TREATMENT OF MAXILLARY FRACTURES.*

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THE subject of maxillary fractures is large, but that part of it which interests military surgeons is the immediate and effective treatment of cases that come to military hospitals as a result of gunshot wounds. The number of injuries of the head and face is by no means a negligible quantity, and their efficient treatment is somewhat out of

FIG. 1.

Ligation of Teeth with Brass Ligatures.—The wires are passed and twisted around the necks of different teeth, and then the upper and lower teeth fastened together. Bicusps and molars are wired singly, but incisors and cuspids should be fastened together in pairs, as in the diagram, then attached to the corresponding teeth of the opposite jaw. This method is especially useful for simple fractures, or fractures with very little displacement, involving the mandible only. It is not applicable in cases with extensive wounds, which require more adequate drainage of the mouth than this treatment affords.

ported and controlled by muscles of mastication which have very great contractile power. It is exposed and very irregular in shape. Fracture of this bone, therefore, is very often associated with considerable displacement of the parts.

2. Fractures of the jaws are almost always compound, and, as the mouth is an ideal nidus for bacterial infection and subsequent complications, much is added to the difficulty of treatment.

3. Being the most mobile and exercised bone of the body, the parts of a broken mandible are very difficult to hold together.

FIG. 2.

Barton Bandage.—This form of bandage affords a simple and effective method for reducing downward and forward displacement of the mandible, and holding the two jaws in close proximity. The turn passing under the chin is applied in the direction in which the force is required.

There can be no mistake in diagnosis, but it is necessary to ascertain the number of fragments, the directions of the fractures, the amount of lost tissue, and the location of

foreign bodies as well as fragments of the bones or misplaced teeth. The x rays will give very valuable assistance, and a radiograph of every extensive case should be taken.

Treatment.

I will not discuss the care and treatment of the external wound, as that is not essentially different from that of a wound in other parts of the body, but confine myself to the matter of adjustment and setting of the bony parts.

Our aim must be to create a comparative immobility of the parts, and to restore the functional activity of the jaws as far as possible. It has been an accepted practice in the past, and one somewhat in use at present, to connect the parts together with wire sutures or metal plates fastened to the bones. This method, while useful in exceptional cases, has some serious objections. It quite often interferes with the normal occlusion of the teeth, creating deformities, and, as the mouth cannot be kept sterile, infection spreads, causing additional complications.

The oral surgeon, however, follows a different method. All the fixation is accomplished by utilizing the remaining teeth or roots and the alveolar ridges, assisted by bandages and chin and head supports. Our knowledge of the normal occlusion of the teeth gives us an excellent guide. This should be emphasized and followed very faithfully, no matter how extensive the fracture, or how much bony tissue is lost. Otherwise we may create very serious deformities that will upset the symmetry of the facial contour and the performance by the jaws and tongue of their normal function—the efficient mastication of food and proper articulation in speech.

It has been customary in the past to ligate the upper and lower teeth together with brass wires and support the jaw with bandages, a method which, while very simple and useful in many fractures as seen in civil life, I find of very little use, as the cases are complicated by external wounds.

If the fractures are anterior to the last lower teeth a simple splint of vulcanite or metal is made and cemented on, fitting over the teeth, allowing always room for drainage of the wounds of the mouth. This gives the patient the chance to use the jaws moderately. The same result is accomplished by using metal bands around the teeth and connecting these with heavy wires. If the fracture is at the angle of the mandible or along the ascending ramus, the lower jaw is attached to the upper either by rubber bands, silk ligatures, or wires, splints being made accordingly.

In cases which come under treatment late the question is more complicated. The external wounds in healing form scar tissue; the displaced parts of the bones begin to

FIG. 3.

Modified Vulcanite and Band and Wire Splints.—Either of these is applicable to fractures of the mandible, and are especially useful where there is loss of teeth and contiguous tissues. The heavy wire bar of the vulcanite splint affords a bridge over the lost tissues, and removes the objection to the continuous vulcanite type by giving adequate drainage to the mouth.

FIG. 4.

Intermaxillary Elastics.—Elastic bands drawing between hooks soldered to metal bands (which are soldered in pairs or triples to prevent elongation of the teeth in their sockets) are useful for gradual reduction of displacements of the mandible. Elastics can be applied by this method so that force may be exerted in any desired direction.

* Read at a meeting of the Military Medical Society mentioned in the BRITISH MEDICAL JOURNAL of December 18th, 1915, p. 905, and December 25th, p. 933.

form union, the muscles of mastication lose their contractile power, partly owing to want of use and partly through injury, and ankylosis of temporo-maxillary joints is very marked. In addition we have gross deformity of the face. In these circumstances the correction must be gradual. We have to fight against the cicatricial tissues, and that is always difficult. Mechanical appliances must necessarily be more or less complicated, and the degree of success is partly proportional to the ingenuity of the oral surgeon,

FIG. 5.

Metal Band and Wire Splint for Maxilla.—A useful retaining appliance for fractures of the upper jaw, which has been used successfully in fractures involving the process carrying all the teeth of the maxilla, except the two last molars on one side.

as new appliances have to be devised to meet the demands.

Cases with extensive loss of soft and bony tissues are comparatively difficult to treat, and it is impossible to outline a class of appliances to meet them, as each has its own peculiarity and should be handled accordingly. We have, however, certain rules to guide us:

1. We must try to control the infected area

by free drainage and frequent irrigations, etc.

2. No attempt should be made to suture the soft parts with the idea of closing the gap until such time as permanent splints are adjusted and union of the bony fragments is well under way. This rule is practically universal with all the oral surgeons doing extensive work of this kind.

3. The appliance should be made with the intention of holding the dissociated parts in their normal positions, taking as a guide the normal occlusion of the teeth.

Fractures of the superior maxilla are easier to control than those of the mandible, as they are more or less firmly connected with the other cranial bones. If there is no displacement, simple bandaging is usually sufficient. More complicated cases are treated with splints made of either rubber or metal, assisted by straps passing over the top of the head.

FIG. 6.

A form of band and wire splint, useful in the reduction of multiple fractures of the mandible where a one-piece splint is not practicable. It affords a method for the gradual reduction of extensive displacement of the broken parts, not found in continuous wire splints. (From casts.)

The following methods I have found very satisfactory:

1. Tincture of iodine is applied to the gums and teeth with a small piece of cotton.
2. Pledgets of cotton are saturated with hydrogen peroxide and rubbed over the teeth and all the mucous surfaces of the mouth as thoroughly as possible; this helps to remove particles of food, mucus, clots of blood, etc.
3. The mouth is irrigated with an antiseptic fluid.

The nurse should be instructed to repeat this treatment three or four times a day, except the use of iodine, which is applied only two or three times a week.

Complications.—Fractures of the maxillary bones alone are rarely fatal, but gunshot wounds are seldom limited to the jaws. The bullet may pass through or lodge itself in the head or neck, causing serious damage to the organs and tissues of the immediate neighbourhood. We must not overlook this fact, and the patient should be watched

very carefully in the first few days. It is highly important to examine the path of the bullet, and determine the amount of injury done as far as is possible.

The complication most dreaded is sudden haemorrhage. This is most common, of course, when the injury is in the immediate vicinity of good-sized blood vessels, particularly those of the neck. A very slight flow of blood, either from the external wounds or the mouth, should be carefully followed up. It may be the beginning of a serious haemorrhage.

FIG. 7.

Kingsley Bars.—This appliance consists of a vulcanite plate holding at the sides square metal tubes, for the reception of squared heavy wires, which extend externally from the corners of the mouth along the cheeks. The splint is supported by a head harness connected to the bars. This splint gives an excellent anchorage from which to work to the mandible, in cases in which fractures extend to both jaws.

An extensive fracture of the superior maxilla may involve the cranial bones and lead to disorders of the higher nerve centres, a possibility which should be carefully considered.

Among the minor complications we may expect is ankylosis. In very many cases this is only temporary, due to the injury of the soft tissues and the non-use of the jaws. Yet if the injury is at the temporo-maxillary joint we may have serious results if the treatment is not in the right direction. To prevent adhesions the mobility of the joints should be encouraged.

The control of the inflammation, abscesses, and necrosis of the tissues is part of our general treatment.

Importance of Early Treatment.—The importance of early treatment of maxillary fractures cannot be over-estimated. The appliances should be adjusted as soon as possible, as this assures the quickest and best result. I have noticed that on account of the unsightly appearance of the external wound there is a strong temptation to give attention to the wound, to the neglect of the setting of the bones. The wound should undoubtedly receive proper care, but the fundamental treatment must begin with the bony structure. If the patient has a fractured arm we do not wait several weeks or months before applying our splints or bandages. This rule holds equally true with fractured jaws.

War-time injuries to the jaws, with their attendant injuries to other parts and resulting constitutional disturbances, are best handled by the hearty co-operation of the general surgeon and the oral specialist, working together for the welfare of the patient by restoring to him as far as possible his normal facial appearance and the use of his jaws and teeth in the processes of mastication.

I desire to express my great indebtedness to my friend and colleague, Dr. F. H. Brigham, of the Harvard Surgical Unit, for the skill and care with which he has prepared the diagrams that illustrate this paper.

Brigade-Surgeon Lieutenant-Colonel Andrew Barry, I.M.S., of St. Andrews, Fife, left personal estate valued at £23,066.

THE report of the Surgeon-General of the United States Navy for the fiscal year 1915 shows that the death-rate was only 4.18 per 1,000 per annum. Three years ago there were 222 cases of typhoid fever with 15 deaths; the present report shows 13 cases with no death. This improvement is said to be due almost entirely to prophylactic inoculation. The rate for venereal diseases was higher than that for 1913, but lower than those for 1909-12. The rates for tuberculosis showed improvement.