

AN

INAUGURAL DISSERTATION,

ON

Of Fracture Generally, & Individually

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Fractures in General.

The subject we have chosen for our honest investigation on our part, and careful consideration on yours, is one that should claim as much attention as any that have heretofore engaged the minds of medical writers.

A fracture of any bone may properly be defined to be a solution of continuity of bone. Fractures are divided according to their direction into transverse, oblique, and longitudinal. Simple fracture is a separation of the bone into two parts; compound has reference to an open wound communicating with a fracture; comminuted when broken into many fragments; complicated when attended with laceration, or laceration of the soft parts. A fracture may occur in three classes of bones; long, thick, and flat. The first class are more apt to be fractured on account of their

shape and situation in the skeleton. They are generally fractured about the middle of the bone, owing to the force being applied to the extremities. In fractures we may have several positions of fragments from violence - weight - and contraction of the muscles &c. &c. 1st. We may have displacements in the diameter of the bone. In which case the upper fragment will not be found "in situ", or in contact with the lower fragment; but will be found to be rather to one side, before, or behind. 2nd. We may have displacement of the bone in its circumference. In this instance we will have the inferior surface of the anterior portion of the lower fragment (turned around,) and in apposition with the superior surface of the posterior portion of the lower fragment of the bone. Causes of fracture may be divided into predisposing, and exciting. In the former we may observe age, situation of the bone,

To fracture - absence of the earthy and animal matters so necessary to the strength and elasticity of the bone. Certain diseases also predispose bones to fracture: as *maladies osseuses*. Original Conformation; the bones of some individuals being exceedingly brittle without any assignable cause. Exciting causes may be divided into mechanical violence, and muscular contraction. The former may be divided into direct, and indirect violence. Direct when applied immediately to that portion of the bone in which the fracture is produced. Indirect when a force is applied to two parts of a bone which gives way between them. The second cause of fracture (that of muscular contraction), may be observed in the patella, Olecranon process of the ulna and other bones as the femur and humerus when prematurely weak from any cause. Symptoms: First - Increased

instability - one end of the bone moving when pressed upon independantly of the other; or one part yielding when pressed upon; 2. Deformity, - such as bending, shortening, or twisting of the limb; 3. Crepitation, - owing to the fractured surfaces being rubbed together. Though the last symptom is very highly esteemed in determining the reality of a fracture it is sometimes wanting; in which case the fragments are displaced. If we draw the fractured surfaces in contact - we may then hear the grating noise. Treatment. - First. - Reduction. - It is necessary to reduce the fracture as soon as it takes place as the fragments are apt to injure the blood vessels in the neighborhood; though it may remain sometime after fracture before reduction without any ^{great} injury to the patient. It should not be left longer than a week before reduction. Reduction is to be brought about by ex-

Tension, and Counter-tension. The former to the
lower fragment - the latter to the upper. After
bringing the limb "in situ" so as to relax the mus-
cles, the fractured surfaces may be brought in contact.
If the muscles are found contracted, they are to
be overcome by the proper means. After reduction
we may keep the limb "in situ" and its fractured
surfaces together, by means of splints, made of
cigar boxes, binder's ^{board,} pasteboard, leather, bandages,
or rollers, pads, ^{boards,} night's, string's, boxes for the leg.
The above materials should all be light - as
all unnecessary weights will be an injury
to the patient. Bandages should be loosened when
inordinate swelling occurs without moving
the limb, compresses, & splints. The last indi-
cation is to keep the bowels opened; opiates to al-
lay pain, and muscular twitching. Leeching,
bleeding, very rarely employed. If the patient

be unable to pass off his water recourse must be had to the catheter. Cordials may be necessary if the patient be very weak. If through bad management a fracture has united crookedly an attempt may be made to bend the callous, & restore it to its right shape. It should be done before the fourth month, though it has proved successful at the sixth month. Repparation. The process of repparation is more rapid in the young than in the old. It is attended with the following changes. (1.) Extravasation of blood in the vicinity of the fracture. (2.) Absorption of the extravasated blood. (3.) Liguor sanguinis is effused and occupies the place of the blood; this consolidates, the serous portion is absorbed, the fibrous remains and becomes organized. This period of plastic exudation lasts for 8 or 10 days and then becomes cartilaginous. This mass contracts and increases ^{in density} until it becomes bone.

Individual Fractures.

Osse Nasii. A fracture of these bones may occur from a blow or fall against any object. As it is sometimes attended with danger it should receive immediate attention. Treatment. - The fragments should be adjusted by means of the common dressing forceps, probe, or female catheter; the fingers being used at the same time externally. Swelling and inflammation must be subdued by leeching, cold application, and rigid diet. Plugging of the nose causes very often irritation; and should not be resorted to unless it be to check profuse hemorrhage. Malar and Superior Maxillary bones may be fractured by external violence as gun-shot wounds, or any other force applied to these bones in such a way as to produce fractures. Treatment. - Reduce the fracture if there be any undue inflammation, and keep the parts quiet.

Inferior Maxillary Bone -

This bone may be fractured at its base - at the ramus - processes - or symphysis. The most frequent seat of fracture is between the chin and insertion of the masseter muscle. Symptoms. Inability of the patient to move the jaw accompanied with pain, swelling, &c. Irregularity of the teeth owing to the anterior fragment being drawn downwards. On moving the chin whilst the hand is placed on the posterior fragment crepitus will be felt. The gums are found lacerated and bleeding. Great pain, & loss of motion are the chief signs in fracture of this bone. Treatment. A piece of paste-board, or sole leather (after being soaked in water so as to fit it to the jaw) must be confined with the four Tail bandage. The patient is to be fed by gruel and soups until union takes place.

Fracture of the Clavical.

This fracture is quite frequent, and is most usually produced from external violence upon the shoulder or hand. It is generally fractured about the middle of the bone. The part is painful and swollen; and every attempt to move the shoulder produces severe pain. The shoulder is brought downwards, forwards, and inwards, by the weight of the arm, and action of the subclavius muscles. The patient supports his elbow with the hand of the sound side to prevent pressure upon the axillary plexus of nerves. The indications are to move the shoulder upwards, backwards, and outwards; and place the hand of the diseased side upon the shoulder of the sound side. After doing this we must maintain the shoulder and arm in this position by the following apparatus.

"Procure a yard of Cotton fabric (unbleached

Fracture of the Clavical.

Shirting for example, as it is softer, ^{than} the bleached which is usually starched, and cut it diagonally so as to obtain a Triangular bit: to the acute angles of which should be sewed Strips three inches wide and three or four yards long. Apply the middle of the base or long side of the Triangle beneath the elbow leaving a margin of about four inches behind and carrying the obtuse angles towards the fingers. One of the acute angles with its Strip, will now be carried between the arm, and Chest, up to the fractured Clavical, around the back of the neck, over the sound shoulder in front, and beneath the axilla; and finally around the Chest and arm, including the arm just above the elbow. The other end and Strip, will be carried in front of the fore-arm, up to the sound shoulder, behind and beneath the axilla, a-

Fracture of the Clavical,

round the chest and arm, so as to meet its fellow and be tied to it. Finally the margin left projecting behind the elbow, should then be elevated, doubled, and secured with stitches so as to prevent the elbow from sliding out of the sling in that direction.

The portion of the Triangle situated along the fore-arm should also be folded around it, and secured. Lastly the Strips surrounding the chest should be secured so as to prevent their upward, or downward displacement. If it be necessary to press down the sternal fragment, this can be effectually done by interposing a pad between the bone and bandage which pass over it.

This plan of Treatment is so plain and easy to be understood that the nurse may apply it if it becomes necessary to take it off.

Fracture of the Scapula.

This bone though rarely ever fractured, may be fractured at most any point. The common process when fractured may be distinguished from dislocation, by crepitation, and mobility of the joint. Treatment: The humerus is to be elevated and fixed by placing a cushion between the elbow, and side; and maintained by a roller: The elbow being carried a little backwards. It is generally united together by ligament. Fracture of the neck may be mistaken for dislocation. The shoulder in this fracture falls: the deltoid sinks making a hollow, and the head of the humerus can be felt in the axilla. It can be recognized by the facility with which the parts are replaced. The falling of the head of the bone in the glenoid cavity when extension and counter-trusion is removed, and by Crep-

Fracture of the Scapula.

itation. The first-point is to carry the head of the humerus outwards, and the second to raise the glenoid cavity and arm. The former is effected by a thick cushion confined in the axilla by a bandage; the latter by placing the arm in a short sling. The coracoid process may be fractured by external violence. In this instance we have the process drawn downwards by the action of the Coraco brachialis, pectoralis minor, and biceps muscles. The Treatment consist in placing the fingers of the injured limb on the shoulder of the sound side, and confined by bandages around the body, and over the shoulder. The treatment in fracture of the Clavical, will answer in this case. When the body or angle is found fractured the bone should be secured to the body, ^{by} bandages.

Fracture of the Spine.

so as to keep the bone from any movements, and the fractured surfaces in apposition.

The arm should be kept in a sling.

Fracture of the Spine.

The spine may receive a fracture either in the cervical, dorsal, or lumbar regions. It is attended with great danger as it surrounds the spinal cord. Immediate death may be the result of fracture in the cervical region from injury of the phrenic nerve which supplies the diaphragm. Paralysis of the muscles of the upper extremity, great difficulty of breathing. In the lumbar region we have paralysis of the muscles of the lower limbs, involuntary discharge of feces, and retention of urine. In fractures of the spine the kidneys are apt to be affected.

The indications are to keep the patient - at

Fracture of the Pelvis

rest upon a mattress; low diet, antiphlogistic means to prevent the formation of pus and thickening of the membranes; bowels regulated. Bladder relieved by the catheter. Counterirritation and frictions will be found useful in the latter stage of the disease.

Fracture of the Pelvis.

Fracture of the bones of the pelvis can only be produced from the greatest external violence. Although there is but little displacement in the bones, there may be great danger resulting from injury to parts within. Treatment: Consist in keeping the patient at rest and the bowels and bladder properly attended to. Incisions should be made if urine and pus be extravasated in the perineum. A broad bandages around the pelvis will assist in preventing motion.

Fracture of the ribs.

The ribs are very frequently the seat of fracture—generally about the middle of the bone. Indications are to apply Compresses to the angular projections of the extremities, and to the extremities of the ribs if a depression exist. The Chest should be surrounded by a roller to prevent respiration by the intercostal muscles. Inflammation and Cough are to be treated by antiphlogistic means, and anodynes. Fracture of the Sternum may be treated upon the same principles as in fracture of the ribs. Fractures of the humerus. The anatomical neck may be fractured any time during life, but more frequently takes place in youth, and old age. There is little or no flattening of the shoulder owing to the ^{head of} the bone remaining in the glenoid cavity. The end of the shaft is directed obliquely

Fracture of the humerus

upwards, and forwards. The arm is shortened, crepitus is heard after slight extensions. In fracture of the surgical neck the upper fragment remains in its place, but its lower extremity inclines a little outwards; the upper end of the lower fragment is drawn upwards under the pectoralis major muscle, the arm is shortened, crepitus is observed. Treatment consist of a pad in the axilla; two splints secured by a roller, the hand supported by a sling, with the elbow free. Fracture of the neck may be accompanied with dislocation. This is recognized by the tumor in the axilla formed by the head of the bone which does not move when the shaft is rotated. The treatment consist in bringing the upper fragment in its proper place, coaptating the fractured extremities. The same dress-

Fracture of the humerus

ing as in the last; In fracture of the humerus below the pectoralis major it is easily recognized by the crepitus, and by the lower extremity of the upper fragment being drawn inwards, by the action of the muscles inserted in the bicipital groove, and the upper extremity of the lower fragment drawn outwards by the deltoid muscles.

Treatment. After reduction the bones, or fragments may be secured by four splints sufficiently wide not to come in contact when applied, and about three inches shorter than the entire bone may be placed upon thin compresses and secured by the many-tailed bandage. Two bits of binder's board each wide enough to surround nearly one half the arm, may be substituted for splints.

Fracture of the fore-arm.

Binder's board should be soaked in water before application. The hand should be placed in the sling in such a manner as to exercise gentle extension by the weight of the elbow.

Fracture of the fore-arm.

Fractures of the fore-arm may be recognized by pain, swelling, crepitus, and displacements of the bones. Whether involving one or more bones these fractures will require two splints; one of which should extend from the bend of the arm over the palm of the hand and to the ends of the fingers in order to prevent in order to support the hand and prevent the movements of the fingers. The other should be applied to the dorsum of the fore-arm, and extending from the elbow to the wrist.

Fracture of the femur and patella

The fragments together: To do this we apply a roller around the thigh just-above the upper fragment: Then by other bandages extending from this roller to the foot on either we may be able to coaptate the fragments and maintain them in their position for union. Another bandage in the form of a figure 8 should then be applied to assist in coaptation, and compression of the muscles. Young splints on both sides of the limb with soft-compresses to prevent chafing, will keep the limb still. The union will be ligamentous.

Fracture of the femur.

(1.) The neck is frequently fractured especially in old persons. The fracture may be produced by a fall, blow, or muscular contraction.

The head of the bone remains in the acetabulum the lower fragment is drawn up by the contraction of the muscles and the limb vaulted by the rotatory muscles: The limb is shorter, pain, crepitus by slight extension, and counterextension, and want of ob-

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untary motion, Treatment - Splints and ex-
tension unnecessary - The limb should be
supported by pillows and motion restrained.
When the fracture occurs outside of the Cap-
sular ligament, In this case the union is more
favorable crepitus is obscure, the displacement
slight, Considerable power and motion of the
limb. But little shortening and eversion of
the limb; and great pain, and swelling are
the principle symptoms, Reduction and Con-
finement is generally all that is necessary
Condyles and Trochanter major may
be sometimes fractured. In such cases if the
limb be placed in a proper position, the Mus-
cles relaxed, and rest be obtained, the frag-
ments will usually unite, Fracture of the
shaft of the bone may be easily managed by
applying four splints a little shorter than
the femur, around the thigh Confining
them by the many-tailed bandage. Suti-
able compresses of course being placed between

the Splints, and integuments, to prevent chafing.
In addition to these a long Splint - may be
~~extended~~ extended from the Thorax to the foot, or a little
below this if confined by roller bandages ar-
ound the body, pelvis, short-Splints, the leg, and
foot, will keep the limb "in situ". Traction may
be made by weights to the foot - the body ser-
ving as a weight - in counterextension.

The patient should lie upon a hard bed so
that his body may be as horizontal as possi-
ble: thus prevent any banding at the seat
of fracture. If it becomes desirable at any
time to place the limb upon the inclined
plane, we can do so by removing the
long Splint; and without interfering
with the shorter ones.

Fracture of the Tibia:

In fracture of this bone immediately below
the knee joint - we may use two lists of boards
nailed ^{to} the edges of the one the leg rest upon
so as to make a box: this will maintain

Compresses of various kinds, to prevent Chopping
and and the motion of the bone. To prevent
excursion the Trough or bot should extend from
the knee to a few inches beyond the foot.
A light-splint with compress in front will
prevent tilting up of this bone: this should
be secured by separate bandages around
the Trough. Extension if necessary should be
made by weights hanging from the ankle.
For this purpose we take two yards of Tape strings;
apply the middle of it - across the sole of the
foot, and bring the ends up the ankle and
side of the leg; then secure the tape in this
position by passing a roller bandage
about three inches wide around it, and the
leg, just above the ankle. If the ends
of the Tape be now turned down, and the
weight fastened to them, the force will
be applied both to the ankle, and sole of the
foot; and may be borne along time with-
out any inconvenience.

Fracture of the Fibula

Fracture of the Tibia or fibula at their lower extremities will require the fracture-bot and pillow. If the lower part of the fibula be fractured the foot should be confined to the splint (on the inner side of which the bot is compressed) by a bandage in such a manner, as to produce inversion of the foot. The inside splint - in this case should extend beyond the foot. A suitable compress should extend to the ankle of a wedge shape. Fracture of the bones of the foot - rarely ever occur. In fracture of the Os calcis from the action of the Gural muscles; the muscles are to be overcome by flexion of the leg upon the thigh, ^{and} extension of the foot. The fragments are then brought in contact, and maintained by the figure of 8 bandage. Fracture of the astragalus may be successfully managed with the fracture bot.

Yours very Respectfully,
Charles S. Evans.