Chapter 13: The fractured nose

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Epidemiology

According to Fry (1967), fracture of the nose is the commonest fracture in humans. This chapter refers to fracture of the nasal bone but this is only half of the problem of the fractured nose. If fractures of the quadrilateral cartilage and the bone are taken in conjunction, then it must be the commonest fracture but no figures exist to confirm this.

It is certainly more common in the Caucasian than in the Asian or African. In the Caucasian, the nose is the most prominent feature of the face in the anteroposterior direction and is at risk in any fall or facial injury. Furthermore, it is reasonably easily diagnosed because deviation, saddling or swelling are easily noticeable in a nose of this shape. In the African or the Asian, with the squat nose, then deviation and saddling are not so easily noticed and fractures may be missed. This is also the case in children under the age of 5 years where the nose does not form a prominent part of the face. In children, the nose may be fractured and not noticed clinically but the fracture alters the growth pattern of the nose and the nose thereafter grows 'squint' (Pirsig and Lehmann, 1975; Grymer, Gutierrez and Stoksted, 1985).

The nose alone is fractured by low velocity trauma. If it is fractured by high velocity trauma then it is usually accompanied by other facial fractures usually of the Le Fort type I or type II (Le Fort, 1901).

Any nasal injury may be associated with neck or skull damage. The essential whiplash nature of the injury that fractures a nose must always be suspected of having caused neck trauma.

Causes

Four main causes of nasal trauma are: personal assault, sports injuries, personal accidents and road traffic accidents.

The commonest cause is probably assault. In this group the people most affected are, of course, young males. Although many of these patients will come to the hospital spontaneously, a number will come because of pending legal action and it is essential that accurate documentation is made on the first visit with these patients.

The types of sports that cause nasal trauma are football, especially when two players go to head a high ball; rugby, usually due to elbow or fist injuries; racquet sports such as squash where the racquet during the back or forward swing can hit an opponent's nose, or karate. Although it is stated that fractured nose in boxing is rare (calculated by the British Boxing Board of Control to be two out of 4350 bouts), this just applies to nasal bones. It would, indeed, take a blow of enormous frontal force to break the nasal bones with a large 170-gram (6-oz) boxing glove. The area of contact is far too large. What is very common in boxing, however, is damage to the nasal septum.
Under the heading of personal accidents come such events as falls in the home and elderly patients, in particular, will present in this fashion together with the traditional walking into doors or other objects. It is occasionally seen in the spectators at ice hockey matches and has been reported in golf spectators.

The force of injury in a road traffic accident is usually high velocity, so other facial fractures are also caused. It is possible, however, to have isolated nasal damage from the nose hitting the dashboard or steering wheel at a relatively low velocity.

Special attention needs to be given to women and children admitted with nasal trauma. More care than usual should be given to taking the history of events leading up to the nasal trauma in these patients, because of the increasing frequency of wife beating and child abuse.

Pathogenesis

If the central part of the face is traumatized then five things can happen depending on the velocity and the direction of the blow.

No fracture

With a low velocity blow, the septal cartilage will be deviated to the side and may be pushed back as far as to touch the cheek, but unless it is split between its two fixed points, which are the end of the nasal bone and the maxillary spine, then its inherent elasticity will bring it back to the mid-position and the worst that the patient will suffer is some nasal congestion due to oedema of the septal mucosa.

Class 1 fracture

If the blow is of greater severity then a class 1 fracture will result. The nasal bone, although one rather short bone, is in two distinct parts. The distal half is thin and easily broken from the proximal part which is joined to the frontal bone and becomes very thick. A class 1 fracture, therefore, either breaks the quadrilateral cartilage between its two fixed points or takes with it a depression or displacement of the thin distal part of one of the nasal bones. To cause this fracture the direction of the blow must be frontal or frontolateral. The vertical fracture that occurs in the nasal septum was first described by Chevallet and still bears his name. The distal segment of the nasal bone is attached to the upper lateral cartilage which stops it falling into the nasal cavity.

In children these fractures can occur in a greenstick variety and so at puberty, when a growth spurt occurs in the nose, the nose can apparently grow in a squint fashion (Pirsig and Lehmann, 1975). There may also be reduced growth of the nasal bone giving a ski-slope deformity of the nose. The depression of the distal part of the nasal bone may also not be noticed at the initial injury because of the recoil due to the underlying upper lateral cartilage. It is only if the fractured distal segment becomes impacted under the remaining nasal bone that the fracture becomes obvious.
**Class 2 fractures**

These are fractures of the nasal bone, including the frontal process of the maxilla, as well as the structures involving in a class 1 fracture. This fracture needs a fine degree of medium velocity trauma. There has to be quite a difference between the trauma that causes a class 1 fracture and a class 2 fracture and, if there is enough force to break the thick root of the nasal bone and the maxillary processes of the frontal bone, then it is likely that the fracture will spread and become a Le Fort type II or III fracture. The importance of a class 2 fracture, however, is that it indicates that the ethmoidal labyrinth has not collapsed or been compressed. It is recognized by the fact that the patient does not have gross depression of the nasal bones, although there will be a high deviation. It is nearly always due to lateral trauma and, if the same velocity of trauma were applied from a frontal direction, then it is almost certain that the fracture would have become a Le Fort type fracture.

The nasal bones are attached to the perpendicular plate of the ethmoid. If there is any degree of deviation of the nasal bones visible other than a slight depression of a distal fragment of a nasal bone then, by definition, the perpendicular plate of the ethmoid must also be fractured. It has been shown on several occasions that this fracture takes on a special shape which is governed by the lines of tension present in a structure with the shape of the nose (Mayell, 1973; Harrison, 1979; Murray and Maran, 1980). It is a C-shaped fracture which begins just under the tip of the nasal bones in the quadrilateral cartilage and extends posteriorly and caudally through the perpendicular plate of the ethmoid and, at the anterior border of the vomer, turns anteriorly to run along the lower part of the perpendicular plate of the ethmoid and through the quadrilateral cartilage just above its junction with the maxillary groove. This latter cartilaginous fracture has, on occasion, been called the Jarjavay fracture and has occasionally been described as a dislocation of the nasal septum from the maxillary spine. It is in reality, however, merely an extension of the C-shaped fracture that occurs in deviation of the nasal bones accompanied by fracture of the perpendicular plate of the ethmoid.

This has important implications for treatment because mere replacement of the nasal bones may be successful but, in over 40% of cases, there will be redisplacement of the nasal bones due to overlapping of the fractured ends of the perpendicular plate of the ethmoid and the quadrilateral cartilage. The tension in this overlap will drag the nasal bones back to their original fractured position (Murray and Maran, 1980). Although more will be said about this under Treatment, it is essential to excise the overlapping fragments, before manipulating the bones back so that they heal in their correct position.

**Class 3 fractures**

A class 3 fracture indicates that the velocity of the trauma has been even greater. It means that the fracture has extended to include the ethmoid labyrinth. The three classes of fracture indicate the three areas of the nose with varying strengths. The class 1 fracture indicates a rather weak but elastic area, the class 2 fracture indicates the main buttress and strength of the nasal skeleton and the class 3 fracture indicates that the fracture has extended back into another weak, but this time rigid, part of the nasal skeleton. If the ethmoid labyrinth, which consists of anything from 4 to 12 air cells, is fractured, then it virtually telescopes on itself taking with it the bony nasal skeleton. The perpendicular plate of the
ethmoid is also rotated thus pulling the quadrilateral cartilage backwards giving the patient a pig-like appearance with forward facing nostrils and saddling. There is apparent widening of the space between the eyes, described as telecanthus and the medial ligament which is attached to the lacrimal crest is often disrupted allowing even further telecanthus. The lacrimal sac and the nasolacrimal duct may be damaged in this injury leading to subsequent tearing and the nasal bones may become impacted under the frontal bone.

This is one of the most difficult nasal reductions and can be likened to the repair of a shattered egg shell. It carries with it many other complications which will be discussed later.

*Le Fort type II and III fractures*

These are discussed in Chapter 14.

Although most of these fractures are closed, if the velocity is high enough or if the trauma is due to a sharp instrument, they may be compound. They are, however, all compound when viewed from the interior of the nose and the consequence of an open fracture with regard to the nasal bone and associated structures does not carry with it the same possibly serious consequences of a similar opening in a fracture involving a long bone.

**Complications**

*Deviation of the nose*

Although this is primarily a cosmetic problem, it carries with it probable nasal obstruction. This nasal obstruction may be present to a greater or lesser extent, however, and many patients with grossly deviated noses do not complain of obstruction while others with mild deviations complain bitterly. The surgeon must learn to differentiate between those who are too shy to talk about the cosmetic abnormality and sublimate it into functional nasal problems, and those who have a truly functional nasal problem. This to a large extent decides the type of nasal operation required.

There will be some nasal obstruction with either of the septal fractures, namely the Chevallet or the Jarjavay. Both will carry some degree of deviation of the lower part of the nose, but it may not be obvious on frontal viewing. It is nearly always obvious on viewing the tip from below. The caudal end of the septum very often presents itself in one or other nostril with consequent asymmetry. If the fracture was created in the early years of life then there may be associated distorted growth of the lower and upper lateral cartilages (Pirsig, 1986). Greater degrees of trauma can cause reduplication of septal fragments. A spur is basically either a Jarjavay fracture if occupying the whole length of the floor of the septum, a reduplication of cartilage if involving a moderate amount of the septum or an isolated septal fragment if localized.

The concept of dislocation of the septum is incorrect. It is intuitively attractive to explain the presence of the caudal end of the quadrilateral cartilage in the nose and a bony cartilaginous disjunction along the floor as the quadrilateral cartilage having exited from the maxillary spine, but this in fact is incorrect. Operations on these patients show that it is always a fracture along the bony cartilaginous junction and there is still cartilage present in
the maxillary crest. It is, in fact, mechanically impossible to extract the cartilage from the maxillary crest in view of the complicated cross ties between the periosteum and perichondrium in this area.

Deviation of the nasal bones can recur after manipulation if the nasal bones are pulled back by the overlapping fragments of the fractured perpendicular plate of the ethmoid. Patients with nasal deviation can present later if the original fracture was missed due to swelling or if the patient did not attend primarily. Another reason for persistence of nasal bone deviation is the clinician believing an X-ray that is reported as showing no fracture.

A false impression of nasal deviation can be given by a depressed distal fragment of nasal bone. It is essential that this is diagnosed or else undue or overenthusiastic attention can be applied to the rest of the nasal skeleton which is really quite normal.

The effect of a greenstick fracture was pointed out earlier; with growth, it will cause a deviated nose either in the bony or cartilaginous segment.

**Bleeding**

Nearly every patient who has trauma to the nose will bleed due to mucosal lacerations. Particularly troublesome bleeding can occur with fractures of the perpendicular plate of the ethmoid when the long sphenopalatine artery may be caught up in the fractured segments and not allowed to constrict. A similar situation can occur in class 3 fractures where the anterior ethmoidal artery may be held open by pieces of the fractured ethmoidal labyrinth. Both of these situations, if the bleeding persists in spite of packing, demand an open exploration and arterial ligation.

**Saddling**

When blood is in contact with cartilage for any period of time, cartilaginous absorption results. If the septal cartilage is fractured, reduplicated or absorbed, then there is loss of height (Huizing, 1986). This may not be immediately obvious. The area of cartilage loss will fill with fibrous tissue which will then contract in the avascular phase and pull on the remaining cartilaginous pieces of the septum. This pulls the upper lateral cartilages down between their fixed points between the lower lateral cartilage and the undersurface of the nasal bone. The patient then presents with a dip between the lower lateral cartilages and the nasal bone.

A greater degree of saddling is found in class 3 fractures. When the ethmoid labyrinth is shattered, then the nasal bones are pushed backwards underneath the frontal bone and the perpendicular plate of the ethmoid rotated upwards carrying with it the quadrilateral cartilage. The patient then presents with a ski-slope nose and hypertelorism.

The lower lateral cartilages are always supported on the maxillary bone and the caudal end of the quadrilateral cartilage. Although they may be rotated upwards, showing the nostrils from the frontal view, their height is usually preserved thus exaggerating any saddling.
**Cerebrospinal fluid leak**

It is unlikely in a class 1 and class 2 fracture that there will be an associated cerebrospinal fluid leak, but any clear discharge from the nose must be regarded with suspicion and tested accordingly for the presence of sugar. In a class 3 fracture, it is quite likely that the fracture line could extend through the fovea ethmoidalis thus involving the dura, giving a cerebrospinal fluid leak. A greater degree of class 3 trauma may involve the sphenoid, but this would be exceedingly rare.

Perhaps the commonest site of a cerebrospinal fluid leak is a fracture involving the cribriform plate in the class 3 variety. Here the dura extends along the olfactory nerves as they exit through the pits in the olfactory plate, and a minor degree of trauma is enough to produce a cerebrospinal fluid leak. Although a cerebrospinal fluid leak usually seals spontaneously and does not require operative intervention, it can create a preformed tract and recurrent meningitis may be a later problem.

**Orbital complications**

Any central facial trauma involving fracture of the nasal bones will result in leakage of blood into the lax periorbital space giving a haematoma. It is essential not to accept this in every case as the common complication of a fractured nose, because it may mean that there is an associated fracture of the floor of the orbit. Class 3 fractures are the type that affect the orbital apparatus. The medial orbital ligament can be detached from the lacrimal crests, causing further hypertelorism and also diplopia. Damage to the lacrimal sac and the nasolacrimal duct will result in tearing and dacryocystitis. It would take very severe injury to create a fracture line that went back to the optic foramen to cause blindness, but it must be remembered that the posterior ethmoid cells is only 1-3 mm away from the optic foramen, although this latter foramen is surrounded by very thick bone.

**Healing**

Skull bones form in membrane and, in general, heal by fibrous union rather than calcification. Nasal bones heal by calcification and are in this respect odd. The assessment of a healed nasal fracture is, however, often complicated by the calcification of the subperiosteal haematoma that often accompanies a nasal fracture. It is possible that a nasal hump for which the patient requests cosmetic rhinoplasty later in life is a calcified subperiosteal haematoma from a minor degree of trauma in early life. A depressed distal fragment of the nasal bone can distort the upper lateral cartilage. Distortions of the upper lateral cartilage due to trauma or growth abnormalities are exceedingly rare and usually reflect anomalies of the bone or the quadrilateral cartilage.

Cartilage heals by fibrous union. Cartilage that is absorbed by blood will, over a period of 18 months, have an effect on the attached cartilages and in this way the lower lateral cartilage and upper lateral cartilages may be distorted.

When dealing with nasal fractures, one has to be aware of the concept of dynamic healing. Scar tissue takes a full 18 months to mature and, while there is a 90% result at 3
months, a final result cannot be estimated before 18 months and indeed the result may gradually get worse over this period.

An example of this is nasal saddling. Some degree of nasal saddling and retraction of the nasolabial angle is inevitable after the submucous resection operation but it is seldom seen until up to a year after such a procedure. The same applies to saddling due to cartilage absorption after trauma, which takes up to a year to occur.

Greenstick fracturing in childhood leads to abnormal growth which is evident during growth spurts (Pirsig, 1986).

Clinical features of nasal trauma

History

The patient may present with no immediate past history of trauma but the nose is deviated. These patients have had trauma in the past and have not recognized it at the time. This can apply not only to deviations but also to saddling and hump formation. The only cause for a deviated nasal septum in the absence of trauma is an asymmetrical face. Although when one talks about trauma one thinks of adult trauma, there has been a great deal of work done on the effects of forceps delivery on the nasal skeleton and the immediate septal abnormalities due to fracture and distortion found after such deliveries.

When the patient does give an immediate past history of trauma then there are a number of points to establish. The first is the direction and the degree of velocity of the trauma. This gives an estimate of the fractures that are possible. Secondly, one has to get the patient to give some description of the shape of his nose prior to the trauma and also his breathing capacity through each nostril. Often this is impossible and asking the patient to bring photographs to the clinic at the next visit is largely a waste of time because, unless the photographs are taken as for rhinoplasty, then one can tell little from holiday snap shots.

The patient who has had fairly severe trauma may have epistaxis, a cerebrospinal fluid leak, diplopia, tearing or telecanthus.

It is essential to make good notes of these injuries because, although few of them come to law, those that do are expected to have a fairly accurate description of the findings and the circumstances. With the law in mind one should also remember to ask the patient about neck pain, limitation of neck movement and root symptoms down the arm, since every facial injury should be regarded as a potential neck injury.

Examination

This is very often difficult because of nasal swelling. There is little to be lost by carrying out immediate first aid and asking the patient to return to the clinic again 5-7 days later. At the first visit, however, it is essential to assess the severity of the injury and also other associated injuries. It is essential to notice whether or not there is cerebrospinal fluid leak and to get any bleeding under control. The patient can be given nose drops to help the
recovery of nasal airways but, if there is any suspicion of septal haematoma, then an incision under local anaesthesia should be performed, followed by drainage if necessary.

Radiology

By and large, X-rays for nasal fractures are a waste of time and there is no place for routine radiology in simple nasal injuries. Vascular markings look just like fractures and patients may be taken to theatre on the basis of a radiologist's report which relates to a vascular marking. The importance of X-rays is to rule out more extensive fractures than are assessed clinically and also to make sure that the neck is not damaged.

Radiographs may also show that there is blood in the maxillary antrum and, in these cases, it is essential to make sure that there is not a concomitant fracture of an antral wall. If a class 3 fracture is suspected, then tomography is essential to assess the damage to the ethmoid labyrinth and anterior cranial fossa. If the patient has a number of other facial injuries, then it is best to record these by photography.

Nasal endoscopy

If there is sufficient airway then nasal endoscopy should be carried out. This is done with a 70° telescope after vasoconstricting the nose. In particular, one looks for compounding of the fracture of the nasal bones into the nose and the state of the perpendicular plate of the ethmoid.

Treatment

No treatment

About half the patients who come to an otolaryngology outpatient department as an aftermath of nasal trauma, have no fracture either of the nasal septum or the nasal bone. They may have some oedema but what they require is documentation, examination, reassurance and vasoconstrictor nose drops for the subsequent swelling.

Some patients may become regular attenders with nasal trauma. Their septum may be badly deviated and the nasal bones deviated from previous trauma. These patients should probably not be offered treatment for the acute injury and it should be explained to them that a corrective septorhinoplasty is required, but this would not withstand further trauma as much as their present broken nose. Most patients will accept this situation.

A special category is created by sportsmen who wish to continue in their chosen sport or who have long-standing nasal deformity. These patients should be told that a septorhinoplasty would certainly not strengthen their nose and that further nasal trauma was going to occur. They should be advised to return for a corrective septorhinoplasty when they have retired from active participation in their sport.
Class 1 fractures

These are the fractures of the nasal septum and the distal segment of the nasal bone. Simple manipulation and packing may well be sufficient in these patients. This is usually performed under general anaesthesia with an endotracheal tube and a pharyngeal pack. Elevation of the nasal bone with accurate packing in the vault of the nose should be successful. If manipulation of the Chevallet fracture is not successful, then an open reduction can be done relatively quickly and easily by realigning the fractured segments and stitching the fractured area making sure the knot is to the side that was concave. Packing on the side that was obstructed by the fracture should be left in for at least 3 days. Much attention has been given to the optimum time to carry out simple manipulation. It does not seem to matter so long as it is performed within the first 2 weeks after the injury but thereafter osteotomy may be required.

Class 2 fractures

It has been pointed out earlier, that about half of these fractures redisplace because of overlapping segments of the fractured plate of the ethmoid and the posterior part of the nose as part of the C-shaped fracture that accompanies severe deviations (Murray and Maran, 1980). The manipulation of the nasal bone here should be accompanied by an open reduction of the septal deformity. This takes the form of a Killian incision in the nose with elevation of septal fragments. The C-shaped fracture is easily seen and the overlapping segments excised. The nose is then packed, a plaster-of-Paris splint applied and the packing and splinting removed after 3 days.

Class 3 fractures

The problem with this fracture is to pull the depressed nasal bones out of the face and support them when the normal bony support of the medial wall of the orbit has disintegrated. The septum also requires attention because the rotation of the vertical plate of the ethmoid carries with it the quadrilateral cartilage which gives the patient a pig-like appearance, with the nostrils facing anteriorly. A third problem lies in impaction of the nasal bones under the frontal bone.

These problems all require open reduction. It may be necessary to make an incision over the nasofrontal angle in order to move the nasal bone from under the frontal bone. Nothing can be done about the disintegrated medial wall of the orbit because the bone is so thin, but the nasal bones can be held forwards over wires in the hope that they will attach themselves once again to the frontal bone and that, with replacement of the septum, the upper lateral cartilages will give them support lower in the nose. The wires are 26 gauge and are passed under the nasal bones with straight cutting needles and are tied on the outside over silicon or lead plates. It is better to do this open reduction as soon as possible after the injury but it can be done at any stage. The manipulation of the fractured nasal bone may have to be augmented with osteotomies if the delay is more than 3 weeks (Brain, 1986).

The septum is dealt with as before with a Killian excision and septal exploration. The aim of this operation is to pull the septal cartilage forwards and downwards and it is essential to do all of this surgery as soon as possible because, on leaving for some days, the nasal skin
shrinks and it is impossible thereafter to get increase of length of the nose without adding in extra skin by grafting.

Treatment of complications of nasal trauma

Bleeding

The bleeding after nasal trauma is either due to mucosal lacerations which should stop within 24 hours with nasal packing or, if it persists and is profuse, then it is due either to an open long sphenopalatine artery or an anterior ethmoid artery. The site of the bleeding should be identified and, if it is from the long sphenopalatine, then open septal exploration should be carried out and, when the artery is freed from the fractured segments, it usually stops with packing.

If the anterior ethmoid artery is continuing to bleed after an ethmoidal fracture, then it needs to be clipped with an external ethmoid approach.

There is no place for postnasal packing in the treatment of bleeding after nasal trauma because the bleeding almost never comes from the artery of Zuckerkandl at the posterior end of the turbinate.

Cerebrospinal fluid leaks

It is very seldom that cerebrospinal fluid leaks after nasal trauma require surgical repair. It is only if a bone fragment has been inserted in the dural tear that the leak will continue. In this case it is better to approach the area through a frontal craniotomy. Any approach to the cribriform plate through this area, however, carries with it certain permanent anosmia and thus it is a procedure that should be avoided if at all possible. The importance of a cerebrospinal fluid leak is the possible complication of meningitis, either sooner or later. The patient should be observed for meningism in the immediate post-injury period and, after discharge, the medical advisers should be appropriately warned to take meningitis type symptoms seriously. The place of routine prophylactic antibiotics is still uncertain.

Orbital complications

Telecanthus is improved by correcting the height of a flattened nasal dorsum. If the medial ligaments are torn from the lacrimal crest, then they have to be wired together again and it is best done with 24 gauge wire. There is little that can be done as an immediate reconstruction of the lacrimal sac and nasolacrimal duct. If the patient develops tearing after the trauma and subsequent correction has settled, then a dacryocystorrhinostomy should be on offer.

Treatment for late complications of nasal trauma

The deviated nose

This may be due to deviation of the nasal septum, the nasal bones, or both. It is essential that the nose be 'read' properly so that the correct procedure can be carried out. It
is very seldom that anything needs to be done to the upper lateral cartilages or lower lateral cartilages as these usually reflect displacement due to the quadrilateral cartilage or the nasal bones.

A standard septoplasty approach would be used for the deviated septum. A hemitransfixion incision is made, flaps are elevated and the septal damage inspected. There will almost certainly be a Jarjavay fracture which will look like a 'spur'. This deviated cartilage should be excised. The cartilage that is still in the maxillary crest should not be removed but the rest of the cartilage should be placed on it.

Scoring fresh nasal cartilage, as described by Fry (1966) does cause it to bend to the other side due to the release of elastic forces within the cartilage. This, however, does not apply in cartilage that has been traumatized. Scoring scarred cartilage will never cause it to move and, if there is a Chevallet fracture, then it is best dealt with by excision of the fractured segments and appropriate stitching.

It is important to judge what the patient hopes to achieve by surgery after trauma. If he/she wants an airway more than cosmetic improvement, then consideration should be given to an inferior turbinectomy on each side.

A medial and lateral osteotomy, as is performed for cosmetic rhinoplasty, is not applicable to bones that have healed after trauma. Any attempt at osteotomy on previously fractured bones will result in an irregular fracture line running along the old fracture line. There will be no control over the osteotomy as there would be in cosmetic rhinoplasty. This is why the triple osteotomy has gained favour. A complete medial, intermediate and lateral osteotomy is performed and this results in the nasal bones virtually being shattered (Mackay, 1986). It releases all of its scarred forces, however, and allows it to be manipulated and reformed in the midline. Appropriate packing and fixation completes the procedures.

The saddle nose

Cartilaginous saddles

There are many ways to improve the appearance of a nose that has suffered a saddle deformity as a result of cartilage absorption secondary to trauma. Minor degrees of saddling can be dealt with by the insertion of small pieces of diced homograft cartilage via an intercartilaginous incision.

Most patients, however, who have a noticeable cartilaginous saddle, should have either a Silastic stent or a piece of rib cartilage inserted into the appropriate area and fashioned to the appropriate shape via an external rhinoplasty approach.

Although heightening the cartilaginous segment of the nose will reduce the broadening effect that usually goes with saddling as a result of splaying of the upper lateral cartilages, some cases may benefit from one of the various cartilaginous swing techniques applied to the upper lateral cartilage (Sear, 1977).
Bony saddling

This is usually the result of a class 3 fracture and is the result of failure to extract the nasal bones from under the frontal bone or a malunion of the nasal bone with resultant depression into the space left by the fractured ethmoid labyrinth.

Again an external rhinoplasty approach is to be preferred and either the dorsum of the nasal bones is freshened or osteotomies are performed. It needs a raw bone surface for a bone graft to take and in these cases an iliac crest bone graft is preferable to a Silastic stent.