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President—E. D. D. DAVIS, F.R.C.S.

Discussion on Injuries of the Nose and Throat

MR. V. E. NEGUS

THE *proportion of injuries* in the various regions is illustrated by a table showing the cases of injury to the head and neck treated at Horton Emergency Hospital. The table demonstrates that of all the head injuries admitted, just over half were cranio-cerebral, while the remainder affected regions other than the cranium. The nose and sinuses suffered relatively infrequently and the pharynx and larynx scarcely at all.

INJURIES OF THE HEAD AND NECK. ADMITTED TO HORTON EMERGENCY HOSPITAL FOR EIGHTEEN MONTHS

	Civilian	Service	Total
Total cases	1,476	2,441	3,917
Total head and neck cases	372	205	577
Cranio-cerebral	214	113	327
Other regions of head and neck ..	157	126	283
Face	55	32	87
Eye	92	34	126
Nose and sinuses	10	5	15
Mouth and tongue	0	2	2
Mandible	5	7	12
Neck	4	10	14
Pharynx	0	1	1
Larynx	0	1	1
Trachea	2	1	3
Bronchus (F.B.)	0	1	1
Ear	39	35	74
Wounds and other parts of the body	51	31	82

NOTE.—The added total of head and neck cases is 610; the excess of 33 over the number given as 577 refers to combined injuries.

Nose

Hæmatoma of the septum is to be expected and if present free incision and evacuation are required, particularly if infection has occurred.

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Much can be done to prevent infection if it is realized that the vestibule of each nasal fossa is heavily infected, while the regions lined by mucous membrane are practically sterile.

Mercurochrome in 2 per cent. solution or biniodide of mercury 1 : 500 in spirit, can be used both for the vestibule and exteri or of the nose. To maintain asepsis the patient should wear a small roll of gauze held in position over the nostrils by tapes tied behind the head.

For fracture of the nose with displacement I have found a splint made of successive strips of broad ribbon gauze, to which collodion is applied with a brush, very convenient. Each layer is allowed to dry partially before the next is applied ; eight thicknesses are sufficient.

Para-nasal Sinuses

Simple injuries to the sinuses may be confined to effusion of blood into the antrum. Such a collection of fluid is best left alone, as it will in all probability absorb without immediate or subsequent trouble ; here again, prevention of infection from the nostrils is of importance.

Simple fracture of the walls of sinuses may not call for treatment, except in special instances.

Depression of the lachrymal bone associated with inward displacement of part of the ethmoid plate, may lead to obstruction of the fronto-nasal duct, with subsequent headache ; manipulation into normal position can be carried out with Walsham's forceps.

Compound fractures into the sinuses may present both cosmetic and functional difficulties. If the wound is clean, it may be possible to effect immediate closure without drainage. If, however, potential or actual sources of infection are present, it is desirable to provide free drainage, to cleanse lacerated skin edges, to remove foreign bodies and pieces of bone and then to dust the wound with sulphonamide powder. A full prophylactic course of sulphapyridine, 1 g. four-hourly, is given for three days. Failure to carry out this form of treatment, or excess of zeal in opening up bony layers or venous and lymphatic channels in early septic cases, may precipitate osteomyelitis, or thrombophlebitis, with possible spread to the meninges or the cavernous sinus.

After an interval of at least fourteen days a further operation can be undertaken if necessary, according to the site and type of injury.

The *maxillary sinus*, if containing pieces of metal or fragments of bone, must be opened by the sublabial route as soon as possible after the injury, unless the wound itself is of sufficient size for the removal of foreign bodies. If infection is present or impending, it is wise to provide an opening into the inferior meatus of the nose.

Clearance of the *ethmoidal labyrinth* may be required in injuries

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of this region, if infection is present; the operation should be postponed for at least fourteen days and is best carried out by the external route.

If it appears that obstruction of the fronto-nasal duct might follow the operation, it is well to make a free communication between the nasal fossa and the frontal sinus and to insert a skin graft, held in place by a rubber tube.

The *frontal sinus*, if injured, may present the double difficulty of cosmetic repair and functional restoration. If the anterior wall is depressed, but still more or less intact, elevation may be possible. If, on the other hand, the wound is severe and the cavity of the sinus infected, there will be swelling of the mucosa and blockage of the fronto-nasal duct, particularly if the injury extends downwards to the nose. In such a case it is essential to provide a free passage into the nose by enlarging the fronto-nasal duct; the operation should include the insertion of a skin graft.

If there be destruction of the anterior bony wall, it may be desirable to restore the lumen of the sinus and to replace its mutilated lining with a skin graft in the form of a sac, held in position by a bag of oiled silk packed with ribbon gauze. I have on two or three occasions adopted this procedure with satisfactory results.

It is extremely difficult, if not impossible, to obliterate a frontal sinus and a pocket is liable to be left, with continuation of suppuration. The restoration of the lumen and provision of a free new fronto-nasal duct, eliminates this source of chronic infection and at the same time avoids the severe disfigurement resulting from destruction of the anterior wall. Insertion of fat or bone grafts in such cases offers difficulty because of the probability of sepsis.

Compound fracture involving the posterior wall of the frontal sinus is of serious import and a radical operation may be indicated.

A further complication of a wound involving the ethmoidal and maxillary sinuses, in one case under my care, was penetration of the *pterygo-maxillary fossa* by a piece of high explosive shell.

Fracture of the base of the skull may be of serious moment if it throws the meninges into communication with the nose or pharynx. The regions where this may occur are the nose, from fracture through the roof of the ethmoidal cells or cribriform plate, or in the naso-pharynx. Escape of blood is not of so much significance as the presence of cerebrospinal fluid, indicating tearing of the dura.

If the cleft in the roof of the nose remains open, it may be necessary to refer the case to a neuro-surgeon, for closure with a graft of fascia lata or by some other method.

Pharynx

Wounds of the pharynx are rare, because of the fatal result produced in most cases by projectiles penetrating the neck.

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There may be no marked symptoms following wounding of the pharynx by a piece of metal or other object, except for dysphagia, possibly of mild degree. I have removed from a bronchus a piece of high explosive shell which had passed through the side of the neck to enter the pharynx, whence it passed through the glottis; the patient was never seriously ill and suffered no apparent ill-effects.

If the patient survives perforation of the pharynx, he may be placed in a position of danger from infection of the para-pharyngeal space. Such an occurrence may cause death by spread to the mediastinum, by thrombophlebitis in veins of the neck, or by sloughing of one of the great vessels in the carotid sheath or of one of the branches.

It is imperative, therefore, to open widely any such infected wound, and sometimes it is advisable to tie the internal jugular vein.

Larynx

Indirect effects on the larynx are produced by certain wounds of the neck in which the vagus nerve is bruised or pressed upon by a hæmatoma. It is improbable that a patient with a divided vagus will survive, owing to its position in relation to the great vessels, and, therefore, the injury is unlikely to be due to division of the main trunk.

The effect is seen in *paralysis of the recurrent nerve* supplying one vocal cord, with disturbance of phonation, but with no severe upset of respiration; bilateral paralysis, with dyspnœa, is unlikely to occur. No treatment other than removal of the foreign body, is practicable; the paralysis may recover.

Simple direct injuries are produced by falls on the larynx or by motor or aeroplane crashes; they are unusual owing to the protection afforded by the lower jaw and sternum. They do occur, however, sometimes with effects so severe as complete occlusion of the glottis.

It is a general rule, in simple injuries of the larynx, to find that fracture of the thyroid cartilage is not of itself of serious import, but that fracture of the cricoid is dangerous because of subsequent obstruction to respiration. Tracheotomy is then called for as a life-saving measure, and later, relief of stenosis may be possible; it is wise to wait until all active inflammatory changes have subsided.

The method recommended is opening of the larynx, division of adherent surfaces, which may include the whole of the opposed surfaces of the vocal cords and subglottic areas, and removal of prominent masses of scar tissue; a lumen can thus be restored. To maintain patency, an effective method is the insertion of a rubber tube, held in position by transfixion with silver wire, as recommended by Schmiegelow.

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An essential addition is the application of a skin graft to the divided surfaces ; healing is thereby accelerated and recontraction avoided.

It may be necessary to keep the rubber tube in for as long as two months, if the cartilaginous framework is much damaged. In other cases, where the thyroid and cricoid cartilages are intact, as short a time as twelve days may be sufficient to obtain a permanent result.

Sometimes it is impossible to restore the airway sufficiently to permit of normal respiration and no more can be done than reconstruction of a passage sufficient for purposes of speech.

Compound fracture is of more serious account because of the danger of infection and particularly of perichondritis. Free exposure of the wound is required, with excision of lacerated skin edges ; sulphonamide powder should be dusted into the wound, which is then kept widely open by a loose packing of gauze impregnated with iodoform. Tracheotomy may be required if much swelling is produced by hæmatoma formation or by inflammatory swelling.

Penetrating wounds of the larynx or trachea are rarely seen because of the liability to associated injury of the carotid sheath or the vertebral column. Should the patient survive these immediate dangers, he will be exposed to various others ; such as hæmorrhage, fatal of itself, or from flooding of the trachea, sepsis in the wound, with spread to the lungs causing septic bronchitis or bronchopneumonia, and finally perichondritis.

The immediate treatment consists in keeping the lungs clear of blood by allowing the patient to cough in the sitting posture and without the centrally depressing effect of morphia, or by the use of a suction pump ; and in controlling hæmorrhage by pressure or the application of ligatures.

If there is a wide enough wound into the lumen of the larynx or trachea, it is permissible to insert through it a tracheal cannula as a temporary measure ; it is imperative, however, that the tube should not remain in contact with the laryngeal cartilages for more than a few hours, as otherwise perichondritis will follow. The right procedure is, therefore, a correctly placed tracheotomy as soon as practicable. The wound itself should be laid freely open.

Possible sequelae are immobility of the crico-arytenoid joints, with mechanical fixation of the cords, or stenosis from organization of granulations or from perichondritis.

The glottis and lumen of the trachea may be so narrowed that normal respiration is impossible ; a permanent tracheotomy may be necessary, but sometimes it may be possible to restore the lumen by excision of scar tissue, with skin grafting, after all active inflammation has subsided.

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Certain cases do not lend themselves to the operation described and it may be necessary to turn in skin flaps, to be united to the mucosa of the larynx or trachea and subsequently divided and folded in, so as to restore the airway.

Laryngo-œsophageal fistula.—A condition disturbing to the patient and difficult for the surgeon, is traumatic fistula between the larynx or trachea and the œsophagus. Food flows through into the airway on deglutition and seriously endangers the life of the patient.

A case under my care was operated on by the laryngo-fissure route, with the turning in of a skin flap; a successful result was obtained.

MR. T. POMFRET KILNER

The plastic surgeon's contribution to any discussion of this kind must be of a pictorial character for his results are judged by external appearance. Nevertheless, it is essential in all reconstructive work that restoration of function should be constantly in the surgeon's mind.

The Fractured Nose

Very few nose and throat surgeons are sufficiently radical in dealing with simple fractures of the nasal bones and many come into the hands of the plastic surgeon later when treatment is a much more difficult problem. Free disimpaction and mobilization under general anæsthesia are essential. It is a useful check on the efficacy of this treatment to make sure that the nose can be made to deviate readily to the side opposite to the original displacement. I usually employ a splint of dental modelling-wax moulded over lead but this is retained only until risk of displacement during the stage of recovery from the anæsthetic is over. I have often used with satisfaction the collodion-gauze splint described by Mr. Negus.

In more extensive fractures in this region Mr. Negus's advice that treatment should be delayed for ten to fourteen days in order to avoid risk of meningeal infection must be accepted though it has always been my practice to try to get the bone fragments back into normal position as soon as possible, feeling that by doing so I was re-establishing normal drainage channels. In cases where the crookedness of the nose is confined chiefly to the cartilaginous parts submucous resection is usually required for restoration of free nasal breathing and frequently this, if sufficiently radical, is followed by depression of the bridge line requiring a hinged cartilage graft.

Where, in addition to depression of profile, there is excessive breadth of the bony bridge a two-stage procedure is required, narrowing of the nose by infracture being followed by the insertion of a cartilage or bone graft. In many severe injuries a crush fracture of the nose is associated with posterior displacement of adjacent

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parts of the maxillae. Where early treatment has failed to give correction of contour these cases should be treated as for syphilitic deformities. Building out the nasal bridge line alone is insufficient: restoration of the maxillary contour calls for freeing of the soft tissues from bone by skin graft introduced on Stent mould from an incision in the upper gingival sulcus. The mould is later replaced by a small vulcanite prosthesis or a projection from a denture.

Frontal Sinus Region

No restoration of contour in this region should be undertaken for at least six months after all discharge has ceased. Excision of a depressed scar can usually be carried out without reopening the sinus and after suitable undermining of the skin over the depressed area, a cartilage graft, suitably shaped to fill the defect, is inserted. In one of my cases the whole forehead region was sheared off by a propeller blade. There remained only scar tissue over the dura and both frontal sinuses lay open. After making sure that the sinuses opened freely into the nose, I closed them by folding over part of the mucosa and applied a large skin flap to cover the whole forehead area. At a later date contour was restored by strips of costal cartilage.

Maxillary Sinus Region

Many penetrating wounds in this region close spontaneously but usually with deeply depressed scars, and frequently with troublesome œdema of the lower eyelid. In many such cases it is possible to restore contour by excising the adherent scars and building out the depression by local flaps of deep tissue. Occasionally free fat grafts are needed while, where loss of tissue is extensive, both lining and covering skin flaps have to be provided.

In cases of fracture of the maxilla we use at Queen Mary's Hospital, Roehampton, a simple upper dental plate or metal cap splint with extra-oral projections (Kingsley) held up to a head cap or band. I aim at immediate rather than gradual replacement.

In the lantern slide records which I have shown you I have included a case of gross deformity following the removal of the maxilla for growth and would put forward a plea for the prevention of such deformity. Had the cheek cavity been filled out at the time of operation by a mould attached to a dental plate and carrying on its surface a Thiersch graft no contraction would have occurred and contour would have been readily restored by a simple dental appliance.

Malar and Zygomatic Regions

Fractures in this region are constantly overlooked. The immediate swelling is liable to mask the deformity but the clinical picture is usually a very clear one and radiological examination

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confirms the diagnosis. When the fracture involves the roof of the antrum, as it commonly does, the effects on the eye are so serious that early treatment is of paramount importance. In uncomplicated cases replacement is readily achieved by passing a lever from an incision in the temporal region on the surface of the temporal muscle until it lies deep to the zygoma. Manipulation then disimpacts the fracture and brings out the malar eminence in a most convincing manner. Occasionally difficulty is encountered in maintaining the bone in position and recourse is had to packing of the antrum through a Caldwell-Luc opening or to external support as suggested by Mowlem by wire passing through the antral wall to a projection on a head cap.

In established deformity from this type of fracture much may be achieved by fat or cartilage graft. Diplopia is corrected by inserting cartilage or fat under the periosteum of the depressed orbital floor.

Nose Loss

When only the skin of the nose is lost it is often possible to replace it by means of a free full-thickness skin graft. In cases where there has been both skin and bone loss it is sometimes possible to elevate the scarred area by cartilage graft but it is usually wiser to excise the scar and bring down a forehead flap before introducing supporting material.

Most cases of loss of part or the whole of the nose can be converted into a standard type of defect to which a suitably shaped flap, rolled in distally to make the nostrils, can be applied. Such a flap is best obtained from the forehead, but excellent results can be obtained by means of a short abdominal tubed pedicle flap temporarily transplanted to the wrist. Alternatively the necessary flap may be obtained from the chest wall and swung upwards from its upper attachment near the point of the shoulder.

Here are certain simple principles for all reconstructive work :

(1) The three layer construction of the face—covering, supporting (skeletal) and lining—should always be borne in mind.

(2) Accurate diagnosis must be made particularly in regard to loss or displacement of tissue.

(3) Careful search should be made for foreign bodies ; ingrained dirt, wood, glass and clothing are as important as metal.

(4) Routine excision of wound margins, desirable elsewhere, has no place in facial surgery.

(5) Drainage of a wound for twenty-four to forty-eight hours is infinitely less troublesome than the treatment of a hæmatoma or its usual sequel in this region—an abscess.

(6) Close and friendly collaboration between throat, plastic, ophthalmic and dental surgeons is essential to success.

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Mr. J. F. SIMPSON said fractures of the nose often produced obstruction of the nasolachrymal duct and should be dealt with by the rhinologist and ophthalmic surgeon working together. In performing the Toti operation in such cases the duct was found torn or compressed by flakes of bone. He supported the advisability of making an intra-nasal opening in cases of fracture involving the antrum when these required surgical intervention.

The PRESIDENT said that he saw many of these injuries in their early stages during the last war. He was convinced that they should be treated within the first twelve hours, by restoring the conditions to normal as much as possible, not forgetting the skeletal layer underneath and also the mucous membrane. The maxilla and mandible should be restored as far as possible with the help of the dental surgeon.

In fractures of the nose, frequently one nasal bone was driven in and the other nasal bone driven outwards, and the replacement of the nasal bone driven outwards was forgotten. First of all the depressed nasal bone should be elevated, then the septum replaced, and finally the nasal bone which had been driven outwards should be pressed inwards. He agreed that a general anæsthetic should be used ; these cases could not be manipulated effectively under local anæsthesia.

Mr. D. F. A. NEILSON asked what was the best manner of dealing with an injury which involved the soft part of the nose. In one case he made a Stent splint for the patient to wear in the nose to try to establish the opening, but the patient took it out after two days and wore it at night for only about ten days.

What was to be done with fractures of the nasal bones where there was nothing more than the evidence of the X-rays for the displacement or fracture ? In the case of the boy who had been injured in a game at school it was always a very difficult point to know whether to interfere.

When he had been called in to deal with an infected antrum due to injury he had always found the cases apparently do better after operation than was customary with infections of the sinus due to some ordinary cause. There might be some more basic physiological disturbance in the case of an ordinary sinus infection than in that of a sinus infection from trauma.

Mr. J. H. OTTY said that in early cases it had been found surprisingly simple to reduce these fractures of the malar-maxillary region through the Caldwell-Luc approach. Many of these cases had considerable comminution of the orbital floor and of the posterior wall of the antrum. The displacement of the posterior wall of the antrum caused the patient considerable difficulty in opening the mouth. The comminuted orbital floor was easily moulded into position and then held there with a firm pack of " bipped " gauze.

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The end of the gauze was pulled out through the naso-antral opening and removed after ten days or so when a certain amount of consolidation had taken place. He asked whether Mr. Kilner had any experience of the use of refrigerated cartilage grafts preserved in merthiolate.

Mr. W. G. SCOTT-BROWN said that in the treatment of adhesions in the nose, he had found it advantageous in getting grafts to take on the septum after division of adhesions to use wire cages on which to build up the Stent instead of putting in the Stent moulds. He exhibited a wire frame which was more usually made up as a cage. The discharges would escape through the framework and the graft could be left in position without being disturbed for a long period.

Mr. V. E. NEGUS (in reply) said that the remarks which Mr. Kilner had made about the use of the obturator applied equally well to operations on the upper jaw for malignant disease. It was sometimes necessary to remove the greater part of the maxilla. If the obturator was put in about the fifth day the soft tissues adapted themselves to the obturator instead of the obturator adapting itself to the soft tissues.

Mr. T. P. KILNER (in reply) said that in cases of nasal obstruction due to scar tissue free excision followed by the insertion of a skin graft on a mould was necessary. He fully approved of the contrivance which had been exhibited for retaining such a mould.

When there was any doubt about the diagnosis of fracture of the nose following an accident, confirmation should be obtained either by X-ray examination or by waiting until the subsidence of swelling made the deformity obvious.

He had never used refrigerated cartilage but there was ample evidence that it fulfilled its purpose of contour restoration satisfactorily. He thought that anything other than an autograft of cartilage tended to produce more reaction and was more liable to be replaced by fibrous tissue in the course of time.

He did not consider the presence of blood in the antrum in cases of malar fracture an indication for opening the antrum but he recognized the importance of ensuring intranasal drainage in cases in which the antrum had to be packed to support the comminuted walls of the cavity or when closure of fistulous openings was being undertaken.

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