnosed?*

- (a) Perforation of a gastric or duodenal ulcer.
- (b) Cholecystitis.
- (c) Acute gastro-duodenal catarrh.
- (d) Acute intestinal obstruction.
- (e) Pneumonia.
- (f) Diaphragmatic pleurisy.
- (g) Diverticulitis (*i.e.* inflammation of a Meckel's diverticulum).
- (h) Typhoid fever.
- (i) Intestinal colic.
- (j) Pelvic peritonitis.
- (k) Rupture of an ectopic gestation.
- (l) Cancer of the cæcum.



*Give the Treatment.*

If **all** the main features, *i.e.* pain, rigidity, tenderness, fever, vomiting, and quick pulse begin to disappear, it is justifiable to try expectant measures. If **any one** cardinal sign persists, however, operate immediately. The expectant treatment is to keep the patient in Fowler's position with the knees flexed, and hot fomentations applied over the right iliac fossa. Nothing should be given orally except sips of hot water.

For removal of appendix, see *Operative Surgery Catechism*, Part III.

*Name the Post-Operative Complications of Appendicitis.*

1. Obstruction of the bowels.
2. Sinus.
3. Fæcal fistula.
4. Thrombosis of the femoral vein.
5. Sub-phrenic abscess.
6. Secondary abscesses.
7. Ventral hernia.
8. Pyelophlebitis.

*Give the Surgical Treatment of Ulcerative Colitis.*

Appendicostomy should be performed. Wash out the bowel frequently through the opening, but when the diarrhoea has been controlled, twice daily is sufficient. Many different solutions have been recommended; a very good one is 5 per cent. protargol in warm water. Inject half-a-pint of this fluid, leave it in the bowel for ten minutes, then wash out with plain warm water. In ordinary **mucous colitis**, 0·5 per cent. of protargol should be used for irrigation. For **dysentery**, four to eight pints of weak protargol solution should be injected twice or thrice daily.





# INDEX

| A                               |                     | PAGE               |                             |                        | PAGE               |
|---------------------------------|---------------------|--------------------|-----------------------------|------------------------|--------------------|
| Abdominal Wall, diseases of     |                     |                    | Bassini's operation         |                        | 341                |
|                                 | 233, <i>et seq.</i> |                    | Bazin's disease             |                        | 6                  |
| „                               | tumours             | 233                | Bennett's fracture          |                        | 104                |
| „                               | wounds              | 233, 234           | Benign tumours              |                        | 23                 |
| Abscess                         |                     | 1, <i>et seq.</i>  | Bier's method               |                        | 55                 |
| „                               | antrum              | 190                | „                           | bandage                | 3, 59              |
| „                               | brain               | 163, 164           | Bile ducts, diseases of     | 296, <i>et seq.</i>    |                    |
| „                               | breast              | 146                | Bladder, diseases of        | 258, <i>et seq.</i>    |                    |
| „                               | bone                | 136                | „                           | cancer of              | 267                |
| „                               | ear                 | 221                | „                           | papilloma of           | 266                |
| „                               | jaw                 | 190                | „                           | sarcoma of             | 266                |
| „                               | liver               | 293                | „                           | stone of               | 265                |
| „                               | parotid gland       | 198                | „                           | tubercle of            | 264                |
| „                               | spleen              | 307                | „                           | rupture of             | 260                |
| „                               | subphrenic          | 240                | Blepharitis                 |                        | 223                |
| „                               | tonsils             | 199                | Blood vessels, diseases of  | 35-43                  |                    |
| Achondroplasia                  |                     | 141                | Bones, diseases of          | 128, <i>et seq.</i>    |                    |
| Acromegaly                      |                     | 140                | „                           | injuries of            | 73, <i>et seq.</i> |
| Actinomycosis                   |                     | 17                 | Bowel, diseases of          | 365, <i>et seq.</i>    |                    |
| Adeno-cancer                    |                     | 31, 149            | „                           | cancer of              | 376                |
| Adenoids                        |                     | 199                | „                           | chronic obstruction of | 373                |
| Adenoma, scalp                  |                     | 153                | „                           | intussusception        | 370                |
| „                               | kidney              | 257                | „                           | acute obstruction      | 368                |
| „                               | rectum and anus     | 324                | „                           | ulcer of               | 365                |
| Ambulatory method               |                     | 121                | „                           | volvulus               | 372                |
| Anæsthesia                      |                     | 33                 | Box splint                  |                        | 121                |
| Anus and rectal canal, diseases |                     |                    | Brain, pyogenic diseases of |                        | 162                |
| of                              | 312, <i>et seq.</i> |                    | Brasdor's method            |                        | 38                 |
| Analgesia                       |                     | 33                 | Breast abscess of           | 146-149                |                    |
| Anel's method                   |                     | 38                 | Brodie's abscess            |                        | 136                |
| Aneurysm                        |                     | 36, <i>et seq.</i> | Bronchocele                 | 204, <i>et seq.</i>    |                    |
| Angioma                         |                     | 28                 | Bruning's dilator           |                        | 363                |
| Ankle-joint, dislocation of     |                     | 125                | Bryant's triangle           |                        | 106                |
| Ankylosis                       |                     | 54                 | Burns                       |                        | 14-16              |
| Anthrax                         |                     | 16, 20             | C                           |                        |                    |
| Antrum, diseases of             |                     | 190                | Cachexia strumipriva        |                        | 206                |
| Antyllus' method                |                     | 38                 | Caird's method              |                        | 259                |
| Anuria                          |                     | 249                | Calculi                     | 197, 249, 250, 301     |                    |
| Appendix, diseases of           | 377, <i>et seq.</i> |                    | Cambridge reaction          |                        | 366                |
| Arterial hæmorrhage             |                     | 35                 | Cancer                      | 29, <i>et seq.</i>     |                    |
| Arthritis                       |                     | 53, 55, 58         | „                           | abdomen                | 263                |
| Ascites                         |                     | 239                | „                           | bladder                | 267                |
| Atrophy of bone                 |                     | 128                | „                           | encephaloid            | 31                 |
| „                               | muscle              | 310                | „                           | kidney                 | 257                |
| Axillary aneurysm               |                     | 41                 | „                           | larynx                 | 218                |
| B                               |                     |                    | „                           | liver                  | 296                |
| Bacterial diseases              | 10, 16-22, 353      |                    | „                           | œsophagus              | 211                |
| Base, fracture of               | 159 <i>et seq.</i>  |                    | „                           | pancreas               | 304                |



|                                              | PAGE                |                                     | PAGE                |
|----------------------------------------------|---------------------|-------------------------------------|---------------------|
| Cancer, penis . . . . .                      | 275                 | Cysts, jaw . . . . .                | 190                 |
| „ pharynx . . . . .                          | 200                 | „ mouth . . . . .                   | 194                 |
| „ prostate . . . . .                         | 273                 | „ pancreas . . . . .                | 305                 |
| „ rectum . . . . .                           | 326                 |                                     |                     |
| „ spine . . . . .                            | 181                 | D                                   |                     |
| „ stomach . . . . .                          | 361                 | Dactylitis, tuberculous . . . . .   | 140                 |
| „ testis . . . . .                           | 278                 | Date-stone concretions . . . . .    | 378                 |
| Capillary hæmorrhage . . . . .               | 35                  | Davies-Colley's operation . . . . . | 52                  |
| Carbolic acid gangrene . . . . .             | 9                   | Decortication of lung . . . . .     | 144                 |
| Cardio-spasm . . . . .                       | 362                 | Deformans, arthritis . . . . .      | 58                  |
| Cathcart's method . . . . .                  | 259                 | „ ostitis . . . . .                 | 137                 |
| Catheter method . . . . .                    | 219                 | Deformities of limbs . . . . .      | 43-53               |
| Cauda Equina, injury to . . . . .            | 177                 | „ of spine . . . . .                | 178                 |
| Cephal-hæmatoma . . . . .                    | 153                 | Dercum's disease . . . . .          | 26                  |
| Cephaloceles . . . . .                       | 160                 | Dermoids, scalp . . . . .           | 153                 |
| Cerebellar abscess . . . . .                 | 164                 | „ tongue . . . . .                  | 195                 |
| Chancroids . . . . .                         | 66                  | „ abdominal wall . . . . .          | 233                 |
| Charcot's disease . . . . .                  | 57                  | Diastasis . . . . .                 | 74                  |
| Chauffeur's fracture . . . . .               | 101                 | Diphtheria . . . . .                | 16, 19              |
| Chiene's parallel lines . . . . .            | 107                 | Diseases of antrum . . . . .        | 190                 |
| „ operation . . . . .                        | 341                 | „ appendix . . . . .                | 377, <i>et seq.</i> |
| Cholangitis . . . . .                        | 299                 | „ bacterial . . . . .               | 16, <i>et seq.</i>  |
| Clavicle, fracture of . . . . .              | 80-84               | „ Bazin's . . . . .                 | 6                   |
| Cleft palate . . . . .                       | 187-189             | „ bone . . . . .                    | 128, <i>et seq.</i> |
| CO <sub>2</sub> snow . . . . .               | 29                  | „ Charcot's . . . . .               | 57                  |
| Coaptation stitches . . . . .                | 13                  | „ Dercum's . . . . .                | 26                  |
| Coley's fluid . . . . .                      | 30                  | „ genito-urinary . . . . .          | 271                 |
| Colic, biliary . . . . .                     | 298                 | „ Glenard's . . . . .               | 246                 |
| „ entero . . . . .                           | 370                 | „ Graves' . . . . .                 | 207                 |
| „ renal . . . . .                            | 253                 | „ joints . . . . .                  | 53, <i>et seq.</i>  |
| Colitis . . . . .                            | 380                 | „ kidney . . . . .                  | 241                 |
| Collapse of Lung . . . . .                   | 141, 145            | „ liver . . . . .                   | 292                 |
| Colles' fascia . . . . .                     | 291                 | „ mastoid . . . . .                 | 222                 |
| „ fracture . . . . .                         | 101, 103            | „ muscles . . . . .                 | 309, <i>et seq.</i> |
| „ law . . . . .                              | 70                  | „ nerves . . . . .                  | 32, <i>et seq.</i>  |
| Compression . . . . .                        | 25                  | „ Paget's . . . . .                 | 149                 |
| Concussion . . . . .                         | 154                 | „ pancreas . . . . .                | 301                 |
| Congenital dislocation . . . . .             | 47                  | „ penis . . . . .                   | 273                 |
| Conjoined tendon . . . . .                   | 336                 | „ peritoneum . . . . .              | 233                 |
| Conjunctiva, diseases of . . . . .           | 225, <i>et seq.</i> | „ prostate . . . . .                | 269                 |
| Contusion . . . . .                          | 12                  | „ pyogenic . . . . .                | 54, <i>et seq.</i>  |
| Courvoisier's law . . . . .                  | 299                 | „ Raynaud's . . . . .               | 8                   |
| Coxa Vara . . . . .                          | 48                  | „ Schlatter's . . . . .             | 118                 |
| Cranium, fractures and diseases of . . . . . | 154, <i>et seq.</i> | „ spine . . . . .                   | 169                 |
| Cryptorchism . . . . .                       | 275                 | „ venereal . . . . .                | 64, <i>et seq.</i>  |
| Cystitis . . . . .                           | 262                 | Dislocations . . . . .              | 77, <i>et seq.</i>  |
| Cystoscope . . . . .                         | 242                 | „ ankle-joint . . . . .             | 125                 |
| Cysts 24, 149, 166, 194, 223, 305            |                     | „ congenital . . . . .              | 47                  |
| „ brain . . . . .                            | 166                 | „ elbow-joint . . . . .             | 94                  |
| „ breast . . . . .                           | 148                 | „ hip-joint . . . . .               | 137                 |
| „ ear . . . . .                              | 220                 | „ jaw . . . . .                     | 79                  |
| „ eye . . . . .                              | 224                 | „ knee-joint . . . . .              | 117                 |
| „ hydatid . . . . .                          | 295                 | „ patella . . . . .                 | 114                 |
| „ hydronephritis . . . . .                   | 248                 | „ shoulder-joint . . . . .          | 85                  |
|                                              |                     | Diverticulum, Meckel's . . . . .    | 208                 |



|                                      | PAGE                     |                                     | PAGE                |
|--------------------------------------|--------------------------|-------------------------------------|---------------------|
| Duodenal ulcer . . .                 | 365                      | Foreign bodies in larynx or         |                     |
| Duodenum, diseases of . . .          | 352                      | bronchi . . .                       | 218                 |
| Dupuytren's contraction . . .        | 44                       | "    in intestine . . .             | 368, 373            |
| "    fracture . . .                  | 123                      | Fowler's position . . .             | 380                 |
| "    splint . . .                    | 123                      | Fractures . . .                     | 77, <i>et seq.</i>  |
| Dysentery . . .                      | 380                      | "    base of cranium . . .          | 159                 |
| Dysphagia . . .                      | 263                      | "    Bennett's . . .                | 104                 |
| Dystopia . . .                       | 244                      | "    chauffeur's . . .              | 101                 |
|                                      |                          | "    clavicle . . .                 | 80                  |
|                                      |                          | "    cranium . . .                  | 154                 |
| E                                    |                          | "    Dupuytren's . . .              | 123                 |
| Ear, diseases of . . .               | 219                      | "    femur . . .                    | 109                 |
| Ectopia vesica . . .                 | 260                      | "    fibula . . .                   | 119                 |
| "    testis . . .                    | 275                      | "    forearm . . .                  | 98                  |
| Ectropion . . .                      | 225                      | "    greenstick . . .               | 73                  |
| Elbow, dislocation of . . .          | 94-97                    | "    humerus . . .                  | 89                  |
| Electrolysis . . .                   | 29                       | "    jaw . . .                      | 79                  |
| Empyema . . .                        | 53, 142                  | "    leg . . .                      | 119                 |
| Encephalocele . . .                  | 161                      | "    maxilla . . .                  | 77                  |
| Endotheliomata . . .                 | 166                      | "    olecranon . . .                | 97                  |
| Enlargement, senile . . .            | 271                      | "    patella . . .                  | 115                 |
| Enterocoele . . .                    | 331                      | "    pelvis . . .                   | 105                 |
| Entropion . . .                      | 224                      | "    radius . . .                   | 98                  |
| Epididymitis . . .                   | 276                      | "    ribs . . .                     | 127                 |
| Epiphysis, tibia . . .               | 119                      | "    scapula . . .                  | 84                  |
| Epiplocele . . .                     | 331                      | "    Smith's . . .                  | 103                 |
| Epithelioma, anus . . .              | 325                      | "    spine . . .                    | 173                 |
| "    ear . . .                       | 220                      | "    sternum . . .                  | 127                 |
| "    penis . . .                     | 275                      | "    tibia . . .                    | 119                 |
| "    rectum . . .                    | 325                      | Fracture—dislocation of spine . . . | 173, <i>et seq.</i> |
| "    tongue . . .                    | 194                      | Frog face . . .                     | 201                 |
| "    tonsils . . .                   | 200                      | Fungi of stomach . . .              | 353                 |
| Epulis . . .                         | 189, 191                 | Fungus testis . . .                 | 278                 |
| Erysipelas . . .                     | 16                       | Funicular hernia . . .              | 345                 |
| Erythema . . .                       | 17                       |                                     |                     |
| Extravasation of urine . . .         | 291                      |                                     |                     |
| Eye, diseases of . . .               | 223                      |                                     |                     |
|                                      |                          | G                                   |                     |
| F                                    |                          | Galactoceles . . .                  | 149                 |
| Face, diseases of and injuries . . . | 77, <i>et seq.</i> , 183 | Gall bladder, diseases of . . .     | 296                 |
| Fæcal Stasis . . .                   | 376                      | Gallstones . . .                    | 296, 369            |
| Fascia of Colles . . .               | 291                      | Ganglion . . .                      | 25                  |
| Fat necrosis . . .                   | 302                      | Gangrene . . .                      | 7, <i>et seq.</i>   |
| Femoral hernia . . .                 | 346, <i>et seq.</i>      | Gastrectomy . . .                   | 362                 |
| Femur, fracture of . . .             | 109-114                  | Gastric ulcer . . .                 | 356                 |
| Fibromata . . .                      | 166, 233, 324            | Gastro-anastomosis . . .            | 364                 |
| Fibrositis . . .                     | 310                      | Gastro-jejunosotomy . . .           | 362                 |
| Fistula . . .                        | 2                        | Gastroplasty . . .                  | 364                 |
| "    anal . . .                      | 322                      | Gastrostomy . . .                   | 362                 |
| "    salivary . . .                  | 196                      | Genito-urinary diseases . . .       | 241                 |
| "    urachal . . .                   | 234                      | Genu valgum . . .                   | 49                  |
| Flat-foot . . .                      | 50                       | Gerlach's valve . . .               | 377                 |
| Fluid, Coley's . . .                 | 30                       | Gimbernat's ligament . . .          | 346                 |
| "    Morton's . . .                  | 181                      | Glanders . . .                      | 16, 18              |
| Forearm, fracture of . . .           | 98-105                   | Gleet . . .                         | 65                  |
|                                      |                          | Glenard's disease . . .             | 246                 |



|                                     | PAGE                |                                      | PAGE                |
|-------------------------------------|---------------------|--------------------------------------|---------------------|
| Gliomata . . . . .                  | 165                 | Incised wound . . . . .              | 13                  |
| Glossitis . . . . .                 | 192                 | Infantile paralysis . . . . .        | 43                  |
| Gonorrhœal disease . . . . .        | 55, 64-66, 237      | "    hernia . . . . .                | 346                 |
| Goitre . . . . .                    | 204, <i>et seq.</i> | Infective gangrene . . . . .         | 10                  |
| Gottstein's sound . . . . .         | 363                 | Inguinal aneurysm . . . . .          | 42                  |
| Gouty joints . . . . .              | 59                  | "    hernia . . . . .                | 340                 |
| Graves' disease . . . . .           | 207                 | Injuries of bone . . . . .           | 73, <i>et seq.</i>  |
| Greenstick fracture . . . . .       | 73                  | Intestinal obstruction . . . . .     | 368                 |
| Gumboil . . . . .                   | 190                 | Intussusception . . . . .            | 370                 |
| Gummata . . . . .                   | 166                 | Iritis . . . . .                     | 227                 |
|                                     |                     | Ischaemic contracture . . . . .      | 311                 |
|                                     |                     | Ischio-rectal abscess . . . . .      | 320                 |
|                                     |                     |                                      |                     |
|                                     |                     | J                                    |                     |
| H                                   |                     | Jackson's membrane . . . . .         | 375                 |
| Hæmatemesis . . . . .               | 355                 | Jaw, dislocation of . . . . .        | 79                  |
| Hæmatocele . . . . .                | 285                 | "    fracture of . . . . .           | 79                  |
| Hæmatoma . . . . .                  | 153                 | Jones' Operation . . . . .           | 52                  |
| Hæmatomyelia . . . . .              | 172                 |                                      |                     |
| Hæmaturia . . . . .                 | 245, 268            |                                      |                     |
| Hæmorrhachis . . . . .              | 172                 |                                      |                     |
| Hæmorrhage . . . . .                | 156, 245, 268, 357  |                                      |                     |
| Hæmorrhoid . . . . .                | 316, <i>et seq.</i> | K                                    |                     |
| Hæmothorax . . . . .                | 141                 | Kidney, diseases of . . . . .        | 241                 |
| Harelip . . . . .                   | 183, <i>et seq.</i> | "    injuries of . . . . .           | 244                 |
| H. Cl, free . . . . .               | 358                 | "    tuberculosis of . . . . .       | 255                 |
| Healing ulcer . . . . .             | 4                   | "    tumours of . . . . .            | 257                 |
| Heberden's nodes . . . . .          | 59                  | Klapp's suction bell . . . . .       | 3, 199              |
| Hectine . . . . .                   | 71                  | Kinks of the bowel . . . . .         | 373                 |
| Hernia . . . . .                    | 330, <i>et seq.</i> | Knee-joint, dislocation of . . . . . | 117                 |
| "    femoral . . . . .              | 346                 | Kocher's method . . . . .            | 88                  |
| "    funicular . . . . .            | 345                 | "    operation . . . . .             | 341                 |
| "    infantile . . . . .            | 346                 | Kryoscopy . . . . .                  | 243                 |
| "    obturator . . . . .            | 351                 | Kyphosis . . . . .                   | 178                 |
| "    scrotal . . . . .              | 283                 |                                      |                     |
| "    strangulation of . . . . .     | 332                 |                                      |                     |
| "    umbilical . . . . .            | 350                 | L                                    |                     |
| Hilton's method . . . . .           | 2                   | Lacerated wound . . . . .            | 13                  |
| Hip-joint, dislocation of . . . . . | 107-109             | Lane's kink . . . . .                | 374                 |
| "    disease of . . . . .           | 61-63               | Lanz's point . . . . .               | 377                 |
| Horse-shoe splint . . . . .         | 124                 | Laryngotomy . . . . .                | 213, <i>et seq.</i> |
| Hour-glass stomach . . . . .        | 364                 | Larynx, diseases of . . . . .        | 213                 |
| Humerus, fracture of . . . . .      | 89-94               | Leg, fractures of . . . . .          | 119-124             |
| Hunter's method . . . . .           | 38                  | Leptomeningitis . . . . .            | 162                 |
| Hydatid disease of liver . . . . .  | 294                 | Leucoplakia . . . . .                | 193                 |
| Hydren-cephalocele . . . . .        | 161                 | Lipomata . . . . .                   | 25                  |
| Hydrocele of cord . . . . .         | 281                 | "    abdominal . . . . .             | 233                 |
| Hydronephrosis . . . . .            | 247                 | Liver, abcess . . . . .              | 293                 |
| Hydrophobia . . . . .               | 16, 18              | "    cancer . . . . .                | 296                 |
| Hydrops . . . . .                   | 53, 55, 58, 61      | "    diseases . . . . .              | 292, <i>et seq.</i> |
| Hydrothorax . . . . .               | 142                 | "    hydatids . . . . .              | 294                 |
| Hyperchloridia . . . . .            | 358                 | "    rupture . . . . .               | 292                 |
| Hypernephroma . . . . .             | 257                 | Lithotrite . . . . .                 | 266                 |
| Hypertrophic, pulmonary . . . . .   |                     | Lithotomy . . . . .                  | 266                 |
| osteo-arthropathy . . . . .         | 140                 | Long splint . . . . .                | 112                 |
| Hypochloridia . . . . .             | 358                 | Loose bodies . . . . .               | 56                  |
| Hysterical spine . . . . .          | 177                 | Lordosis . . . . .                   | 62, 178             |
|                                     |                     | Lorenz's method . . . . .            | 47                  |



|                                     | PAGE                |                                            | PAGE                |
|-------------------------------------|---------------------|--------------------------------------------|---------------------|
| Lower extremity, diseases of        | 46                  | Myeloma . . . . .                          | 131                 |
| "    hip-joint 106, <i>et seq.</i>  |                     | Myelocele . . . . .                        | 180                 |
| Ludwig's angina . . . . .           | 203                 | Myositis ossificans . . . . .              | 311                 |
| Lung, injuries . . . . .            | 141                 | Myxœdema . . . . .                         | 206                 |
| "    stab of . . . . .              | 145                 |                                            |                     |
| Lymphangitis . . . . .              | 3                   | N                                          |                     |
|                                     |                     | Nævi . . . . .                             | 153                 |
| M                                   |                     | Nasal bones, injuries of . . . . .         | 77                  |
| McBurney's point . . . . .          | 379                 | Naunyn's sign . . . . .                    | 299                 |
| Macewan's method . . . . .          | 38                  | Neck, diseases of . . . . .                | 202                 |
| "    operation . . . . .            | 334                 | Nelaton's test line . . . . .              | 106                 |
| Madelung's deformity . . . . .      | 44                  | Nephroptosis . . . . .                     | 246                 |
| Malformations of breast . . . . .   | 152                 | Nerves, diseases of . . . . .              | 32-35               |
| "    kidney . . . . .               | 244                 | Nitze's cystoscope . . . . .               | 267                 |
| "    rectum . . . . .               | 329                 |                                            |                     |
| Malignant gangrene . . . . .        | 11                  | O                                          |                     |
| "    tumours . . . . .              | 23, 29              | Obstruction, intestine . . . . .           | 368                 |
| Manson's method . . . . .           | 294                 | "    larynx . . . . .                      | 218                 |
| Mastitis . . . . .                  | 147                 | Obturator hernia . . . . .                 | 351                 |
| Mastoid disease . . . . .           | 222                 | Occult blood . . . . .                     | 366                 |
| Mastodynia . . . . .                | 152                 | Odontomata . . . . .                       | 26                  |
| Matas' operation (endo-             |                     | Œdema of larynx . . . . .                  | 216                 |
| aneurysmorrhaphy . . . . .          | 39                  | Œsophagoscopy . . . . .                    | 208                 |
| Maxilla, fractures of . . . . .     | 77-79               | Œsophagus, diseases of 208, <i>et seq.</i> |                     |
| Meckel's diverticulum . . . . .     | 234, 330            | Olecranon, fracture of . . . . .           | 97                  |
| Melæna neonatorum . . . . .         | 367                 | Operations, Davies-Colley's . . . . .      | 52                  |
| Mennier's test . . . . .            | 357                 | "    Duncan's . . . . .                    | 187                 |
| Meningitis . . . . .                | 162, 178            | "    Jones' . . . . .                      | 52                  |
| Meningocele . . . . .               | 161, 180            | "    Kocher's . . . . .                    | 341                 |
| Meningo-myelocele . . . . .         | 180                 | "    Macewan's . . . . .                   | 334                 |
| Meteorism . . . . .                 | 176, 245            | "    Matas' . . . . .                      | 39                  |
| Method, Caird's . . . . .           | 259                 | "    Mitchell's . . . . .                  | 319                 |
| "    Cathcart's . . . . .           | 259                 | "    Murphy's . . . . .                    | 54                  |
| "    Hilton's . . . . .             | 2                   | "    Phelp's . . . . .                     | 52                  |
| "    Hunter's . . . . .             | 38                  | "    Stacke-Schwartz's . . . . .           | 223                 |
| "    Kocher's . . . . .             | 88                  | "    Whitehead's . . . . .                 | 319                 |
| "    Lorenz's . . . . .             | 47                  | Opplre-Boas bacillus . . . . .             | 354                 |
| "    Macewan's . . . . .            | 39                  | Orchitis . . . . .                         | 277                 |
| "    Manson's . . . . .             | 294                 | Organic-acids in stomach . . . . .         | 353                 |
| "    Moore-Corradi's . . . . .      | 39                  | Osteo arthritis of spine . . . . .         | 177                 |
| "    Politzer's . . . . .           | 219                 | Osteomata . . . . .                        | 27, 181             |
| "    Syme's . . . . .               | 290                 | Osteomyelitis . . . . .                    | 134                 |
| "    Thiersch's . . . . .           | 7                   | Osteophytes . . . . .                      | 58                  |
| "    Valsalva's . . . . .           | 219                 | Osteoporosis . . . . .                     | 128                 |
| "    Wheelhouse's . . . . .         | 290                 | Ostitis deformans . . . . .                | 137, 221            |
| Mitchell's operation . . . . .      | 319                 | Oxalate calculi . . . . .                  | 250                 |
| Monyniham's kissing ulcer . . . . . | 365                 |                                            |                     |
| Moore-Corradi's method . . . . .    | 39                  | P                                          |                     |
| Morris's bi-trochanteric meas-      |                     | Pachymeningitis . . . . .                  | 162                 |
| urement . . . . .                   | 107                 | Paget's disease . . . . .                  | 146                 |
| Mouth, injuries of . . . . .        | 192                 | Pancreatitis . . . . .                     | 301                 |
| Movable spleen . . . . .            | 306                 | Pancreas, diseases of . . . . .            | 301, <i>et seq.</i> |
| Mumps . . . . .                     | 198                 | Papilloma in bladder . . . . .             | 266                 |
| Murphy's operation . . . . .        | 54                  | "    rectum . . . . .                      | 325                 |
| Muscles, diseases of . . . . .      | 309, <i>et seq.</i> |                                            |                     |



|                                             | PAGE                |                              | PAGE                |
|---------------------------------------------|---------------------|------------------------------|---------------------|
| Papilloma in duct . . .                     | 150                 | Pyonephrosis . . .           | 253                 |
| „ larynx . . .                              | 217                 |                              |                     |
| „ pelvis . . .                              | 257                 | Q                            |                     |
| Paracentesis . . .                          | 142                 | Quinsy . . .                 | 199                 |
| Paraphimosis . . .                          | 274                 |                              |                     |
| Parotitis . . .                             | 198                 | R                            |                     |
| Patella, dislocation of . .                 | 114                 | Radius, fracture of . .      | 98-101              |
| „ fracture of . . .                         | 115                 | Railway spine . . .          | 173                 |
| Pelvic-rectal abscess . . .                 | 320                 | Ranula . . .                 | 196                 |
| Pelvis, injuries and diseases               |                     | Raynaud's disease . . .      | 8                   |
| of . . .                                    | 105, <i>et seq.</i> | Rectal and anal canal, dis-  |                     |
| Penetrating wounds of chest                 | 145                 | eases of 312, <i>et seq.</i> |                     |
| Penis, diseases of . . .                    | 273, <i>et seq.</i> | „ „ abscesses of . .         | 320                 |
| Perforating ulcer . . .                     | 5                   | „ „ adenoma of . . .         | 324                 |
| Perforation of duodenal ulcer               | 366                 | „ „ carcinoma of . .         | 326                 |
| „ gastric ulcer . . .                       | 358                 | „ „ fibroma of . . .         | 324                 |
| Peripheral nerves . . .                     | 32                  | „ „ papilloma of . .         | 325                 |
| Perianal abscess . . .                      | 322                 | „ „ malformations of         | 329                 |
| Peritoneum, diseases of 233, <i>et seq.</i> |                     | „ „ polypus of . . .         | 325                 |
| Peritonitis . . .                           | 235                 | „ „ prolapse of . . .        | 314                 |
| Pharynx, diseases of . . .                  | 199                 | „ „ sarcoma of . . .         | 325                 |
| Phelp's operation . . .                     | 52                  | „ „ stricture of . .         | 328                 |
| Phenol-sulphone-phthalein                   |                     | „ „ syphilis of . . .        | 328                 |
| test . . .                                  | 243                 | „ „ tumours of . . .         | 324                 |
| Phimosis . . .                              | 273                 | „ „ tubercle of . .          | 328                 |
| Phlebitis sinus . . .                       | 165                 | „ „ ulcer of . . .           | 328                 |
| Phosphatic calculi . . .                    | 250                 | Relaxation stitches . .      | 14                  |
| Picric acid in burns . . .                  | 16                  | Rheumatism . . .             | 56, 135             |
| Piles . . .                                 | 316, <i>et seq.</i> | Ribs and sternum . .         | 126, <i>et seq.</i> |
| Pituitary, tumours of . .                   | 168                 | „ fracture of . . .          | 127                 |
| Pneumothorax . . .                          | 142                 | Richter's hernia . . .       | 330                 |
| Politzer's method . . .                     | 219                 | Rickets . . .                | 129                 |
| Polypus of rectum . . .                     | 325, 373            | Rodent cancer . . .          | 220                 |
| Popliteal aneurysm . . .                    | 42                  | Rupture of bladder . .       | 260                 |
| Pott's fracture . . .                       | 122                 | „ of liver . . .             | 292                 |
| „ puffy tumours . . .                       | 162                 | „ of muscle . . .            | 309                 |
| „ diseases of spine 169, <i>et seq.</i>     |                     | „ of spleen . . .            | 306                 |
| Pre-senile gangrene . . .                   | 9                   |                              |                     |
| Processus vaginalis . . .                   | 344                 | S                            |                     |
| Proctitis . . .                             | 312                 | Salvarsan . . .              | 71                  |
| Prolapse of rectum . . .                    | 314                 | Sarcoma, abdominal wall      | 233                 |
| Prostate, diseases of . .                   | 269, <i>et seq.</i> | „ brain . . .                | 167                 |
| Prostatitis . . .                           | 269                 | „ breast . . .               | 149, 151            |
| Protargol . . .                             | 56, 65, 380         | „ jaw . . .                  | 192                 |
| Pruritus ani . . .                          | 312                 | „ kidney . . .               | 257                 |
| Psammoma . . .                              | 182                 | „ rectum . . .               | 324                 |
| Psoas abscess . . .                         | 350                 | „ spine . . .                | 181                 |
| Punctured wound . . .                       | 13                  | „ testis . . .               | 278                 |
| Pyelitis . . .                              | 253                 | „ tonsils . . .              | 200                 |
| Pyelo-nephritis . . .                       | 253                 | Sarcomata . . .              | 29                  |
| Pyloric stenosis . . .                      | 354                 | „ of bladder . . .           | 266                 |
| Pyogenic diseases, joints 54 <i>et seq.</i> |                     | „ of bone . . .              | 131                 |
| „ brain . . .                               | 162                 | Scalds . . .                 | 14                  |
| „ kidney . . .                              | 253                 | Scalp . . .                  | 153, <i>et seq.</i> |
| Pyothorax . . .                             | 142                 | Scapula, fracture of . .     | 84                  |



|                                             | PAGE                |                                       | PAGE                |
|---------------------------------------------|---------------------|---------------------------------------|---------------------|
| Schlatter's disease . . . . .               | 118                 | T                                     |                     |
| Sciatica . . . . .                          | 33                  | Tachycardia . . . . .                 | 207                 |
| Scirrhus cancer . . . . .                   | 32, 150             | Talipes equino-varus . . . . .        | 51-53               |
| Scoliosis . . . . .                         | 178                 | Temporo-sphenoidal abscess . . . . .  | 163                 |
| Scurvy-rickets . . . . .                    | 130                 | Testis, diseases of . . . . .         | 275, <i>et seq.</i> |
| Shoulder, dislocation of . . . . .          | 85-88               | Tests, Mennier's . . . . .            | 357                 |
| Sinus . . . . .                             | 2                   | „ Naunyn's . . . . .                  | 299                 |
| Skin grafting . . . . .                     | 7                   | „ Nelaton's . . . . .                 | 106                 |
| Smith's fracture . . . . .                  | 103                 | „ Phenol-sulphone-phthalein . . . . . | 243                 |
| Spastic paralysis . . . . .                 | 41                  | „ Thomas' . . . . .                   | 62                  |
| Spermatic cord, diseases of . . . . .       | 275, <i>et seq.</i> | „ Trendelenburg's . . . . .           | 47                  |
| Spermatoceles . . . . .                     | 286                 | „ Wassermann's . . . . .              | 133                 |
| Spina bifida . . . . .                      | 178                 | Tetanus . . . . .                     | 16, 21              |
| „ occulta . . . . .                         | 180                 | Thiersch's method . . . . .           | 7                   |
| Spinal cord and vertebral column, . . . . . |                     | Thomas's test . . . . .               | 62                  |
| „ diseases of 169, <i>et seq.</i>           |                     | Thoracoplasty . . . . .               | 144                 |
| „ fracture-dislocation 173                  |                     | Thorax . . . . .                      | 141, <i>et seq.</i> |
| „ deformities . . . . .                     | 178                 | Tongue, injuries of . . . . .         | 192                 |
| „ injuries . . . . .                        | 172                 | Torsion of cord . . . . .             | 286                 |
| „ meningitis . . . . .                      | 178                 | Tonsils . . . . .                     | 200                 |
| „ tumours . . . . .                         | 181                 | Torticollis . . . . .                 | 202                 |
| Spleen, diseases of . . . . .               | 306, <i>et seq.</i> | Traumatic aneurysm . . . . .          | 42                  |
| „ absence of . . . . .                      | 306                 | Trachea . . . . .                     | 213                 |
| „ movable . . . . .                         | 306                 | Tracheotomy . . . . .                 | 213                 |
| „ rupture of . . . . .                      | 306                 | Trachoma . . . . .                    | 226                 |
| Stacke-Schwartz operation . . . . .         | 223                 | Trench feet . . . . .                 | 11                  |
| Strangulation of hernia 332, <i>et seq.</i> |                     | Trendelenburg's test . . . . .        | 47                  |
| Stasis, faecal . . . . .                    | 376                 | Trigeminal neuralgia . . . . .        | 35                  |
| Stenosis of pylorus . . . . .               | 354                 | Truss for hernia . . . . .            | 343                 |
| „ of rectum . . . . .                       | 328                 | Tuberculosis, bladder . . . . .       | 264                 |
| „ of urethra . . . . .                      | 288                 | „ dactylitis . . . . .                | 114                 |
| Sternum and ribs, diseases of . . . . .     | 126, <i>et seq.</i> | „ kidney . . . . .                    | 266                 |
| Stricture, oesophagus . . . . .             | 209, <i>et seq.</i> | „ larynx . . . . .                    | 217                 |
| „ rectum . . . . .                          | 328                 | „ periosteum . . . . .                | 139                 |
| „ urethra . . . . .                         | 288                 | „ peritoneum . . . . .                | 237                 |
| Stitches of coaptation . . . . .            | 13                  | „ prostate . . . . .                  | 269                 |
| „ relaxation . . . . .                      | 14                  | „ rectum . . . . .                    | 328                 |
| Stomach, diseases of . . . . .              | 352, <i>et seq.</i> | „ testis . . . . .                    | 279                 |
| „ cancer . . . . .                          | 361                 | „ tongue . . . . .                    | 194                 |
| „ ulcer . . . . .                           | 356                 | Tumours . . . . .                     | 22, <i>et seq.</i>  |
| „ bacteria and fungi . . . . .              | 353                 | „ adenoma . . . . .                   | 153                 |
| „ organic acids . . . . .                   | 353                 | „ adenoids . . . . .                  | 199                 |
| „ wounds . . . . .                          | 355                 | „ angioma . . . . .                   | 28                  |
| Stone ( <i>see</i> calculi) . . . . .       | 265, 298            | „ benign . . . . .                    | 23                  |
| Stye or hordeolum . . . . .                 | 223                 | „ carcinoma . . . . .                 | 29                  |
| Subclavian aneurysm . . . . .               | 41                  | „ cysts . . . . .                     | 24                  |
| Sub-phrenic abscess . . . . .               | 240                 | „ epithelioma . . . . .               | 31                  |
| Suppuration . . . . .                       | 1-3                 | „ fibroma . . . . .                   | 166                 |
| Surgical emphysema . . . . .                | 141                 | „ glioma . . . . .                    | 165                 |
| Syme's method . . . . .                     | 290                 | „ gumma . . . . .                     | 166                 |
| Synovitis . . . . .                         | 53-55               | „ lipoma . . . . .                    | 25                  |
| Syphilis 5, 67, 71, 132, 217, 278, 328      |                     | „ malignant . . . . .                 | 29                  |
| Syringo-myelocele . . . . .                 | 180                 | „ myeloma . . . . .                   | 131                 |
|                                             |                     | „ odontoma . . . . .                  | 26                  |

|                             | PAGE               |                                         | PAGE                |
|-----------------------------|--------------------|-----------------------------------------|---------------------|
| Tumours, osteoma . . . .    | 27                 | Venereal diseases ( <i>see</i> syphilis |                     |
| „ papilloma . . . .         | 150                | and gonorrhœa) . . . .                  | 64 <i>et seq.</i>   |
| „ sarcoma . . . .           | 29                 | Venous hæmorrhage . . . .               | 35                  |
|                             |                    | Vertebral column and spinal             |                     |
| U                           |                    | cord . . . . .                          | 169, <i>et seq.</i> |
| Ulceration . . . . .        | 4                  | Vessels, blood, diseases of . .         | 35 <i>et seq.</i>   |
| „ duodenum . . . .          | 365                | Volkman's contracture . . . .           | 311                 |
| „ healing . . . .           | 4                  | Volvulus . . . . .                      | 372                 |
| „ rectum . . . .            | 328                |                                         |                     |
| „ stomach . . . .           | 356                | W                                       |                     |
| „ syphilitic . . . .        | 5                  | Wardrop's method . . . .                | 38                  |
| „ tubercular . . . .        | 6                  | Wassermann's reaction . . . .           | 133                 |
| „ varicose . . . .          | 4                  | Wens . . . . .                          | 153                 |
| Ulna, fracture of . . . .   | 102                | Wheelhouse's method . . . .             | 290                 |
| Umbilical hernia . . . .    | 350                | Whitehead's operation . . . .           | 319                 |
| Upper extremity, diseases   |                    | Whitlow . . . . .                       | 3                   |
| of . . . . .                | 80, <i>et seq.</i> | Winged scapula . . . .                  | 45                  |
| Urachal fistula . . . .     | 234                | Wounds . . . . .                        | 12                  |
| Uratic calculi . . . .      | 249                | „ abdomen . . . .                       | 233                 |
| Urethra, diseases of . . .  | 287 <i>et seq.</i> | „ chest . . . . .                       | 145                 |
| Urethral stricture . . . .  | 288                | „ penetrating . . . .                   | 145                 |
| Urethritis . . . . .        | 287                | „ stomach . . . .                       | 355                 |
| Urethrotomy . . . . .       | 289                | „ punctured . . . .                     | 13                  |
| Urinary system, diseases of | 241                |                                         |                     |
|                             |                    | X                                       |                     |
| V                           |                    | X-rays in aneurysms and                 |                     |
| Valsalva's method . . . .   | 219                | tumours . . . . .                       | 38                  |
| Varicocele . . . . .        | 280                | „ in tumours of bone . . . .            | 131                 |
| Varicose ulcer . . . .      | 5                  | „ in syphilis . . . .                   | 133                 |
| „ veins . . . . .           | 350                | „ in kidney . . . .                     | 242                 |
| Vater's ampulla . . . .     | 300                | „ in renal calculi . . . .              | 251                 |
|                             |                    | „ in gall-stones . . . .                | 297                 |
|                             |                    | „ in stomach . . . .                    | 353                 |

Wellcome Library

Full Catalogue of Messrs  
E. & S. Livingstone's  
Publications sent post free  
on application.



