

**FRacture of the Lower Jaw** is a very common accident. It may be caused by either direct or indirect violence, though the former is by far the most frequent cause. Blows upon the jaw, falls from great heights, and kicks from horses may be mentioned as the most common causes of the accident.

When the alveolar border is involved in the fracture, as it nearly always is, the mucous membrane gives way and the fracture is, therefore, compound. It is the exception, however, for a wound in the skin to communicate with the fracture.

Not infrequently the bone is broken into two or more pieces, but comminuted fracture, in which the bone is shattered into many small fragments, is rare.



FIG. 2981.—Four-tailed Bandage as Applied in the Treatment of Fracture of the Lower Jaw. (From Heath.)

The jaw may be broken in any part of its extent, though, on account of its more exposed position, the body of the bone is the part most liable to the accident. Of 55 cases of fracture of the lower jaw, recorded by Hamilton, 52 were through the body.

Partial fractures, in which portions of the alveolar process are torn loose from the body of the bone, occasionally occur from extraction of teeth.

When the body of the bone is broken, the line of fracture is most generally in the vicinity of the canine tooth, where the jaw is naturally weakest, owing to the depth of the socket of that tooth and the proximity of the mental foramen.

The ramus of the jaw is less often fractured, on account of the direction of its axis, its great strength, and its protected position.

Fractures through the symphysis are very uncommon, because of the great thickness of that part of the bone.

The coronoid process may be occasionally broken by extreme violence directly applied.

A fracture of the neck of the condyle is of very rare occurrence. When the jaw is broken near the symphysis, the line of fracture is almost vertical; when nearer the angle of the jaw, it is more oblique and, as pointed out by Maligne, the fracture occurs at the expense of the internal plate of the anterior fragment, and of the external plate of the posterior fragment.

**Symptoms.**—The symptoms are usually very obvious. The special signs of fracture—crepitus, preternatural mobility, and deformity—are all well marked. Pain, which is greatly increased by movements of the jaw, is invariably present. Irregularity in the line of the teeth is readily detected by the finger introduced in the mouth. The teeth which adjoin the fracture are loosened, often detached, and, in a case reported by Erichsen, a tooth became separated and lodged between the fragments. The mucous membrane is nearly always torn, giving rise to more or less hemorrhage. Saliva is secreted in excessive quantity, and, mingling with the discharges of the wound, decomposes, and gives rise to an offensive fetor most difficult to control, even by the most careful attention. When the fracture is double, the bone being broken on each side of the symphysis, the central fragment is displaced very much downward by the depressor muscles.

In single fractures near the symphysis the displacement of the fragment is usually great, while it is less

the nearer the fracture is placed to the angle of the jaw. Fractures of the ramus are attended with very little displacement, owing to that part of the bone being covered and protected by the masseter muscle.

In fractures of the neck of the condyle the symptoms are pain at the seat of fracture, crepitation and displacement forward by the action of the external pterygoid muscle, as a result of which the chin is deflected to the injured side.

Considerable inflammation generally follows fractures of the jaw—the face and neck are swollen and infiltrated, and not infrequently troublesome abscesses form.

As possible complications of fractures of the lower jaw may be mentioned, hemorrhage from wound of the inferior dental artery, temporary paralysis of the lower lip and integument of the chin from laceration or contusion of the inferior dental nerve, necrosis, salivary fistula, and abscesses.

Simple fractures of the lower jaw heal in from thirty to forty days. Instances of non-union are extremely rare. The prognosis, both as regards deformity and the restoration of function, is good, for even in cases in which it has been impossible to obtain perfect apposition of the fragments, and union with some deformity has taken place, ultimately the deformity almost disappears, and but little evidence of the fracture may be detected.

**Treatment.**—Reduction in simple fracture is usually easily accomplished by conjoint manipulation, acting within the mouth upon the teeth and externally upon the border of the jaw.

When the line of fracture is very oblique and the fragments overlap and become locked, reduction is occasionally difficult, and, in a few recorded cases—one reported by Gardon Buck, of New York—it became necessary to expose the bones at the seat of fracture by external incision, and to make a resection of the fragments before proper apposition of the broken segments could be accomplished.

When the fracture is simple and the tendency to displacement is slight, in many cases it is only necessary to maintain the fragments in place after reduction by means of a four-tailed bandage, which is so adjusted as to fix the lower jaw against the upper, thus utilizing the latter as a splint.

In addition to this bandage or the other forms of bandage used for this purpose, as Barton's figure-of-eight, or Gibson's bandage, a cup-shaped splint of pasteboard or gutta-percha moulded to the chin, may sometimes be advantageously used.

During the process of repair mastication and talking should be forbidden. Nourishment in fluid form should be administered, either by being sucked into the mouth between the teeth, or through a tube carried into the mouth behind the last molar tooth.

This simple method of treatment is most effectual when the fracture is uncomplicated.

Hamilton has devised an apparatus for the treatment of simple fractures which is admirably adapted to the purpose.



FIG. 2982.—Hamilton's Apparatus for Treatment of Fractures of the Lower Jaw. (From Heath.)

In regard to the management of loosened teeth, the idea formerly held, that they should be extracted as foreign bodies, is no longer entertained; they should be allowed to remain, as they soon contract new adhesions and become as firm as before. It may even be

advisable to tie them with wire or silk to adjacent firm teeth, until they have contracted new adhesions.

When the fracture is comminuted, or the tendency to displacement is very great on account of the obliquity of the line of fracture, this simple plan of treatment will prove ineffectual, and recourse must be had to one of the numerous ingenious mechanical supports that have been devised for such cases.

The old method of binding the teeth or the fragments together with wire or thread is objectionable, from the fact that the teeth soon become loosened by the strain thus brought to bear upon them and no longer afford adequate support.

An ingenious contrivance for wiring the teeth together, which in skilful hands is capable of achieving a certain amount of success, is Hammond's wire splint, which consists of a frame of strong iron wire made to surround the teeth, to a number of which it is fastened by smaller pieces of wire carried between the teeth. To insure accurate adjustment, the wire frame should be shaped upon a plaster cast of the teeth.

Various forms of interdental splints, made of gutta-percha, vulcanite, or metal, and moulded to fit over the

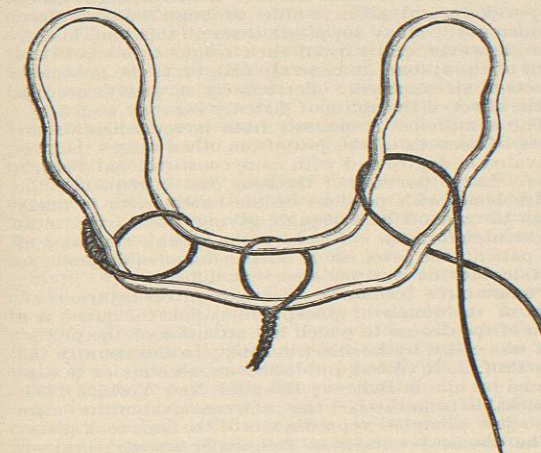


FIG. 2983.—Hammond's Wire Splint. (From Heath.)

teeth for some distance on each side of the fracture, are sometimes used. They are either intended to act as a lateral support while the lower jaw is firmly held against the upper, or they are fastened to the teeth or the bone by means of screws or metal wire, or they may be attached to an outside support by means of rods passing from the mouth to the outside.

Hamilton's method of making an interdental splint of gutta-percha is to take pieces of the gum of the proper size, and render them soft and malleable by dipping them in hot water. The pieces are then worked into the shape of wedges and carried between the teeth on each side, care being taken that the wedge extends on both sides of the fracture. The jaws are then pressed together until the lower border of the bone at the fractured point is smooth and held in position until the rubber hardens. Accurately fitting caps of the teeth are thus obtained.

Of this splint Hamilton says: "The 'clasp' applied over the crowns and sides of the teeth is not intended to act as an interdental splint; but by its lateral pressure it is expected to hold the fragments in apposition upon nearly the same principle as the ligature."

Gunning and Kingsley, of New York, Bean, of Atlanta, Moore, Lonsdale, and Hill, of England, have all devised interdental splints consisting of a clasp for the teeth attached to an external support. These appliances have, in many difficult cases of fracture of the lower jaw, been of great service; but, on account of their complex

mechanism and the necessity of considerable manipulative skill in adjusting them, they have never come into general use.

When the fracture is very difficult of management, as, for example, when the bone is broken in two places, and the middle fragment is drawn downward and cannot be maintained in place by any of the above methods; when the fragments overlap each other and are difficult to reduce, or when the fracture has a wound in the integument communicating with it, a more rational and certain mode of treatment consists in exposing the bone at the seat of fracture by an external incision, drilling holes in the fragments on each side of the fracture, and wiring the fragments firmly together (Fig. 2984).

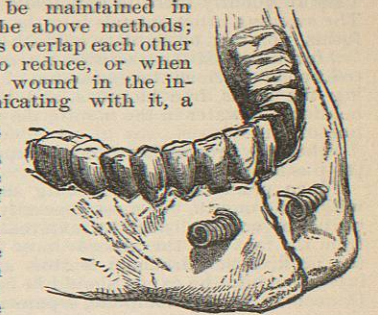


FIG. 2984.—Thomas' Method of Suturing the Fragments in Fracture of Lower Jaw. (From Heath.)

This method of treatment, advocated by H. Thomas, of Liverpool, as especially suited to compound fractures of the lower jaw, is equally appropriate to all fractures of that bone that present obstacles to the ordinary and more simple modes of treatment.

Thomas' method of operation is to expose the bone at the seat of fracture, bore holes through the fragments below the alveolus, on each side of the fracture, about one-eighth of an inch from the broken edges; a strong, pliant wire is passed through the holes thus made from one side to the other, and the ends of the wire are firmly twisted by means of a special instrument (Fig. 2985), called a key, devised for the purpose.

**ABSCESS OF THE LOWER JAW** may be acute or chronic. The symptoms, course, and termination of acute abscess of the lower jaw differ in no respect from those of acute abscess of the upper jaw, given in a preceding portion of this article.

Chronic abscess of the lower jaw may be caused by injury, by irritation of carious teeth, or it may result from suppuration of a dentigerous cyst.

The symptoms are obscure, there being slow, steady enlargement of the bone, sometimes with a dull, aching pain; more frequently, however, there is entire absence of pain. The accumulation of pus occurs between the osseous plates of the jaw, but it is seldom that the expansion is so great that the peculiar egg-shell crackling can be elicited by pressure. The slow increase in the size of the bone, and the firm consistence of the swelling in chronic abscess have, in a number of cases, led surgeons to remove portions of the jaw under the impression that they were dealing with solid tumors.

**Treatment.**—The treatment of chronic abscess is to evacuate its contents, which may usually be easily accomplished from within the mouth; but it is sometimes necessary to expose the swelling by raising a flap of skin, and then to apply the trephine to the bone.

**PERIOSTITIS OF THE LOWER JAW** may be either acute or chronic. The acute variety may be caused by the irritation of diseased teeth, mechanical injury, exposure to cold, or the action of certain medicines, as mercury and phosphorus. It may also arise, independently of any extraneous cause, in children of the scrofulous diathesis, or after the exanthematous fevers.

Acute periostitis of the lower jaw is very rapid in its

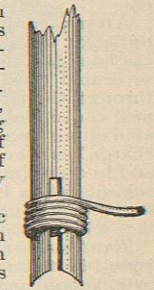


FIG. 2985.—Key for Tightening Thomas' Wire Suture. (From Heath.)

course, terminating in necrosis of the bone if not arrested promptly.

*Symptoms.*—The symptoms are swelling of the gums and the side of the face, a severe tensile pain in the part, worse at night; the teeth are raised in their sockets, and, when pressed upon, the most exquisite pain is elicited. Very frequently there is spasmodic closure of the jaw. The swelling often extends into the neck, and, when pus forms, pointing takes place beneath the jaw.

*Treatment.*—If the condition is recognized early, active treatment—such as the extraction of carious teeth, leeching the gums, free incisions, and hot fomentations by holding hot water in the mouth, may prevent the formation of pus.

When the process has become suppurative, the earlier the pus is evacuated the better.

When practicable the opening should be made from within the mouth, but most generally the evacuation can be better accomplished by external incision, as, aside from the fact that the abscess most frequently points in the neck, better drainage is thus afforded. Detergent injections into the cavity should be constantly employed. If necrosis occurs complete separation of the dead part must be awaited before removing it.

**CHRONIC PERIOSTITIS OF THE LOWER JAW** is usually the result of syphilis. It is almost painless in its course, and manifests itself in the nodes which appear upon the palate and the alveolar border. This form of periostitis yields readily to large doses of iodide of potassium.

**NECROSIS OF THE LOWER JAW** is more frequently met with than is that of the upper, a fact most likely due to the greater vascularity of the latter.

Necrosis is the effect of unchecked suppurative periostitis, the accumulation of pus separating the periosteum from the bone, and in this way cutting off the vascular supply. Death of the bone ensues very rapidly after the establishment of the suppurative process, often in a few hours.

Necrosis may be complete, involving the entire thickness of the bone, or partial, when it is limited to the alveolar process.

It happens quite frequently that the external plate of the alveolar process becomes necrotic and is removed, while the internal plate remains intact and serves as an adequate support for the teeth.

*Symptoms.*—The symptoms of impending necrosis are severe pain, increased heat in the part, and rapid swelling of the gum and cheek. At this stage much may be done to arrest the death of the bone, or at least to limit the destructive process, by free incision of the gums, the extraction of carious teeth, leeching, hot fomentations, etc.

After necrosis has been established the pus finds an outlet by the side of loosened teeth, or wells up between the bone and the gum, which during the process become separated from each other; or it may burrow its way through the soft tissues to points beneath the body and near the angle of the jaw, where it points and is evacuated either spontaneously or by the surgeon. The discharge has the characteristic fetor of pus from dead bone, and in consequence of its constant entrance into the stomach, digestion is seriously interfered with. A probe introduced through a fistulous orifice readily comes in contact with denuded bone.

*Treatment.*—This consists, as in necrosis of the long bones, in the removal of the sequestrum, which, however, should never be undertaken until the separation of the dead from the living bone has taken place. It is especially important that this rule be observed in children before the permanent teeth have made their appearance, as a premature operation may not only seriously damage surrounding healthy bone, but also prevent the eruption of teeth that might otherwise have been saved.

If there are no external openings, and the ends of dead and detached fragments of bone project into the mouth, they may frequently be removed with the fingers or the forceps, only a small incision being required to enlarge the opening in the mucous membrane.

When the sequestrum is too large to be removed entire, it should be divided with bone forceps into two or more pieces, which can be taken away separately.

If at all practicable, the extraction of dead bone should be invariably effected through the mouth; but when the disease is extensive and a number of fistulous openings exist, or when it is impossible to operate within the mouth on account of the fixity of the jaw, the sequestrum may be reached and removed by an external incision so placed as to avoid disfiguration of the face as much as possible.

**Necrosis of the jaws in children** sometimes occurs upon the subsidence of the exanthematous fevers, especially scarlatina and smallpox. It comes on with aching of the teeth, swelling of the gums, and fetid breath; suppuration speedily ensues with all the symptoms of necrosis. A peculiarity that has been observed in this form of necrosis is the symmetrical manner in which it affects the bone. The disease is most generally limited to the alveolar process. The treatment differs in no wise from that of necrosis from other causes.

**Necrosis of the jaws from severe mercurial salivation** was formerly a common occurrence, when in the treatment of syphilis or other diseases it was thought necessary to induce pyalism in order to obtain the best effects of mercury. Many supposed cases of this kind in children, however, really owed their origin to a scrofulous taint of the system, to cancrum oris, or to the poisonous effects of an exanthem. Fortunately, nowadays necrosis as the effect of the abuse of mercury is rarely seen.

The symptoms of necrosis from mercurialization are those of necrosis of the jaws from other causes, but aggravated in degree and with more constitutional disturbance. Large portions of the bone, not infrequently the entire bone, with portions of the cheek, were in many cases thrown off as a slough, giving rise to the most frightful deformity. To add to the pitiable condition of the patient, the jaws often became immovably fixed, so that deglutition was rendered very difficult.

**Phosphorus Necrosis**, arising from the injurious effects of the fumes of phosphorus upon the jaws, is a form of the disease to which the attention of the profession was called by Lorinzer in 1845. In this country the late Prof. J. R. Wood published an account of a case treated by him in Bellevue Hospital, New York, in 1856, remarkable from the fact that, after removal of the entire lower jaw, complete reproduction of the bone took place.

The disease occurs most frequently among workmen in lucifer-match factories, who are constantly exposed to the fumes of phosphorus. The disease is now seldom encountered, owing to precautionary measures adopted in the manufacture of matches.

The fumes of the phosphorus were supposed to gain access to the bone through carious teeth, so that persons with sound teeth enjoyed an immunity from the disease. Langenbeck and others held a different view, however, maintaining that the effects were produced through the system. Both jaws are about equally liable to the disease; but while in the lower jaw the entire body is generally involved, in the upper the necrosis is confined to the alveolar process and palate.

*Symptoms.*—The approach of the disease is very insidious, the symptoms at first being mild and hardly noticeable. As the morbid process advances all the symptoms are manifested in a most marked and exaggerated manner. The pain is excruciating, the swelling is very great, not confining itself to the immediate seat of the disease, but involving the side of the face and head; the discharge is profuse and very offensive; numerous abscesses form and open externally, forming fistulae through which the probe can be made to touch dead bone. The health of the patient rapidly gives way, owing to the quantity of fetid pus necessarily swallowed, and to inability to eat sufficiently. Death frequently supervenes from exhaustion.

A characteristic feature of phosphorus necrosis is the peculiar deposit of pumice-like bone upon the sequestrum.

*Treatment.*—Before detachment of the dead bone occurs, it is important to sustain the vital powers of the patient by the administration of tonics and stimulants. Locally the mouth should be kept as free as possible of the discharges by the frequent use of detergent and antiseptic washes. When the sequestrum is fully detached, it should be removed from within the mouth if possible, otherwise by external incision, especial care being taken to preserve the periosteum as far as may be practicable.

Repair, after loss of the jaw from necrosis, differs in the two bones—in the upper no reproduction of bone takes place, and the gap is invariably left unfilled in adults; but in children, after necrosis following fevers, a hard fibrous tissue is formed which fills the gap, and may even serve as a support for artificial teeth.

In the lower jaw, especially in phosphorus necrosis, there is often the most abundant formation of new bone, which, however, is almost, if not entirely, absorbed afterward. In Dr. J. R. Wood's case, mentioned above, there was entire reproduction of the inferior maxilla, as shown in the celebrated specimen preserved in the Bellevue Hospital Museum.

**TUMORS OF THE LOWER JAW**, especially cysts, central myeloid sarcoma, and epithelioma, are more commonly observed than those of the upper. They frequently reach a vast size, very often entirely filling the mouth, pushing the cheek far beyond its natural dimensions, stretching the mouth, separating the jaws, and sometimes extending far down upon the neck, and even upon the chest.

**CYSTS OF THE LOWER JAW** may be single or multiple. Single cysts are sometimes connected with the fangs of perfectly sound teeth, or may originate from diseased or misplaced teeth.

The first are usually small in size and are occasionally extracted with teeth, to which they may be attached by very slender pedicles. Single cysts of this mode of origin may, however, reach a large size and cause expansion of a limited portion of the body of the jaw.

Single cysts may develop in the cancellous structure of the bone, having an origin connected with the teeth in a manner which is not clearly understood. As the growth increases in size, the bone yields and expands, so that it presents the appearance of a solid tumor. As the walls of the jaw become thinner by absorption, pressure causes the bone to crackle like parchment.

In the more advanced stage of the disease the bone is entirely absorbed, and fluctuation can be readily detected. The fluid contents of these cysts are of a dark color, and rich in cholesterin.

Multilocular cysts occur frequently in the lower jaw. They originate either in the canaliculi of the bone or from cystic degeneration of solid tumors. They are composed of a number of cysts of varying size, with more or less solid matter interposed. They are of slow growth, and may exist for a long period without impairing the health of the patient. Heath mentions a case of multilocular cyst, the history of which extended over a period of thirty years. Multilocular cysts are capable of reaching immense volume. The tendency of multilocular cysts to become solid epitheliomatous tumors, as pointed out by Mr. Frederick Eve, should be borne in mind in the treatment of such growths.

Dentigerous cysts have been more fully described in the section which treats of diseases of the upper jaw. When growing in the lower jaw they form globular tumors, become very large if unmolested, and are very liable to be mistaken for solid tumors.

*Treatment.*—In the treatment of single cysts, evacuation of the contents with excision of a portion of the cyst wall usually effects a cure.

When multilocular, the cyst should be laid open by incision, its contents scraped or gouged out, and the cavity packed with carbolized tow or absorbent cotton, with the view of establishing granulation.

The well-known tendency of multilocular cysts to recurrence makes the admissibility of excision of the portion of the jaw in which the growth is located worthy of consideration.

Dentigerous cysts should be evacuated, and the misplaced tooth found and removed.

Heath's case, in which the tooth was found embedded in the floor of the cyst some time after it had been opened, is unique.

**FIBROMATA** are growths of frequent occurrence in the lower jaw. They may be either of endosteal or of periosteal origin.

The endosteal form of fibrous tumors, as suggested by Heath in his excellent monograph on "Injuries and Diseases of the Jaw," most probably has an origin in the deposit, between the plates of the jaw, of inflammatory products which have undergone organization.

The tumor, as it increases in size, leads to expansion and thinning of the two plates of the jaw—the external to a greater extent than the internal,—and finally the bone undergoes absorption.

The periosteal fibroma grows most frequently at the junction of the gums with the teeth, and is only distinguished from fibrous epulis by its greater size.

*Treatment.*—If the disease is of long standing, the tumor very large, and the jaw more or less destroyed by the absorptive process, the growth should be removed with the segment of jaw that is involved. It may be possible to enucleate small tumors of this class. Advantage should always be taken of the fact that the external plate is principally involved to preserve the internal plate of bone, if practicable.

**ENCHONDROMATA** of the lower jaw are very rare. They occur chiefly in children, and are remarkable for their

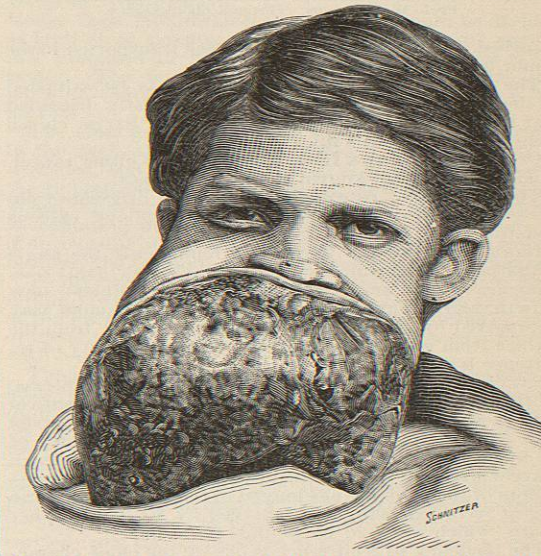


FIG. 2986.—Osteochondroma of the Lower Jaw. (From a photograph.)

slow, painless growth. Enchondromata occasionally grow to immense size, not infrequently causing death by interference with the functions of respiration and deglutition. These growths nearly always contain more or less bony deposits, and sometimes they are almost entirely transformed into bone, generally cancellous in structure, when they are appropriately termed osteochondromata.

The accompanying woodcuts are from photographs of a patient from whom Prof. W. T. Briggs, in 1878, removed the entire lower jaw for a tumor of this class. The patient was a boy twelve years of age, and the tumor had been growing for ten years. The enormous mass protruded from the mouth and extended as far down as the chest. The mouth was entirely filled by the tumor,