SECOND DIVISION, OR DISEASES OF THE TISSUES.

I. DISEASES OF THE BONES.

GENERAL REMARKS.

BONES MOST LIABLE TO DISEASE.

CAUSES OF DISEASE.

EFFECTS ON CONSTITUTION.

CLASSIFICATION.—All diseases of the bones may be ranged under three heads.

1. The non-malignant diseases.
2. The malignant diseases.
3. Wounds and fractures of bones, and their occasional results.

FIRST HEAD, OR NON-MALIGNANT DISEASES.

a. Neuralgia.
b. Atrophy.
c. Hypertrophy.
d. Osteitis.
e. Abcess.
f. Ulceration.
g. Necrosis.
h. Mollities ossium.
i. Fragilitas ossium.
j. Rachitis.
k. Tubercle in bone.
l. Osseous aneurism.
m. Exostosis.
n. Hydatid encysted tumour.
o. Serous encysted tumour, or spina ventosa.

SECOND HEAD, OR MALIGNANT DISEASES.

a. Osteo-sarcoma.
b. Medullary sarcoma.
c. Fibrous sarcoma.
d. Fungus Hematoles.
e. Melanosis.

First Head.

I. NEURALGIA.

Diagnosis.

Causes.

Symptoms.

Prognosis.

Treatment.
II. ATROPHY OF BONE.

Definition.

Varieties.

Causes.—1. diseases of various kinds; 2. retardation of structural growth; 3. old age.

Effect upon the strength of the bone.

Appearance of the bone.

Analysis of atrophied bone.

Treatment.

III. HYPERTROPHY.

Definition.

Varieties.

Causes.—1. exercise; 2. excessive nutrition in different bones; 3. inflammation; 4. degeneration of soft deposits upon bone, the result of periosteal inflammation.

Effect upon the strength of the bone.

Symptoms.

Appearance of bone.

Treatment.

IV. OSTEITIS.

Definition.

Varieties.

Persons most liable.

Bones most frequently attacked.

Causes.—1. Constitutional; 2. Local.

Symptoms.

Diagnosis.—May be confounded most readily with periostitis and endostitis.

Prognosis.

Terminations.—Resolution, atrophy, hypertrophy, suppuration, ulceration, mortification.

Dissection.

Treatment.—Depends on variety of inflammation, its intensity, and the bone attacked. The remedies required may be either general or local, or both combined.

V. ABSCESS IN BONE.

Location of matter.

Causes.

Symptoms.

Diagnosis.

Prognosis.

Dissection.

VI. CARIES, OR ULCERATION IN BONE.

Definition.

Confusion among authors as to its precise nature.

Bones most liable to be involved.

Varieties.—Simple, syphilitic, strumous, malignant, &c.

Causes.—1. Constitutional; 2. Local. The seat of the disease, when
constitutional causes operate in its production, is modified very much by the character of the cause.

**Symptoms.**—Constitutional and local. Modified by the cause, stage, location and extent of the disease. Usually three stages.

**Diagnosis.**

**Prognosis.**—Often confounded with osteitis, periostitis, endostitis, necrosis.

**Dissection.**

**Chemical analysis.**

**Treatment.**—Both constitutional and local remedies will usually be required, and these must be modified to suit the stage, intensity, and cause of the disease. In the first stage, antiphlogistics are usually required. In the second stage, emollients or stimulants, to change the character of the ulcer, are generally employed. In the third, we must either cut out the diseased bone, destroy its vitality, or remove the limb.

The cause must always be removed, if possible; and if specific in its character, specific remedies or alternatives are to be employed.

**VII. NECROSIS.**

**Definition.** The death of a bone.

Confusion among authors as to its precise character. Louis was the first to describe it accurately.

**Bones most liable.**

**Causes.**—1. Constitutional. 2. Local. Most of these operate through the medium of the periosteum, either internal or external. Some affect the bone primarily.

**Remarks in reference to the influence of the periosteum.**

**Varieties.**—1. **EXTERNAL.** 2. **INTERNAL.** 3. **COMPLETE.**

**Symptoms.**—Constitutional and local. Often obscure. We have usually three distinct stages in the progress of the disease.

1. The inflammatory stage.
2. The stage of suppuration and detachment.
3. The stages of reparation.

In **external** or superficial necrosis, the local symptoms, in the first stage, are a dull or acute pain, soon succeeded by a flaccid tumour, in which fluctuation is after a time observed. The skin next changes its colour, ulcerates, and pus is discharged. There is always more or less fever.

In the second stage, the swelling diminishes in size, the bone is felt bare, rough, or smooth, according to the nature of the action preceding its death, often rings when struck, and when we can see it is either whiter or darker than natural. The pus discharged is either laudable or unhealthy. There is sometimes inflammatory fever in this stage, but oftener we have hectic. The bone is gradually loosened and detached by a process termed "exfoliation," which is very analogous to sloughing of the soft parts.

In the third stage, the local symptoms become milder, the constitution improves, and the new bone is formed.

In **internal or complete necrosis,** all the symptoms are more severe; and in the second stage, the swelling does not diminish in size so much as in external necrosis.

**Process of separation described.**

Manner in which the sequestrum or dead bone is disposed of.—Depends upon its being external, internal or complete.
Process of reparation described.—Varies in the different kinds of necrosis. Character of the new bone and its various stages of organization.

Diagnosis.

Treatment.—General indications.

1. Remove the causes.
2. Palliate the symptoms.
3. Remove the dead bone after its detachment, and sometimes detach it with our instruments.
4. Treat the limb, where the entire shaft of the bone has been destroyed, as you would a fracture of the same part, until the new bone is sufficiently firm.

VIII. MOLLITIES OSSUM.

Definition.

Causes.

Persons most liable to be attacked.

Symptoms.

Prognosis.

Diagnosis.

Pathology.

Treatment.

IX. FRAGILITAS OSSUM.

Definition.

Causes.

Persons most liable to be attacked.

Symptoms.

Prognosis.

Diagnosis.

Pathology.

Treatment.

X. RACHITIS.

Definition.

Causes.

Persons most liable to be attacked.

Symptoms.

Diagnosis.

Prognosis.

Pathology.

Treatment.

XI. TUBERCLE IN BONE.

Varieties.—1. Encysted tubercle. 2. Tubercular infiltration.

Characteristics of first form, or encysted tubercle.

Effects on surrounding parts.

Similarity between encysted tubercle in bone, and tubercle in other tissues.

—in bone, as in the lungs, &c., the crude tubercle proceeds from the semi-transparent gray granulation, of Laennec and others.
Process of reparation after softening of tubercle.

Tubercular pouches.

Results of these collections.—1. They may be absorbed. 2. They may cause suppuration and ulceration in the bone. 3. They may serve as the nidus of new tubercles.

Stages in the development and maturation of encysted tubercle.
1. Semi-transparent gray granulations.
2. Crude, opaque, encysted tubercle.
4. Evacuation of the tubercular cavity.
5. Hypertrophy of the cyst, obliteration of the cavity, recovery. (Nelaton.)

Characteristics of second form, or tubercular infiltration.—This may exist alone, or in connection with the other variety. It usually presents two different conditions.

1. Semi-transparent infiltration.
2. Puriform or opaque infiltration.

Difference between the two.

Effects on surrounding parts.—Invariably causes necrosis of the part attacked, and also produces purulent infiltration. It may also occasion tubercular cysts, caries, &c.

Process of reparation after the bone is affected or destroyed.

Stages in the development and termination of this form of tubercle.
1. Semi-transparent gray infiltration.
2. Interstitial hypertrophy of the bony tissue, or ivory degeneration.
3. Puriform infiltration.
4. Necrosis of the infiltrated portion.
5. Sequestration—foreign body—(Nelaton.)

Diagnosis of tubercle in bone.

Prognosis.

Seat of the disease.

Persons most liable.

Diseases produced by these tubercular deposits.
1. Certain forms of diseased spine.
2. Certain forms of white swelling.
3. Certain diseases of the smaller joints.
4. Certain diseases of the inner ear.

XII. OSSOUS ANEURISM.

Definition.

History.

Causes.

Location.

Persons most liable.

Symptoms.

Effects on adjacent parts.

Diagnosis.

Prognosis.

Dissection.

Treatment.

XIII. EXOSTOSIS, OR SIMPLE BONY TUMOURS.

Definition.

Classification.
1. Those which originate in the periosteum, or sub-periosteal cellular tissue, and may be termed external periosteal or peripheral.

2. Those which originate in the substance of the bone, or in its cavity, and may be called internal or parenchymatous.

3. The cartilaginous.

4. The ivory-like.

5. General Exostosis involving the entire bone.

6. Partial Exostosis, when the disease is confined to a portion of the bone.

Mode of development of the periosteal tumours.

Mode of development of the parenchymatous tumours.

Liability.—Some bones more frequently attacked than others.

Number of tumours.

Size of tumour.

Colour of tumour.

Form of tumour.

Causes of disease.

Symptoms.—Vary with the cause, structure, and shape of tumour, its location, and the rapidity with which it grows.

Effects on adjacent parts.

Diagnosis.

Prognosis.

Terminations.—1. Resolution. 2. Conversion into other tissues. 3. Necrosis. 4. Suppuration.

Treatment.—1. Medical. 2. Surgical.

XVI. HYDATID ENCYSTED TUMOUR OF BONE.

Definition.

Causes.

Part of the bone most liable to be attacked.

Effect upon the bone.

Symptoms.

Diagnosis.

Prognosis.

Dissection.

Treatment.

XV. SEROUS ENCYSTED TUMOUR OF BONE.

Definition.

Synonymes.—Spina ventosa, fibro-cellular tumour, wind ball, &c.

Causes.—

Part of the bone most liable to be attacked.

Usual situation of the tumour.

Size.

Symptoms.

Diagnosis.

Prognosis.

Dissection.

Treatment.—Depends upon the size and location of the tumour, and the nature of its contents. Several general methods:

1. Puncturing or simply opening the tumour.

2. Puncture followed by seton.

3. Puncture followed by stimulating fluids.

4. Removal of the semi-fluid contents of the tumour, and pressure.
5. Removal of the tumour, or amputation of the limb when it occurs on an extremity.

**Second Head.**

**XVI. OSTEO-SARCOMA.**

**Definition.** Bone Cancer of the Bone

**Causes.**—1. Constitutional. 2. Local.

**Bones most frequently attacked.**

**Age at which it generally occurs.**

**Symptoms.**

**Diagnosis.**

**Prognosis.**

**Dissection.**

**Treatment.**—Removal. Amputate at a joint if possible.

**XVII. MEDULLARY SARCOMA.**

For the characteristics of this disease, see "Cancer."

**XVIII. FIBROUS SARCOMA.**

For the characteristics of this disease, see chapter on diseases of the "Fibrous Tissue."

**XIX. FUNGUS HEMATOIDES.**

For the characteristics of this disease, see Cancer.

**XX. MELANOSIS.**

For the characteristics of this disease, see "Cancer."

**Third Head.**

**XXI. WOUNDS OF BONE.**

**Definition.**

**Causes.**

**Bones most usually involved.**

**Characteristics of wounds in bone.**

**Prognosis.**

**Diagnosis.**

**Process of union.**

**Treatment.**

**XXII. FRACTURES IN GENERAL.**

**Definition.**

**Causes.**—1. Predisposing or remote. 2. Proximate or efficient. The first class may be subdivided into the local and general.

1. The local predisposing causes are—
   a. The situation of a bone.
   b. The function of a bone.
   c. Some local disease.
2. The general predisposing causes are—
   a. The diathesis of the individual.
   b. The diseases of the individual.
   c. The age.
d. The season of the year.
c. Sex.

(2) The efficient causes of fracture are—
a. Muscular action.
b. External violence, directly or indirectly applied.

Bones most liable to fracture. Refer to statistical tables.

Classification of fractures.
The first division is based upon the relation of the solution of continuity to the axis of the bone. Thus we have—
a. Transverse fracture.
b. Oblique or obtuse fracture.
c. Longitudinal or parallel fracture.

The second division is based upon the appearance of the fracture, which is always modified by the kind of force producing the injury, and the bone involved. Thus we have—
a. Fissures.
b. Stellated fracture.
c. Depressed or indented fracture.

The third division is based upon the displacements of the fragments. Thus we have—
a. Longitudinal displacement, or shortened fracture.
b. Lateral displacement, or displacement in the diameter of the bone.
c. Rotatory displacement, or displacement in the circumference of the bone.
d. Angular displacement, or displacement in the direction of the bone.
e. Impacted fracture.

Causes of displacement:
1. External violence, either direct or indirect.
2. Weight of the body in falling.
3. Weight of the limb.
4. Muscular contraction. Refer to Boyer’s remarks on the influence of the different sets of muscles attached to the fragments. When the muscles are paralysed by the blow, there is often no displacement of the fragments. Nor is displacement invariably present, even when the muscles retain their power. State the causes of this.

The fourth division is based upon the degree of injury done to the parts around the fracture, and to the bone itself. Thus we have—
a. Simple fracture.
b. Compound or open fracture.
c. Complicated fracture.
d. Comminuted fracture.

Symptoms of fracture.—1. Rational or physiological. 2. Sensible or physical.

First or rational signs.
a. Pain.
b. Numbness.
c. Loss of voluntary motion.
d. Occasional constitutional disturbance.

These symptoms are never to be relied on, as they are present in other injuries.

Second, or physical signs.
a. Change in natural form of limb.
b. Unnatural mobility of the part at the seat of fracture.
c. Change in the length of the limb.
d. Crepitus.
These symptoms are more to be relied on; yet it must be recollected that change in the natural form and length of a limb are present in luxations and sprains, and that crepitus may be occasioned by inspissation of the synovial fluid—the riding of one bone upon another in certain luxations—sanguineous tumours—the motion of tendons in their sheaths, and emphysematous collections. It may also be absent in fracture, or very indistinct. Lisfranc in such cases proposes the employment of the stethoscope in our examination.

**Diagnosis.** Fractures may be confounded with—1. Luxations. 2. Bent bones. 3. Partial fracture. 4. Sprains. State the characteristics of each.

**Prognosis.**—Depends on a variety of circumstances. It is modified, for example by:

1. The size of the bone.
2. The number of muscles attached to the fragments.
3. The seat of fracture.
4. The relation of the bone to one of the great cavities.
5. The extent of injury to the soft parts.
6. The character of the force producing the fracture.
7. The direction of the fracture.
8. The age of the patient.
9. The health of the patient.
10. The season of the year.
11. The extremity involved.
12. The existence of more than one fracture.
13. The degree of injury to the bone broken.
14. The existence of a luxation along with the fracture.

**The process of the reparation of fractures, or the formation of callus.**

Two kinds of callus.

a. Provisional, or that which serves the purpose of uniting the fragments for a time, and is then removed.
b. Definitive, or that which unites the fragments permanently.

There are several stages in the organization of callus which deserve attention. We have

1. The effusion of blood and lymph.
2. The absorption of serum and the colouring matter of the blood, the inspissation of the lymph, and the union of the soft parts.
3. The conversion of the lymph into cartilage, which forms a distinct pin in the cavity of the bone, and a ring around the seat of fracture.
4. Ossification of the cartilage in the spongy tissue of the bone.
5. Ossification of the cartilage between the compact portion of the fragments.

The removal of the provisional callus, and the restoration of the cavity of the bone.

**Time required for the formation of definitive callus.**—Depends upon a variety of circumstances. Usually in adults, and in large bones, from eight to twelve months are requisite. The lamb, however, is useful long before the process is completed.

**Agents concerned in the formation of callus.**

1. The periosteum. Not essential, though highly important in the formation of bone.
2. The vessels of the adjacent soft parts.
3. The bone itself.
4. The internal periosteum.
5. The absorbents which remove provisional callus and model the bone.

Mode of union in flat bones.

Strength of bones after the fracture is healed. They are sometimes stronger than others. The location of the fracture affects the regrowth of the bone; and the activity of absorption, are the modifying agents here.

TREATMENT.—General indications.

1. The mode of moving patients in severe fractures from the spot at which the injury occurred, is a matter well deserving the attention of the surgeon.

2. As there is usually displacement of the fragments, "reduction" or setting will be required. This may be effected by extension, counter-extension, relaxation of the muscles, and coaptation. We are often resisted in the accomplishment of this indication by spasm of the muscles, binding of the soft parts, and binding of the bones. Mode of overcoming these difficulties explained.

3. To prevent a recurrence of the displacements, mechanical means must be applied, and the part guarded against all motion. This indication is occasioned by the employment of rest, favourable position, bandages, compresses, cushions, and various apparatus, or dressings.

4. As inflammatory symptoms may supervene, measures must be taken to prevent their occurrence.

5. Spasm and pain often occur after dressing, and these symptoms must be relieved by anodynes, cold or warm irrigation, sometimes by bleeding. Be careful, however, not to deplete too much, as callus will not be formed unless a certain degree of excitement is allowed to take place in the seat of fracture.

6. In applying the dressings be careful to protect parts liable to pressure, or that seem chafed or swollen, by straps, cushions and proper position.

7. Carefully inspect the dressings daily, but do not disturb them so long as they are steady and properly adjusted.

8. When phlyctena form, carefully puncture them with a needle, but do not allow the cuticle to be removed.

9. Should superficial or deep-seated suppuration ensue, it must be treated on principles already laid down.

10. During convalescence the patient requires strict attention in order to prevent the occurrence of "secondary fracture."

11. After callus is formed, the parts, especially the joints, remain rigid. The indication here is to relax this rigidity by friction, passive motion, warm douche, vapour bath, electricity and galvanism.

12. Finally, set the fracture as soon as possible. Do not wait, as some advise, until swelling and inflammation have occurred and subsided.

GENERAL METHODS OF TREATMENT:

1. That in which the limb is kept extended in the horizontal position.

2. That in which it is maintained in the semiflexed position.

3. That in which it is enclosed in some unstiffening and permanent dressing, as the "starch bandage," or plaster mould. This dressing is sometimes called the "immoveable apparatus."

4. That in which the limb is suspended. This method is technically called "hypornarthesis." It originated with Sauter and Mayor.

5. That in which the dressing is composed of handkerchiefs, variously folded. This method, from having been introduced by Mayor, is called "Mayor's handkerchief system."

6. That in which the ordinary splints and bandages are employed.

Review of these different methods.
COMPOUND FRACTURES.

Definition.

Causes.—1. The fragments of bone may be driven through the skin.
2. The integuments may be wounded by the body causing the fracture.
3. Sloughing may open the integuments.
4. An abscess may form and open.
5. Finally, pressure upon some projecting point may cause its ulceration.

Dangers.—1. Immediate shock to the system, from injury to the nerves, or from loss of blood.
2. Inflammation and fever.
3. Hectic fever.
4. Tetanus.

Question of amputation.—When called to a case of compound fracture, we are first to determine between the propriety of amputation, and an attempt to save the limb. No fixed rules in regard to this operation can be laid down, but we must take into consideration several points.

1. The age of the patient.
2. His constitution.
3. His habits.
4. His position in society.
5. His means of obtaining proper nursing, food, &c., during the treatment, if we attempt to save the leg.
6. The season of the year.
7. Atmospheric peculiarities.

Circumstances supposed to warrant amputation.

1. When the injury done to the soft parts and bones is such as to warrant the impression that gangrene will inevitably ensue.
2. Where, along with the fracture, a portion of the limb is torn off, as we see in wounds inflicted by machinery, cannon shot, &c.
3. Where the soft parts are extensively stripped off.
4. Where the fracture extends into a large joint.
5. Where the bone is broken in several places, and the soft parts extensively injured.
6. Where the fracture is complicated with laceration of large bloodvessels and nerves.

Before resorting to amputation, even under these circumstances, weigh well its dangers.

Time at which amputation should be performed.—Difference of opinion among surgeons on this point: some preferring immediate, others secondary amputation. It would appear from the reports that in civil practice the latter method has been most successful, while in military, the former is most to be relied on. Many cases, however, admit of no delay, even in civil practice, and the surgeon must let experience determine the course to be pursued. Never operate until reaction to a certain degree has taken place.

Treatment where it is determined to attempt the cure of the injury without amputation.

1. When the injury of the soft parts is comparatively slight. Here we must close the wound at once by straps, the bandage, lint soaked in blood, or lint covered with oil-silk; apply splints, or the proper dressings, and treat the case like one of simple fracture.
2. When the injury of the soft parts is more extensive, and the bones pro-
trude and overlap, and cannot readily be produced. Here divide the soft
parts, pick away any loose pieces of bone, and, if necessary, saw off the
ends of the bone. Then apply a loose bandage of strips, place the limb on
a pillow in a fracture box, or upon a carved splint, and use irrigation with
cold water if the weather is warm, or, if the accident occur in winter we
may use the warm water dressing or a poultice. It is in this form, also,
that the bran dressing of Dr. J. R. Barton is so useful. Constitutional
symptoms are to be prescribed for.
3. When, in spite of all our efforts to prevent it, profuse suppuration
takes place, we must give free vent to the pus, and support the constitution.
4. After the subsidence of swelling, suppuration and severe pain, treat
the case like a simple fracture, with splints and bandages.
5. Where our remedies fail to relieve, and mortification sets in, we must
amputate if possible.
Character of the callus in compound fracture and the agents employed in
its formation.

Although not clearly visible, the text continues with detailed instructions on how to treat compound fractures, including the use of cold and pressure to treat swelling, and the application of leeches or cold or hot applications to relieve pain and spasm. The text also mentions the importance of preventing phlebitis and the need to expose the wound to avoid sloughing. Overall, the text provides a comprehensive guide on the treatment of compound fractures, highlighting the necessity of careful observation and intervention to prevent complications and reduce the risk of amputation.
6. When the fracture extends into a joint, we have to fear intense inflammation, and must treat the case accordingly.
7. When mortification takes place amputate.
8. When tetanus supervenes treat it in the usual manner.

**IRREGULAR CALLUS, OR FRACTURE UNITING WITH DEFORMITY.**

**Causes.**—Usually, neglect or bad treatment of the case, or the wilfulness of the patient, are the immediate causes of deformity.

**Question of the propriety of interference in these cases.**—Many points must be considered before the operation is undertaken.
1. The duration of the injury.
2. The degree of functional injury resulting from the deformity.
3. The practicability of relieving the deformity without endangering the life of the patient.
4. The size and location of the injury.
5. The age of the patient.
6. The health of the patient.
7. The season of the year.
8. The existence or not of disease of the soft parts or of the bone itself.

**Means employed to remove the deformity.**—These vary with the duration of the injury.
1. **Pressure and extension of the limb.**—When called to a badly set fracture, within the first sixty days after its occurrence, or while the callus is yet yielding, we may often succeed in restoring the limb by well regulated pressure and extension of the limb. Cases are reported by Dupuytren and others, in which these measures have succeeded even after the lapse of 120th day from the receipt of injury.

2. **The seton.**—In these cases Wienhold proposes the introduction of a seton, which by causing suppuration would break down the callus.

3. **Rupture of the callus.**—If more than sixty or seventy days have elapsed before we are called, as a general rule rupture of the callus will prove more useful than any attempts to mould it into proper shape. This is an old operation, and has been recently revived by Esterlen, Richerand, Dupuytren and others.

4. **Resection of the bones.**—In cases of long standing, where the bones overlap, and are firmly bound to each other, pressure, the seton, and refracture will all fail to afford relief, and we must then resort to "resection of the bones."

5. **Removal of exuberant callus.**—When the spicula or ledges of bone are thrown out around the seat of fracture, and interfere with the motion of the parts, or occasion pain, we may, after waiting a few months, for the efforts of nature cut down upon them and remove them with the knives or saw. (See cases of this deformity reported by Alcock, Velpeau, Dawson and myself.)
PSEUDARTHROSIS, FALSE JOINT, OR NON-UNION.

Definition.
Frequency of the defect.
Varieties. 1. Where the fragments are united by soft callus. 2. Where the fragments are united by a ligamentous bond or bands. 3. Where the fragments are united by cellular tissue alone. 4. Where a sort of joint is established. The bones being rounded off, tipped with cartilage, covered by a synovial membrane, and held together by a capsular ligament. Very rare.

Causes. 1. Constitutional. 2. Local.

First or constitutional.
a. Syphilis.
b. Pregnancy and suckling.
c. Fevers of different kinds.
d. Cancer.
e. Fragilitas ossium.
f. Scurvy.
g. General impoverishment of the system.
h. Paralysis.
i. Deficient supply of arterial blood.
j. Advanced age.

Second or local.

a. Frequent motion of the fragments.
b. Separation of the fragments.
c. Disease of the fragments.
d. Interposition of foreign bodies between the fragments.
e. Tight bandaging.
f. The long continued use of cooling applications.
g. The too early use of a fractured limb.
h. Division or stripping off the periosteum.
i. Want of cellular tissue.

Symptoms.

Diagnosis.

Prognosis.

Object of treatment.

Treatment. Various methods have been introduced.

1. Simply keeping the parts in splints for several months.
2. Friction.
3. Compression.
4. The application of caustic alkali to the integuments over the seat of fracture.
5. The introduction of a heated canula between the bones. Proposed by Mayer.
6. The seton—proposed by Dr. Physick. Modification of this agent by Rhynd.
7. Escharotics applied to the ends of the bone.
8. Removal of the extremities of the fragments.
9. Section of ligamentous union.
10. Section of muscles attached to the fragments, coaptation, and friction or pressure. Proposed by Dieffenbach, in false joint of the olecranon, patella, &c.
11. Acupuncture.
12. Electricity.

PARTICULAR FRACTURES.

I. NASAL BONES.

II. MALAR BONES.

III. SUPERIOR MAXILLARY BONES.
14. The use of iodine or mercury.
15. The metallic ligature of Somme.
16. The actual cautery. Employed by Kirkbride and others.

DIATASIS, OR SEPARATION OF EPIPHYES.

Definition.
Age at which the accident occurs.—Varies in different individuals. May take place at any age previous to that at which the epiphyses become attached by bone. This generally occurs before puberty.

Causes.—Violence or muscular contraction.

Synonymes.—Obscure. Unnatural mobility at the seat of the epiphysis is the most important sign.

Diagnosis.—May be confounded with fracture or luxation.

Prognosis.—The injury, if properly managed, rarely results in deformity; if neglected, the person is almost sure to be crippled.

Treatment.—Depends of course on the seat of the lesion. The general indications are nearly the same with those laid down for our guidance in the treatment of fracture.

PARTICULAR FRACTURES.

I. NASAL BONES.

Liability.
Causes. 
Varieties.
Complications.—Concussion of brain; emphysema; injury of lachrymal duct and canal; fracture of cribiform plate; inflammation, and caries or necrosis of the bones.

Symptoms.
Diagnosis.
Prognosis.
Treatment.

II. MALAR BONES.

Liability.—This accident is very rare.

Causes.
Varieties.
Complications.
Symptoms.
Diagnosis.
Prognosis.
Treatment.

III. SUPERIOR MAXILLARY BONES

Liability. When broken it is by direct force.

Causes.
Varieties.
Complications.
Symptoms.
Prognosis.
Treatment.
IV. INFERIOR MAXILLARY

Liability.

Causes.

Parts most liable to fracture.

Varieties.

Complications.

Symptoms of each of the fractures of this bone.

Diagnosis.

Prognosis.

Treatment.—Depends on the seat of fracture.

V. OS HYOIDES.

Liability.

Causes.

Varieties.

Complications.

Symptoms.

Diagnosis.

Prognosis.

Treatment.

VI. THYROID CARTILAGE.

Liability.

Causes.

Varieties.

Complications.

Symptoms.

Diagnosis.

Prognosis.

Treatment.

VII. STERNUM.

Liability.

Causes.

Varieties.

Complications.

Symptoms.

Diagnosis.

Prognosis.

Treatment.

VIII. RIBS.

Liability.

Ribs most frequently broken.

Parts of the bone most liable to fracture.

Causes. External violence. Muscular contraction, as in coughing.

Varieties.

Complications. Hemoptysis, emphysema, pleuritis, empyema.

Symptoms.

Diagnosis.

Prognosis.

Treatment.

Throat Bandage of Dr. Hay Stewart: made a simple
post-operative splint.
IX. CLAVICLE.

Liability.—Its shape, size, texture, exposed situation, and function, render this bone very liable to fracture.

Parts usually broken.

Causes.—Direct or indirect violence.

Varieties.—Complete, incomplete, simple, &c.

Complications.—Paralysis of arm, injury of axillary plexus and vessels.

(Earle.)

Symptoms.

Diagnosis.

Prognosis.

Treatment.—Various dressings employed to carry out the three indications of Dessault: 1, Dessault's bandage; 2, Boyer's bandage; 3, Mayor's handkerchiefs; 4, Fox's apparatus; 5, Brown's bandage; 6, Dr. Reynell Coates' bandage; 7, Hiester's dressing; 8, Sir A. Cooper's.

X. SCAPULA.

Liability.—Its site and mobility protect it in a great measure from fracture.

Parts most liable to fracture.—1, acromion process; 2, inferior angle; 3, body of the bone; 4, the coracoid process; 5, the spine; 6, the neck.

Causes.—Muscular contraction, direct and indirect violence.

Varieties.

Complications.

Symptoms.—Depend on part broken.

Diagnosis.—Depends on part broken.

Prognosis.—Depends on part broken.

Treatment.—Varies with the seat of injury.

XI. HUMERUS.

Liability.—According to Longsdale, fractures of this bone are proportionately less frequent than is usually supposed—about one-sixteenth of all fractures.

Ages at which it usually occurs.—Childhood and old age.

Parts of the bone liable to fracture.—1, the head; 2, the anatomical neck; 3, the surgical neck; 4, the epiphysis; 5, the shaft; 6, the condyles.

Causes.—Muscular contraction, direct and indirect violence.

Varieties.

HEAD OF HUMERUS.

Liability.

Causes.

Variety.

Signs.

Diagnosis.

Prognosis.

Treatment.

ANATOMICAL NECK.

Liability.

Causes.

Variety.

Signs.

Diagnosis.
Surgical Neck.

Liability.
Causes.
Variety.
Signs.
Diagnosis.
Prognosis.
Treatment.

Separation of the Epiphysis.

Liability.
Causes.
Variety.
Signs.
Diagnosis.
Prognosis.
Treatment.

Shaft Above Insertion of Deltoid.

Liability.
Causes.
Variety.
Signs.
Diagnosis.
Prognosis.
Treatment.

Shaft at Its Middle.

Liability.
Causes.
Variety.
Signs.
Diagnosis.
Prognosis.
Treatment.

Shaft Above Condyles.

Liability.
Causes.
Variety.
Signs.
Diagnosis.
Prognosis.
Treatment.

Condyles.

Liability.
Causes.
Variety.
Symptoms.
Diagnosis.
Prognosis.
Treatment.
XII. BONES OF THE FORE-ARM

Liability.—More frequently broken than the humerus—one-fifth of all fractures.

Bones involved.—One or both may be broken. The radius is most liable, from its connexion with the wrist.

Causes.

Varieties.

BOTH BONES.

Parts generally broken.

Causes.

Variety.

Symptoms.

Diagnosis.

Prognosis.

Treatment.

FRACTURE OF RADIUS ALONE.

Liability.—Very common.

Causes.

Variety.

Parts usually broken.—Head, neck, shaft, or inferior extremity.

Symptoms of each.

Diagnosis.

Prognosis.

Treatment.

FRACTURE OF ULNA ALONE.

Liability. Not so liable as the radius.

Causes.

Variety.

Parts usually broken.—Shaft, extremities, coronoid process, olecranon process.

Signs of each.

Diagnosis.

Prognosis.

Treatment.

XIII. CARPAL BONES.

Liability.

Causes.

Varieties.

Symptoms.

Diagnosis.

Prognosis.

Treatment.

XIV. METACARPAL BONES.

Liability.

Causes.

Varieties.

Symptoms.

Diagnosis.

Prognosis.

Treatment.
XV. PHALANGEAL BONES

Liability.
Causes.
Varieties.
Symptoms.
Diagnosis.
Prognosis.
Treatment.

XVI. SACRUM.

Liability.
Causes.
Varieties.
Symptoms.
Diagnosis.
Prognosis.
Treatment.

XVII. OS COCCYGI.

Liability.
Causes.
Varieties.
Symptoms.
Diagnosis.
Prognosis.
Treatment.

XVIII. OS INNOMINATUM.

Liability.
Causes.
Varieties.
Symptoms.
Diagnosis.
Prognosis.
Treatment.

XIX. FEMUR.

Importance of the fractures of this bone.

Liability.
Causes.
Varieties.

Parts usually broken.—Head, neck, trochanters, shaft, and condyles.

FRACTURE OF THE HEAD.

Liability.
Causes.
Varieties.
Symptoms.
Diagnosis.
Prognosis.
Treatment.

FRACTURE OF THE CONDYLE.
FRACTURE OF THE CERVIX WITHIN THE CAPSULAR LIGAMENT.

Liability.

Causes.

Age most liable.

Sex most liable.

Varieties.

Symptoms.

Diagnosis.

Prognosis.

Treatment.

FRACTURE OF THE CERVIX WITHOUT THE CAPSULAR LIGAMENT, OR PARTLY WITHIN AND PARTLY WITHOUT.

Liability.

Causes.

Age most liable.

Varieties.

Symptoms.

Diagnosis.

Prognosis.

Treatment.

FRACTURE OF THE TROCHANTERS.

Liability.

Causes.

Varieties.

Symptoms.

Diagnosis.

Prognosis.

Treatment.

FRACTURE OF THE SHAFT JUST BELOW TROCHANTERS.

Liability.

Causes.

Varieties.

Symptoms.

Diagnosis.

Prognosis.

Treatment.

FRACTURE OF THE SHAFT.

Liability.

Causes.

Varieties.

Symptoms.

Diagnosis.

Prognosis.

Treatment.

FRACTURE OF THE CONDYLES.

Liability.

Causes.

Varieties.

Symptoms.

Treatment.
Diagnosis. 
Prognosis. 
Treatment.

Liability. 
Causes. 
Varieties. 
Symptoms. 
Diagnosis. 
Prognosis. 
Treatment.

XX. PATELLA.

FRACTURE OF FIBULA ALONE.

Liability. 
Causes. 
Varieties. 
Part of bone usually broken. 
Symptoms. 
Diagnosis. 
Prognosis. 
Treatment.

FRACTURE OF THE TIBIA ALONE.

Liability. 
Causes. 
Varieties. 
Part of bone usually broken. 
Symptoms. 
Diagnosis. 
Prognosis. 
Treatment.

XXI. BONES OF THE LEG.

FRACTURE OF OS CALCIS.

Liability. 
Causes. 
Varieties. 
Symptoms. 
Diagnosis. 
Prognosis. 
Treatment.

XXII. BONES OF THE FOOT.