SOCIETIES' PROCEEDINGS

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COMBINED SUMMER MEETING HELD IN LONDON

June 1st, 1945

LARYNGOLOGICAL SESSION

Chairman—C. GILL-CAREY, F.R.C.S.ED.
(President of the Section of Laryngology)

External Operation on the Nasal Sinuses

By NORMAN PATTERSON

THE operation is designed to give an adequate exposure of the ethmoidal cells, sphenoidal sinus, and maxillary antrum by means of an external route of approach. The skin incision is made in the line of the naso-jugal fold and the resulting scar is practically invisible. The method of approach possesses the advantage, so far as the maxillary antrum is concerned, of avoiding a route, as in the Caldwell-Luc operation, through the cavity of the mouth which is always more or less septic.

Since bringing the maxillary antrum into the compass of the operation I have found that not only exposure of the lacrimal duct, but free mobilization of this structure by removing the bone which surrounds it is necessary if the operation is to be thoroughly and successfully carried out.

Nearly all the patients subjected to operation have suffered from extensive polypi; frequently the antrum has also been involved, often being filled with polypi. Most of the patients had already undergone several unsuccessful operations.

The skin incision begins immediately below and external to the internal canthus and follows the naso-jugal fold in an outward and slightly downward direction for about an inch. The skin should be sliced rather than cut vertically to its surface and if the incision is made slightly wavy the best cosmetic result is obtained. After making the incision the eyelids are brought together by two or three stitches to avoid injury to the conjunctiva.

The fibres of the orbicularis oculi are separated with a blunt dissector till the infra-orbital margin is exposed. At this stage it is advisable to insert a stitch of strong material through the skin and soft tissues just internal to the inner end of the skin incision; this prevents tearing when the sides of the wound are retracted.

The periosteum is now incised immediately below the infra-orbital margin making sure that this membrane is divided right down to the bone; it can

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now be elevated from the upper part of the anterior surface of the maxilla bearing in mind the position of the infra-orbital foramen. The upper part of the ascending process of the maxilla is denuded of periosteum, care being taken not to interfere with the attachment of the internal tarsal ligament. The periosteum is elevated from the anterior and inner part of the floor of the orbit. It is now possible using a sharp gouge to remove a small portion of the lower orbital margin and so bring into view the muco-periosteum in the region of the anterior superior angle of the maxillary antrum. The antrum can now be opened. At this stage a swab should be taken for subsequent bacteriological examination.

The next step is to expose the outer surface of the lacrimal duct by removing bone from the neighbourhood of the lower part of the lacrimal groove. A piece of bone often comes away bearing the impress of the lacrimal duct. The antrum may now be exposed freely by removing more bone. It is well to postpone any surgical treatment of the antrum till a later stage in the operation. The next step is to remove all bone and cells lying in proximity to the anterior internal and posterior aspects of the upper part of the lacrimal duct ; it is important not to proceed too far in the direction of its nasal orifice as there is a danger of detaching the duct from its lower attachment. The upper portion of the duct is now mobilized and it is possible so to displace it as to facilitate carrying out the further stages of the operation. Diseased ethmoidal cells and polypi are frequently found in front of the duct extending nearly up to the anterior nasal angle.

The next stage in the operation is to elevate the periosteum covering the inner wall of the orbit, upwards towards the base of the skull and backwards nearly as far as the posterior limit of the orbital cavity ; the proximity of the optic nerve must be kept in mind. By employing a suitable retractor the orbital periosteum together with the contents of the orbit can be displaced outwards and slightly upwards. Removal of the lower portions of the ethmoid, including cells and orbital plate, can be accomplished without danger, great care, however, must be taken when the region of the sphenoidal sinus is approached and special caution is necessary in dealing with the upper part of the ethmoid which lies in close proximity to the anterior fossa. The upper cells are roofed in by a very thin plate of bone and in opening these cells the forceps should be gently placed in position ; no force is permissible. The forceps are closed and by gentle traction downwards and forwards the bony fragments are removed bit by bit until all the upper cells have been opened. The remaining depressions representing the roofs of the cells can best be cleared of mucous membrane or polypi by the use of pledgets of gauze held at the end of a pair of nasal dressing forceps. The sphenoidal sinus should be investigated and if the cavity is found to be diseased the natural ostium should be enlarged sufficiently to allow of free drainage.

The next procedure is to examine thoroughly the maxillary antrum and if sufficient bone has not been removed for this purpose more may be taken away. To illuminate the antral cavity the surgeon should change his position and stand at the head of the table directing the beam of light downwards and backwards. When the lining membrane is unhealthy it can be eliminated as thoroughly as when carrying out a Caldwell-Luc operation. In cases where the antrum is

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diseased the whole of its nasal wall above the inferior turbinate should be taken away so as to establish a large permanent opening. An opening in this situation is to my mind more effective than one situated in the wall of the inferior meatus.

This operation is not designed to deal with the frontal sinus but it is often possible to pass a probe into the sinus and not infrequently pus is seen to ooze from the neighbourhood of the fronto-nasal opening. Even in cases where there is chronic suppuration in the frontal sinus, clearance of the ethmoidal region carried out sufficiently far forward and high up will sometimes result in so much improvement in drainage that there is a cessation of all frontal sinus symptoms. If, however, the disease in the frontal sinus persists that cavity should be opened through an incision which corresponds to the lower margin of the eyebrow. A final inspection, under magnification if possible, is carried out. I find that polypi may spring from the upper or ethmoidal portion of the nasal septum, a point which has received little notice. In one case in order to effect a cure I had to take away the whole of the upper part of the septum.

It is necessary during the course of the operation to keep the cavity as free as possible from blood. A suction apparatus is essential aided by gentle swabbing. The head should be kept in a slightly elevated position. Hydrogen peroxide and weak adrenaline solution are useful hæmostatics. The cavity is finally dusted with sterilized sulphanilamide compound.

In closing the wound the orbicularis oculi is brought together with a few stitches of fine catgut. Ophthalmic thread is employed on a small curved needle to bring the edges of the skin together. The stitches are removed in from three to five days.

Recently I have on two occasions tried another incision which may prove useful to those who are nervous about any incision on the face. The incision corresponds to the margin of the lower eyelid and at the outer canthus it is carried outwards a little further in one of the creases nearly always present in this neighbourhood. A flap of skin is turned down so as to expose the orbicularis oculi and subsequently the operation proceeds as described.

This operation has led to much better results than I have obtained by other methods. Generally speaking instead of a large percentage of failures in cases of chronic nasal sinus disease associated with polypi I can now claim a very large percentage of successes. Complications have been few and generally insignificant. It is gratifying to see how many patients recover often after the loss for many years of their sense of smell and frequently of taste.

1. Total number of external sinus operations performed at the Royal Bucks Hospital between December 1939 and March 1945.[1]

Total 73	
Norman Patterson	44
S. W. Hargrove assisted by Norman Patterson.. ..	14
E. O. Harris assisted by Norman Patterson	15
	73

[1] Statistics compiled by my Assistant Mr. S. W. Hargrove.

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2. Post-operative complications.

(*a*) Three cases of diplopia (in two of these cases a radical frontal operation was also performed).

(*b*) Epiphora—in the early series where the naso-lacrimal duct was not preserved, epiphora was permanent, varying in severity from case to case. In the cases where the naso-lacrimal duct was preserved there was transient epiphora which always cleared up.

(*c*) There were no other complications; the average stay in hospital for cases operated on under regional anæsthesia was seven days; under general anæsthesia eleven days.

(*d*) Three cases—polypi recurred and further operative treatment was performed, and it was found that the polypi were growing in two cases from the cells lying anterior to the naso-lacrimal duct.

3. In those cases in which smell was absent it returned in all but one.

4. Anæsthesia:

(*a*)	General	19
(*b*)	Regional	54

Anæsthesia for Surgery of Nasal Sinuses

By H. W. Loftus Dale

We now only employ general anæsthesia in those cases which are temperamentally unsuited for regional methods such as children, adolescents and those with an unstable nervous system. The patients who require this operation are usually those most suitable for regional anæsthetics, the majority of them being between the third and sixth decade, many of whom have already undergone several intra-nasal operations under surface anæsthesia with cocaine, and have been agreeably surprised.

Since the discomforts incidental to the operation are not negligible, the length of time on the table, the face being covered with towels, the use of the hammer and chisel, nibbling forceps, etc., something more than complete abolition of pain sense is required, hence the important part played by premedication to which regional anæsthesia owes its increasing popularity.

Scopolamine in full doses tends to produce mental disorientation, particularly in older patients, and intense discomfort due to the drying up of secretions. The opiates produce a pleasant lethargy, a reasonable degree of general analgesia and amnesia giving a drowsy but co-operative patient, with sufficiently active reflexes to protect himself against the aspiration of foreign matter.

This state is best attained by the intravenous route, the action is rapid in onset, more intense, and of shorter duration, the maximum depressant effect on respiration and metabolism being reached in fifteen minutes, and analgesia in a matter of seconds, side-effects, such as vomiting, are much less frequent. This method is perfectly safe providing a few simple rules are observed.

Intravenous omnopon technique.—(1) If morphia or omnopon is given by the hypodermic route in the ward, at least one hour must have elapsed before giving an intravenous dose in order that the maximum depressant effect on respiration will have been reached. (2) The injection must be slow in order to see if any idiosyncrasy exists, and to avoid unpleasant subjective sensations,

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viz., feeling queer or dizzy, tinnitus, palpitation or dyspnœa. (3) Pauses should be made in order that the effect of the previous instalment is apparent before giving the next, in other words to give the signs time to develop. (4) The patient's respiration, colour and pupil should be watched; the minimum analgesic dose produces contraction. Speak to him and when his responses become slow and he shows signs of drowsiness, stop. It is better to give some more later if he becomes too alert than to produce undue depression with the initial dose.

Nembutal 1½ grains three hours and 1/3 grain of omnopon with 1/150 grain of scopolamine one and a half hours before operation is given to the average patient; scopolamine is not given to those over 60.

The patient's response gives a fair idea of the intravenous dose likely to be required, which varies from 0 to 1 grain.

I use omnopon in 1 c.c. ampoules containing 1/3 grain adding 2 c.c. of sterile distilled water for each ampoule used so that each 3 c.c. = 1/3 of a grain, this dilution facilitates slow injection, and shows at a glance how much has been given; constantly using the same dilution assists in correlating the dose and the time factor,

Nerve block.—The sensory innervation of the nose and sinuses is derived from the first and second divisions of the 5th cranial nerve. The ophthalmic nerve is not accessible at the base of the skull, but branches within the orbit are easily reached. The nasociliary nerve enters the orbit through the sphenoidal fissure, crosses the optic nerve obliquely between the superior and internal recti reaching the anterior ethmoidal foramen where it becomes the anterior ethmoidal nerve and can easily be reached at this site by the medial orbital route.

The maxillary nerve is accessible in the pterygo-palatine fossa; injections at this site are bound to include the spheno-palatine ganglion and efferent branches in the resulting zone of analgesia.

Five approaches have been described, three extra- and two intra-oral. (1) Through the incisura of the mandible just below the mid-point of the zygoma. (2) Through the angle formed by the anterior border of the coronoid process with the inferior margin of the zygoma. Both routes have been termed zygomatic. (3) Orbital route: Through the infero-lateral margin of the orbit following the floor and passing through the inferior orbital fissure. (4) Oral: (i) Through the mucous reflection above the first upper molar. (ii) With a needle or mount angled to 145 degrees introduced behind the last upper molar in a vertical direction at right angles to the upper occlusal plane.

I chose the first route for several reasons. Approach through the skin seemed to hold less risk of carrying infection to an area containing structures such as the pterygoid plexus of veins. The deep and superficial landmarks are easily identified and the angles of approach easier to estimate. Hæmatoma of the cheek is said to be a common complication of the second route. Deep orbital injections involve the risk of injuring or anæsthetizing the optic nerve. The term mandibular is preferable to zygomatic for the route chosen, since confusion with the second route is avoided and the mandibular nerve can be blocked from the same point of entry.

Technique Block I.—With the patient supine, head sideways, affected side

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up, the depression, bounded by the inferior border of the zygoma and the incisura of the mandible, is palpated ; identification is assisted by the patient opening and closing his mouth. Using a fine needle, a wheal is raised inferior to the mid-point of the zygoma, which corresponds with the centre of the depression. Through the centre of this wheal a 10 cm. needle, fitted with a rubber marker, is introduced transversely at right angles to the sagittal plane of the skull.

Bony contact at a depth of 4 to 5 cm. which should not be exceeded, indicates that the point is in contact with the lateral pterygoid plate. The marker is now set at a distance of $\frac{1}{2}$ to 1 cm. from the skin surface.

In order to change direction the needle is withdrawn until the point is free in the subcutaneous tissues, and is then reinserted at the angle of 20 degrees forwards and slightly upwards, so that the point is directed towards the pterygo-palatine fossa.

If no contact with bone is made when the marker again reaches the skin surface, connect the syringe to the needle and inject a few drops of the solution in order to see that the needle has not become blocked ; aspirate to ensure that the point is not in a blood-vessel. If the aspiration test is negative 2 c.c. of the solution is slowly injected. If on reinsertion bony contact is made before the marker reaches the skin surface it means that the angle was too small to enable the needle to clear the pterygoid plate, withdraw and reinsert at a greater forward angle. Paræsthesias referred to the palate or upper molar region are common.

The absence of paræsthesias is not necessarily an indication of failure. The head is now straightened for the performance of *Block II Medial Orbital !* A 5 cm. needle is introduced below the eyebrow 1 cm. vertically above the inner canthus, keeping the bevel in close contact with the wall of the orbit at its superior and medial angle until a depth of 2·5 to 3 cm. is reached. The point should now be in the region of the anterior ethmoid foramen. The syringe is connected and if the aspiration test is negative 1 to 1·5 c.c. of the solution is slowly injected. The loose areolar tissue permits of rapid diffusion. If this technique is carefully carried out there is no danger to the contents of the orbit.

Analgesia appears in from three to fifteen minutes ; testing by pin-pricks is unreliable in the pre-medicated patient. If the preliminary suture of the eyelids can be performed painlessly it may be assumed that both blocks have succeeded.

Drugs and Technique

Drugs.—The action of procaine, also known as novocain, neocaine, ethocaine, may not be sufficiently sustained for the duration of this operation.

Anethaine, known variously as decicain, pontocaine, pantocaine, butethanol, amethcain, acts for much longer. It can be used alone or combined with procaine, which is said to enhance the advantages of both drugs. It is supplied in this country by Glaxo Ltd. under the name " anethaine ".

Distrusting the traditional rubber-capped bottle of uncertain sterility, potency or pH, I prefer to make up my own solutions freshly as required. Recently, however, Messrs. Glaxo make for me 2 c.c. ampoules each containing :

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procaine 40 mg., anethaine 2 mg. with adrenaline 1 in 400,000. These are etched to avoid infection arising from glue used for labels. This solution gives analgesia of rapid onset and sustained effect.

Pressure should always be exerted in the long axis of the needle to avoid bending or breaking. Marked paræsthesias before the injection is made suggest penetration of the nerve, intraneural injections may be followed by severe and persistent neuralgic pain. Paræsthesias coming on whilst the injection is being made indicate an accurate paraneural injection and the early onset of complete analgesia.

Repeated attempts are not justified since the injection of large amounts of fluids will, in either block, produce exophthalmos and anæsthesia of the entire contents of the orbit. For this reason I prefer to rely on the accurate placing of a small quantity of a strong solution rather than on the diffusion of a larger amount of a weak solution forced into the surrounding area.

There never has been complete failure to obtain analgesia, a very small number of patients have complained of pain during the operation and in these cases it was only for a short while, and limited to manipulations in a small area, and possibly due to traction on structures outside the zone of analgesia or an overlap of nerve supply from the opposite side.

Nearly all our patients have had bilateral operations and did not in the least mind facing the second one ; one only, a highly-strung girl of 16, asked for a general anæsthetic for the second operation.

Complications have been few and minor, two patients complained of neuralgic pain lasting three to four days, and a few of paræsthesias and numbness.

SURGEON COMMANDER E. R. G. PASSE said that Mr. Norman Patterson had evolved a transorbital approach to the ethmoid labyrinth and the sphenoidal and maxillary sinuses. Since 1939 he, Surgeon Commander Passe, had made use of this approach in this country and abroad, on 145 occasions, for the following conditions : chronic non-specific infections of the ethmoidal, sphenoidal, and maxillary sinuses ; in conjunction with operations on the frontal sinus, for chronic infections of that sinus ; drainage of an extradural abscess ; drainage of an orbital abscess : in a case of retrobulbar sinusitis due to a large infected posterior ethmoidal cell ; in malignant disease of the ethmoidal mass, and as one of the steps in excision of the upper jaw.

In order to obtain a less superimposed radiograph of the ethmoidal labyrinth, he had constructed from dental X-ray films, a film the shape of the old-fashioned septal splint, which under light cocaine anæsthesia could be inserted alongside the septum as high as the roof of the nasal cavity. Lateral pictures of each ethmoidal labyrinth were then obtained separately by directing the rays through the maxillary sinus.

For anæsthesia he preferred heavy premedication with nembutal and morphia, followed by simple packing of the nasal cavity with 5% cocaine and 1/1000 adrenaline. For the skin incision he infiltrated with novocain. This appeared also to give as dry a field as it was possible to obtain, and though in several cases a preliminary ligature of the internal maxillary artery as it left the parotid gland was performed, he had now abandoned this method as it had no very appreciable effect on the bleeding. Illumination in the depth

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of the field was sometimes a difficulty, and he had found that a small light on a malleable flex was of considerable help. Both sides of the nose could be operated on at the one operation.

Although it was known that many cases of intractable neuralgias of the first and second divisions of the 5th cranial nerve were due to infections of one or more groups of ethmoidal cells, rhinoscopy did not always reveal the disease. In these cases, it seemed to him, ethmoidotomy was as justifiable a procedure as any other exploratory operation.

The theory of Mr. Norman Patterson's operation in cases of chronic infection and polypoid degeneration was sound in that the infected and polyp-bearing area was removed so far as the ethmoid was concerned. The results which were uniformly good bore this out. Mr. Norman Patterson had given a great stimulus to nasal and accessory nasal sinus surgery with his new, safe, and direct approach to this area.

E. O. HARRIS said he had been invited to say a few words as he had assisted Mr. Patterson with this operation in 15 cases, and had operated on 10 others, making 25 in all.

This operation should be restricted to cases with recurrent nasal polypi: recently, a patient said to him "I have had twenty operations on my polypi, now I want a proper radical". She had been sitting next to a patient who had had a "proper radical". When a regional was unobtainable, he found a general anæsthetic satisfactory.

The incision used fulfilled three desiderata: First, the lacrimal duct, literally surrounded by polypi, was in the middle of the incision. Secondly, as that anchor of the eye, the medial palpebral ligament, was left intact, no diplopia had ever resulted even temporarily. Thirdly, it gave an excellent entry to the maxillary antrum, which, in all 25 cases, was abounding in polypi, so that any radical operation must include the removal of the antral contents.

To avoid danger to the optic nerve, the level of the front wall of the sphenoidal sinus was the limit of the removal of the lamina papyracea.

The results of this operation were excellent: in these 25 cases no deaths resulted, nor were there any complications, which might be surprising in view of the enormous amount of bone removed.

V. E. NEGUS said that it would be a pity if this operation were accepted—as it probably would be on Mr. Patterson's recommendation—and were used broadcast. In Mr. Patterson's hands it might be very successful, but it was not an operation for all. He, Mr. Negus, had spent a lot of his time during the last few years in undoing some of the damage done to sinuses, and particularly the frontal sinus, and he thought there had been in the present discussion a tendency to ignore and forget the frontal sinus. It came back on one later.

In cases of polyposis with no infection this operation might give good results, but it seemed a very inconvenient route of approach. Most of them thought that they could eventually by an extended intranasal operation clear the patient's nose satisfactorily, and that the necessity for external operations for simple polyposis rarely arose.

This operation was going to be used for infection. If one operated on the ethmoidal cells where there was a sinusitis of long-standing and forgot the

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frontal sinus the patient was in for trouble. He thought it was fatal to clear the ethmoidal cells without making certain as to the provision of free drainage through a new fronto-nasal duct, which was probably either blocked at the time or would shortly become blocked.

What was the reason for this approach? It seemed to centre very much on facial disfigurement. If one made a correct scar in the more usual type of frontal sinus operation, starting just below the inner margin of the eyebrow, and curving round the inner margin of the orbit as far as possible from the canthus, no disfigurement followed. If there were disfigurement something had been done wrongly, either the incision had been made through the eyebrow or too close to the canthus.

They had heard just now that the naso-lacrimal duct was surrounded by polypi. He thought that was incorrect. The ethmoidal polypi were inside the orbital plate of the ethmoid. If one lifted up the orbital periosteum cleanly, the polypi would all be on the inner side. If the orbital plate of the ethmoid were removed it was possible to remove the cells much more cleanly than by the lower approach, and open the sphenoidal sinus and drain it with safety.

He hoped that if this operation was going to be used it would be in an extremely limited number of cases of polyposis without infection.

MR. WALTER HOWARTH: I went to see Mr. Patterson perform this operation at Aylesbury and watched it with great interest. I have tried it myself several times and I have come to the conclusion that it is a highly dangerous operation except in hands as skilled as those of Mr. Patterson. The operation seemed to me to be directed towards the cribriform plate which is the danger area of the nose, instead of towards the fronto-nasal duct. Moreover it entirely failed to expose the fronto-ethmoidal cells, and so drain the frontal sinus. I regard this as a very great defect of the operation, as even if the ethmoid is thoroughly cleared out it is essential to deal with the fronto-nasal duct and so drain a possible frontal sinusitis.

G. EWART MARTIN said that Mr. Patterson's operation did not appeal to him for the usual type of ethmoidal infection with polypi as mentioned by Mr. Negus. The operator seemed to be working in the danger area of the nose and although Mr. Patterson demonstrated that the ethmoid could be cleared through this route it would appear that in doing so the fronto-nasal duct was being completely blocked. The secret of success in all nasal operations was the obtaining of perfect drainage.

NORMAN PATTERSON said that his feeling was if one looked after the ethmoid, the frontal sinus in a large majority of cases would take care of itself. The reason for persisting suppuration in a frontal sinus was very often due to the fact that drainage was interfered with on account of the presence of ethmoiditis, generally of the polypoid variety.

He agreed that it was a difficult operation to perform; it required a good deal of dexterity, and an intimate knowledge of the anatomy of the region.

It is the lacrimal sac which lies in the orbit, not the duct. He thought the duct was the key to the situation. In a good many of his cases chronic infection was present and practically all were associated with extensive polypi. There had been no evidence of blockage of the fronto-nasal duct as suggested by

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Mr. Ewart Martin. Results proved the operation to be practically free from danger. Free access to the antrum as well as the ethmoid and sphenoid was one of the great advantages of the operation.

June 2nd, 1945

Primary War Injuries Involving the Nose and Sinuses

By Colonel Norton Canfield, M.C., A.U.S.

During the feverish activity of the past two years, the members of our specialty have been occupied chiefly with the application of well-known and recognized principles of therapy. A few have had the opportunity for investigation of new ideas and advancing lines of thought. Some of this work has been reported but much of it is still to be presented. Masses of statistical data are available on the usual conditions of otitis media, sinusitis, pharyngitis. Final reports on blast ears and the resulting damage to hearing are in the process of being assembled.

In addition to these there is a significant group of cases which will continue to come under the observation of the otolaryngologists as time passes. The acute injury presents a picture to the forward surgeon which from now on we will see but rarely in this theatre of war. Fortunately the repair processes start at once and when the danger of infection has passed, healing around the head is rapid and progresses in an excellent manner.

The advent of effective chemotherapy has probably been our greatest aid in war wounds and gradually as we discover its limitations we shall see it in proper perspective. It is now firmly established that a proper blood concentration of sulphadiazine and penicillin does prevent the spread of infection into healthy tissues if the patient's general condition is good. These agents do not completely prevent infection from developing in the wound and are not a substitute for surgical attention to the traumatized region.

The drama associated with facial wounds tends to put the emphasis upon appearance of the patient and the considerations of internal anatomy and physiology of the nose, sinuses and pharynx are too often disregarded in spite of the warnings of the otolaryngologists. The exigencies of war can never be adequate reason for failure to pay the strictest attention to the field of the rhinologist. To be sure, many cases will require plastic repair, but the upper-respiratory comfort of the patient will be a lifelong consideration, long after the plastic surgeon has completed his final repair.

Photographic methods have so improved that we can now present these cases as they originally were seen in the Army hospitals. All these which are shown at this meeting were taken within approximately ten days of injury and are typical of thousands which occur in modern warfare. One wonders why the face is not better protected when the known dangers produces such specimens.

In the handling of these cases certain principles emerge and should be observed: (1) Anti-bacterial chemotherapy is of definite benefit in keeping undamaged tissue healthy. (2) Wounds of the face heal extremely well. (3) Foreign bodies which interfere with healing and function should be removed. (4) Thorough débridement of the wound is essential. This demands that the

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para-nasal sinuses be completely cleaned and drainage provided for later irrigation. If débridement is not done primarily it must be done before the final plastic repair. (5) Primary suture of the tissues produces excellent results, *providing* the débridement has been adequate. (6) If the loss of tissue is excessive primary treatment should consist of débridement and skin traction to prevent further gaping of the wound, leaving any definitive treatment till the inflammatory phase and local infection have subsided.

COL. CANFIELD showed 21 coloured lantern slides and commented on various features of the individual cases: (1) The use of tracheotomy in war wounds of the face and neck. (2) Different types of wounds from various types of missiles. (3) Foreign bodies in the sinuses. (4) Nerve repair.

The following films were shown: (i) "Highspeed motion pictures of the human vocal cords" (Bell Telephone Labs.); (ii) "The Right to Hear" (State University of Iowa).

DISCUSSION ON FILM NO. 1

NORMAN PATTERSON said since seeing this remarkable film he was more than ever convinced that the term vocal cord should be given up and some such substitute as vocal lip adopted. The structure in no way represented a cord and in the film transverse movements of a wave-like character could be seen which could not take place in a cord.

H. V. FORSTER said that whilst admiring these remarkable motion pictures of the vocal cords in action, he had been especially interested in the management of the laryngeal secretion.

The behaviour of the upper surface of the vocal cord gave the impression of "flag waving" with the sharp crest of a wave of the mucosa passing regularly from side to side.

Distal to this crest there was being constantly maintained and controlled a shallow lake of fluid from which fine droplets appeared to be thrown at regular intervals over the wave crest to lubricate the glottic chink.

Remembering that one of the commonest words used by our patients to describe their symptoms was "catarrh", he felt that Colonel Canfield would agree that kinematography of such a high order offered an opportunity to study the behaviour of the laryngeal secretions in conditions of disease.

LIONEL COLLEDGE: I feel a particular appreciation of the film which Colonel Canfield has shown as I believe that Sir Charles Ballance and myself were the first to attempt to take moving pictures of the living larynx, and I have some understanding of the difficulties. The image of the larynx is apt to dance about over the field; this difficulty has been overcome and the image is kept well centred in the film shown. This is no doubt partly due to the very short exposure needed for the slow motion pictures, whereas we had to make much longer exposures to obtain a reasonable length of film. One point which the film displays is the difference in mechanism of the cords when the voice is produced in falsetto. McKenzie believed that there is a damping effect, which shortens the active portions of the cords like the strings of a violin, when the falsetto is produced, and the film shows clearly that this view is correct and that the mechanisms of production of tenor and falsetto are different.

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It is said that Braham, the leading tenor during the first half of the nineteenth century, had such perfect control of his voice that he was able to pass from the tenor to the falsetto without any break perceptible to his audience. Such capacity is very rare and the film explains why there is usually a break in passing from tenor to falsetto, especially noticeable in untrained voices.

I think Mr. Norman Patterson has already won his battle, as I understand that vocal fold is now the accepted anatomical term, and I find that students fresh from the anatomical department now use it spontaneously instead of vocal cord.

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