MALAR – MAXILLARY DISPLACEMENT

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"Fracture of the Zygoma" is a misnomer for the zygoma (malar bone) although displaced is rarely broken. The maxilla is broken as the result of the zygoma being displaced into it and occasionally the zygomatic arch is broken. The displaced zygoma is one of the most commonly missed injuries by the recently qualified doctor, and it is well to remember the axiom that every "black eye" is a displaced zygoma until proved otherwise.

ANATOMY

The zygoma constitutes a large part of the prominence of the cheek. It articulates superiorly with the frontal bone, inferomedially with the maxilla, posteriorly with the temporal bone and medially with the sphenoid bone (Fig. 1).

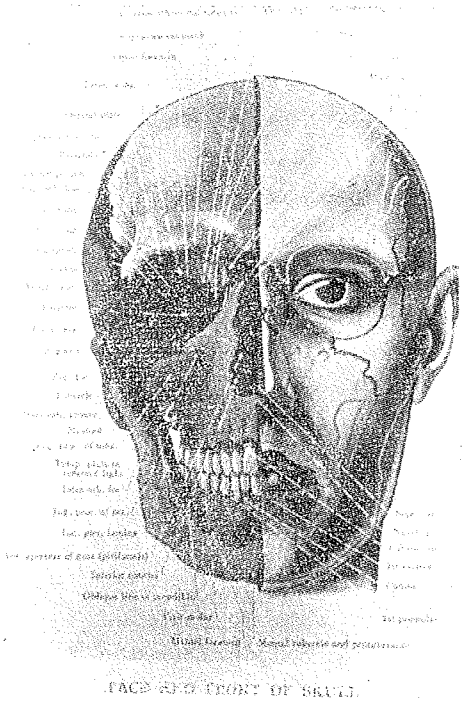

Fig. 1. This demonstrates the relationship of the Zygoma to the other bones of the face. (Illustration of Regional Anatomy. E. B. Jamieson).

The infra-orbital nerve comparable in thickness to a thick match stick is commonly involved as a result of a fracture of the maxilla resulting in disordered sensation on the side of the nose and along the upper lip (Fig. 2). It is a branch of the maxillary division of the trigeminal nerve and it runs in the roof of the maxillary antrum, that is the floor of the orbit, enclosed in the substance of the maxilla, which in this area is .5 to 1mm. thick. It emerges on the anterior surface of the maxilla about a finger's breadth below the inferior orbital bony margin in line with a vertical projected from the centre of the pupil.

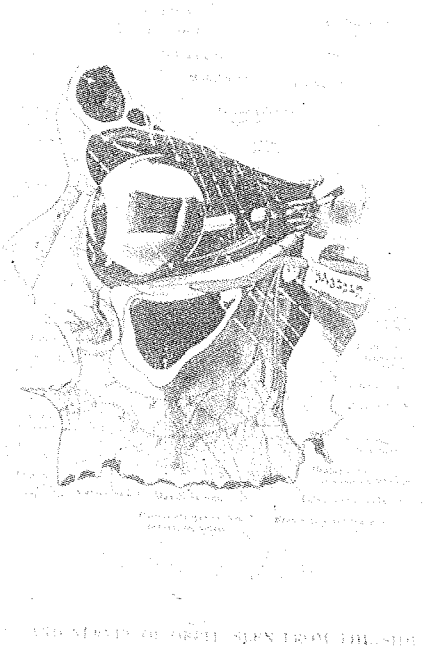

Fig. 2. This shows the relationship of the infraorbital nerve to the floor of the orbit and to the maxillary antrum. (Illustrations of Regional Anatomy. E. B. Jamieson).

Aetiology — Lateral violence is the moving force in displacements of the malar and results from:—

Automobile accidents
Alcohol
Altercations
And Australian Rules Football

Clinically, the patient presents with a black eye, often extensive sub-conjunctival ecchymosis and flatness of the cheek.

The patient will often mention:—

1. Numbness of the side of the nose and along the upper lip, both sites of numb-

ness being on the side of the fractured maxilla.

2. Painful mastication. This occurs because of the fracture in the maxilla, a medially displaced arch impinging on the coronoid process or contractions of the masseter muscle which is attached to displaced bone.

3. Blood in the post nasal discharge or epistaxis.

4. Impaired or double vision.

Examination may reveal a distinct step or depression along the inferior margin of the bony orbit. This may be difficult to appreciate when there is a considerable degree of swelling or emphysema. A useful manoeuvre is to examine the patient from behind — the patient sitting in a chair — and by comparing the prominence of the "cheeks" as seen from above and behind, one can appreciate that the profile is altered. This, with palpation will often show that the bony skeleton is abnormal. It is also useful to have the patient lie down to view the profile from the foot end of the bed.

X-Ray Examination is very important, but it is equally important to appreciate that the fracture may not be demonstrated although clinically there is one present. The radiological department recognises this deficiency.

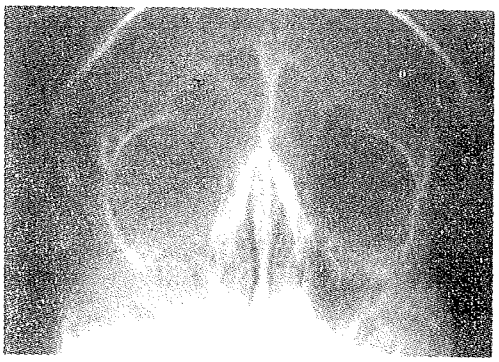

Fig. 3. This shows opacity of the maxillary antrum on the injured side. In addition the fractures of the maxillary buttress and of the infra-orbital margin are shown.

One looks for the following points in the radiograph (Fig. 3):—

(a) On the side of the fracture, the maxillary antrum is opaque.

(b) The maxillary buttress, that part of the antrum just above the first molar, is often comminuted and pushed in.

(c) The inferior orbital margin if followed from the frontozygomatic suture line down and medially, is seen to be different from the other side.

Thus, three X-ray signs are important — the opacity of the antrum, the pushing in of the maxillary buttress and the deformity of the bony margin of the orbital cavity. In addition, the frontozygomatic suture line may be widened.

INDICATIONS FOR OPERATION

It is not easy to lay down strict criteria for operation. Not every displacement of the zygoma requires operation. It is not uncommon to see minor displacements of the zygoma where there is very little cosmetic disability and in addition there being no nerve or visual impairment, surgery is not required.

In considering what are the indications for surgery in this increasingly common injury, the following will be discussed:—

(a) Cosmetic aspect.
(b) Nerve involvement.
(c) Visual impairment.
(d) Interference with chewing.

(a) The zygoma may be so displaced into the antrum that obvious flattening of the cheek with or without depression of the inferior rim of the orbit results. In the less common arch fracture the depression is felt and seen at the side of the face. Asymmetry demands, in the interests of cosmesis correction of the displacement.

(b) The infra orbital nerve may be contused as the result of the maxillary fracture. This produces a disordered sensation on the ala of the nose and on the upper lip corresponding to the side of the fractured maxilla. By elevating the misplaced zygoma the pressure on the infra-orbital nerve is relieved and the disordered sensation may improve rapidly. Thus, nerve involvement in the presence of displacement is an important indication for operation.

(c) Visual impairment is an uncommon indication for early corrective procedures. If the eye is low, surgery is required to elevate the floor. On two occasions a displaced malar bone has pressed on the eye thus demanding early correction. One requests, prior to any operation on the maxilla an ophthalmological assessment of the eye. It is my experience that diplopia occurs in less than 8.4% of cases as in Barclay's series, and certainly persistent diplopia is rare. As Schjelderup points out there must be muscle imbalance to have diplopia and although this statement may seem supererogatory it must be stressed that mere difference in eye level will not, by itself, cause diplopia. Transient diplopia recovers rapidly within a week and is not an indication for surgery.

(d) Interference with chewing may be the result of the zygomatic arch being displaced medially. This interferes with the normal excursion of the coronoid process of the mandible deep to the arch. Pain occurs on chewing with the simplest fracture involving the maxilla because of upward thrust. Obviously, if the zygomatic arch is displaced medially and it is causing interference with mandibular movement the fracture must be elevated.

LATE INDICATIONS FOR OPERATION

1. Nerve involvement.
2. Visual.
3. Cosmetic.

1. In some unreduced displacements numbness of the cheek and side of the nose is troublesome. If the displacement is severe, osteotomy may be required before reduction is possible. Wire fixation is necessary in such late cases. In some cases a tomogram of the orbital floor may be necessary to demonstrate the fracture. Nerve involvement without gross bony displacement requires neurolysis only. The nerve is unroofed in its canal from the floor of the orbit to the exit foramen.

2. Visual disturbance may occur late, due to involvement of the inferior oblique and inferior rectus muscles in scar tissue. The adhesions result from comminution of the orbital floor which is rarely demonstrated by radiographs unless a tomogram is requested. The floor may sag into the antrum and to correct the resultant diplopia cancellous bone wafers are inserted under the orbital periosteum.

3. The flatness of the cheek can also be corrected by bone graft.

TYPES OF OPERATIONS PERFORMED

1. *Elevation of the Malar Bone by the Temporal Route.* This is the basic operation. A small incision is made parallel to the temporal artery in the hairline and after identification of the temporal fascia, a lever is passed down superficial to the temporal muscle deep to the fascia. The depressed bone is then lifted forward. In the vast majority of cases, this simple procedure produces a stable result.

2. Less commonly, after simple elevation the displacement proves to be unstable (Fig. 4). Under these circumstances, *open reduction and internal fixation* is performed by an incision along the inferior orbital margin, the fracture being wired in the desired position. The fronto-zygomatic suture may require wire fixation also (Fig. 5). Mowlem states that comminution of the fracture determines instability whereas Rowe and Killey believe that the time between injury and operation determines instability . Knight and North stress that the type of displacement determines instability. In their experience the medial displacement type is unstable.

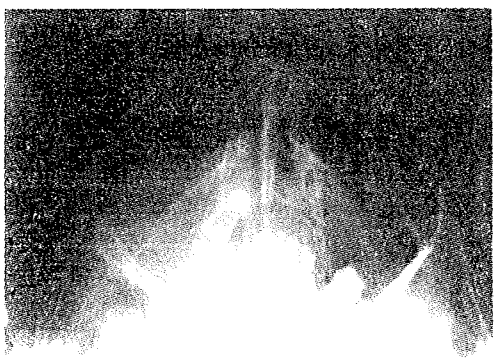

Fig. 4. Shows displacement of the infraorbital margin.

Fig. 5. Same case as Fig. 4 after operation. Wire fixation of the fragments has been used.

Fig. 6. Shows a maxillary antrum packed with ribbon gauze impregnated in BIPP in order to hold up the fragments of the orbital floor.

Fig. 7. This demonstrates the maintenance of reduction of an unstable fracture by the use of continuous traction.

3. On occasion it is necessary to push the fragments up via the antrum as described by Abrahams and Dodd. An incision is made in the bucco-gingival sulcus after infiltrating the site with saline to diminish the bleeding. It is not difficult to enter the antrum for the fracture commonly extends well down the face of the maxilla. Packing is introduced into the cavity of the antrum and pressure is then exerted in an upwards and forwards direction to restore the normal outline. It is important, having packed the antrum that the floor of the orbit should be inspected because of the risk of elevating unevenly part of the floor. Half inch ribbon gauze impregnated with BIPP is used as packing (Fig. 6). An intra-nasal antrostomy has not been used nor have anti-biotics been exhibited. The gauze is left in place for two to three weeks before removal. Infection has occurred once only and that in an old man with a dirty mouth. The mucosal incision closes spontaneously.

4. Continuous traction by means of a wire from the underlying bone to a plaster head piece has been used once only (Fig. 7). Other procedures such as intra-oral elevation of the malar (Lothrop) and the intra antral pressure balloon and jack (Anthony and Fisher) have not, as yet, been used in this series.

SUMMARY

a. The fractured zygoma is a rare injury. The maxilla is commonly fractured by displacement of the malar.

b. The malar — maxillary injury is easily missed by the recently qualified and has potential medico-legal implications.

c. Radiographic examination is insufficient to exclude the fracture.

d. The fracture of the maxilla is more extensive than is revealed by routine radiography.

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