hours of the accident died; of 14 operated on within 24 hours of the accident 11 survived; of six operated on from 24 to 48 hours after the accident five survived; and of five operated on from two to eight days after the accident one survived. Secondly, that hæmorrhage had so far arrested itself that ligature of the pedicle was dispensed with.

There are two specimens (2308*a* and 2308*b*) in the St. Bartholomew's Hospital Museum which show how nearly the spleen can repair itself after extensive laceration. The first was taken from the body of a woman, aged 42 years, who fell a distance of 30 feet. She was admitted to the hospital in an unconscious condition and was treated for a simple fracture of the left thigh. She died in an exhausted condition ten weeks after the accident from cystitis and morbus cordis. She never complained of any abdominal injury throughout her illness. At the necropsy the spleen was found to be torn on its anterior and external surfaces. The rent passed right through the organ, involving the capsule, and was closed by a firm, white scar, one-eighth of an inch in diameter. The outermost border of the spleen was soft and lacerable, and tore when it was separated from the clot which lay above it. The subperitoneal tissue was stained a dark purple colour, evidently by an extravasation of blood which had taken place some time before death. An encapsuled collection of fluid blood was situated immediately round the spleen. The second specimen was taken from a woman who died 60 hours after being run over by an omnibus. The spleen was extensively torn on the outer surface near the upper margin, but the rupture was closed by a firmly adherent clot. This woman also had a small rupture of the right lobe of the liver.

THE TREATMENT OF CHRONIC SUPPURATION OF THE MAXILLARY ANTRUM: AN OPERATION AND NEW INSTRUMENTS.

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FOR several years there has been a growing tendency amongst surgeons to abandon the alveolar method of draining acute or chronic abscesses of the antrum of Highmore. Where an acute abscess is obviously connected with dental disease that method may still be adopted in the hope that the evacuation of the cavity may in a short time be followed by cure. The recorded experience, however, of most surgeons in this country and abroad appears to be that this result is but seldom attained and then only when all the conditions, especially that of the middle meatus, are favourable and when there have been very few or no previous attacks. The more common issue is that the acute condition becomes chronic and the patient has to go on syringing through the alveolus until he makes up his mind to have some further operation that will not only allow freer drainage but will permit the path of buccal re-infection to be closed.

One of the chief causes of the abandonment of the alveolar method is the recognition of the fact that maxillary suppuration is far more frequently set up by infective conditions within the nose or its other accessory sinuses than from the teeth, which are perfectly sound in a great many cases. Such antral abscesses are now usually treated in the acute stage by intranasal puncture and irrigation together with removal as far as possible of all obstruction to the natural outlet in the middle meatus. When this fails, as it must be admitted it very often does, further measures consist in the removal of a greater or less portion of the external wall of the nasal cavity so as to drain the antrum into the inferior meatus or, in very obstinate cases, the radical operation through the canine fossa with a large counter-opening into the nose.

The experience of the last 12 or 15 years shows that with the increasingly early recognition of the causes of intranasal suppuration the necessity for the radical operation arises much less frequently than was formerly supposed and that it should be reserved for cases in which other measures have failed or those complicated with well-marked polypus formation in the antrum or nasal cavity. My own experience is that if a sufficient opening is made in the exterior nasal wall and nasal polypi and part of the middle turbinal are

removed at the same time one often avoids the canine operation despite considerable degeneration of the antral mucous membrane.

For the past ten years I have given up the alveolar route except in a very few cases of acute abscess of dental origin, and none of these was cured without eventual recourse to the intranasal method. Realising that removal of part of the nasal wall of the cavity was likely to give better results than any other method I have tried instruments of various forms with a view to improving the technique, especially in the clean and rapid removal of the excised portion. Forceps were found slow and uncertain in a rapidly bleeding cavity, while breaking down the partition roughly with a burr was followed by a greater tendency to cicatricial contraction with very often formation of little pus pockets between the irregularly torn fragments of the mucous membrane. Moreover, in many cases patients complained of severe neuralgic pain for several hours after the burr was used.

With a view to overcoming these objections I designed a right and left rectangular chisel, of which the present is the third modification. When these instruments were shown lately at the Laryngological Section of the Royal Society of Medicine,¹ reference was made to some instruments designed for a similar purpose by the late regretted Dr. McKay MacDonald. That was the first time I heard of Dr. MacDonald's instruments. I have never seen them, but I was given to understand on that occasion that they were made in sets of four and were in other respects quite different from mine. The chisel (shown in Fig. 1) has a stout handle

FIG. 1.

Rectangular chisel for maxillary antrum.

and shaft with a double-edged blade wrought in the same piece at right angles. Along the "obverse" side this blade has a strong ridge slightly hollowed in the middle to facilitate retention in the cut. The "reverse" side is flat and placed at an angle of about 50° to the shaft. My first pair of chisels were made of English shear steel and gave satisfactory results without a second sharpening in 63 cases. The next were of too soft a material, had to be sharpened twice in 13 cases, and in the last of these a portion of the blade broke off in the left antrum but was recovered when the bleeding had ceased. The present instruments, by Messrs. Krohne and Sesemann, have been used in 27 cases, some of them of old persons with hard, thickened bone, and do not yet require sharpening. The resistance of the living bone of the antral wall, even more than an eighth of an inch thick, has no perceptible ill-effect on a good steel edge. Stress is laid on this point here as it has been objected to instruments of this class that they require frequent sharpening.² For the initial puncture I have designed an angular gouge V in section, with curved cutting edges brought to a point. (Fig. 2.) This has, I think, some advantages over the large

FIG. 2.

Curved gouge for antral wall (part of shaft A omitted).

curved solid trocar often used for this purpose, as it not only pierces the wall but makes a clean-edged < cut which gives the starting lines for the subsequent incisions.

The operation may be performed in some cases of young persons under local anaesthesia and suprarenal ischaemia. I have not found this method satisfactory even in persons of considerable fortitude when the bone was hard and there was

¹ Proceedings, vol. i., No. 6, p. 112.

² Ibid.

any difficulty in cutting it down to the floor of the nose. But for this it would be the ideal method. I have usually employed general anæsthesia. In a few cases suprarenal preparations were used beforehand to produce local ischæmia, and I have seen them used by some of my colleagues who have done me the favour to make trial of these instruments. On the whole, it seemed that local ischæmia gave more trouble than it was worth when used with a general anæsthetic. The general narcosis was as a rule much delayed, sometimes nearly an hour even in the hands of an expert, and in most cases took place only when the antagonism of the suprarenal agent had been overcome to such an extent that the ischæmia was so reduced as to be of little practical value. On the other hand, if any difficulty arose in the course of the operation the application of any of the ordinary suprarenal solutions for a few minutes sufficiently arrested the bleeding to permit removal of strayed fragments and even examination of the cavity with a small aural mirror.

A point of considerable importance in these operations is the treatment of the inferior turbinal. The natural opening of the maxillary antrum being so secluded from the respiratory current, and some patients on whom the radical operation had been performed having complained of neuralgic pains in cold weather which were relieved by lightly plugging the nostril with gauze, it seemed advisable to avoid interference with the turbinal as much as possible. Accordingly in some of the earlier of the present series of 103 antra (including 12 double cases) an effort was made to preserve the turbinal intact by removing the whole inner wall of the antrum below it. This, however, formed too much of a slit-like aperture to remain permanent in all cases. I have never removed the "anterior half-inch" or the "anterior third" as recommended by so many authors for the following reasons. This part of the turbinal bears only rarely any relation to the maxillary antrum, and then only a very small and useless one for surgical purposes. The antrum in the vast majority of a large number of skulls examined by the writer, when present at all, is in relation to the second, or even the third, molar tooth and its greatest width will constantly be found in this situation. On the other hand, the anterior third of the inferior turbinal, which is that portion attached to the inferior turbinal crest, corresponds to the solid origin of the nasal process of the superior maxilla, and the dependent fleshy portion in all but the negro races is almost constantly in a line with the nasal border of the superior maxilla. The only cavity, therefore, in constant relation to the anterior third of the inferior turbinal is the tear duct, and this probably explains how it is the latter has been wounded sometimes when this portion of the turbinal has been removed with an idea of facilitating access to the antrum. Moreover, when this part of the turbinal happens to correspond to any part of the antral cavity it does so only where the latter is extremely shallow and where, if a curved trocar is pushed, there is very great danger of wounding the anterior wall or even the cheek. On the other hand, the middle third or posterior half of the turbinal bears a practically constant relation to the widest part of the cavity. It is in this region, therefore, that the initial opening should be made, and I have done so with unvarying good results in 97 out of my 103 cases (the remaining six were those in which the turbinal was preserved intact). At first the middle portion of the turbinal was cut out by a rapid use of the two edges of the chisel, but it was soon found to be unnecessary to divide the operation into two stages as with a little practice it is easier to carry the incisions through both turbinal and external wall.

The patient should be anæsthetised in the reclining position with the head slightly raised and turned to the right, where the surgeon stands for either cavity. It is better to stop the naso-pharynx with a captive sponge. Taking, for example, the right antrum, the angular trocar should be applied at a point not less than an inch and a quarter behind the posterior border of the nostril immediately below the inferior turbinal in such a way that the lower limb of the < is nearly parallel with the floor of the nose, while the upper edge raises and cuts through the turbinal. The puncture is made slowly and so that while the point travels towards the deeper part of the cavity a slight swing of the handle towards the middle line obtains the full advantage of the curved cutting edges. It will sometimes, though rarely, be found needful to shift the point a little higher or farther back, but never forwards. The < puncture having been

made, the chisel corresponding to the figure should be held with its "obverse" surface upwards, slipped into the upper limb of the <, and carried backwards and somewhat upwards as far as may be thought necessary, generally from half to three-quarters of an inch. It should then be drawn back, slipped into the lower limb of the <, and pushed back, cutting with its distal edge along the floor for a similar distance but taking at the end a turn upwards towards the termination of the first incision. Then the companion instrument (reverse of figure) should be slipped along the upper cut with its "obverse" surface downwards and a short cut down and back made to complete the excision. A slight twist of the handle at the end will send the fragment into the meatus whence it can be removed with forceps. The whole excision takes only a few seconds from the initial puncture. The cavity should then be explored with the little finger, or where this is not possible with a large probe suitably bent. Further portions of the wall may then be pared away if desired, the proximal edge of the blade finding its chief use here, and it is often advisable to remove what remains of the posterior end of the turbinal. This may be done with either chisel used as a spokeshave. At this stage suprarenal products and a small aural mirror with a good head-light will often be found useful in examining cases of long standing which are inaccessible to the finger. Even if the mucous membrane is much degenerated no curetting should be attempted, as in the majority of cases it gradually becomes healthy. If, however, there are distinct polypi, and especially if a similar condition has co-existed in the middle meatus, it will probably be better to proceed with the radical operation. In either case the cavity should next be injected with a 10-volume solution of hydrogen peroxide or washed out with sterilised water or saline solution. After operation it is better to use no packing. Hæmorrhage is rarely troublesome.

The after-treatment consists in the regular antiseptic douching, which may be gradually discontinued in from four to six weeks. For this purpose the writer has designed an antral tube which can be fitted to any douche or Higginson syringe. If pus is found after that time apart from any temporary local inflammation it will probably proceed from the frontal sinus or anterior ethmoidal cells. In 15 of the cases referred to the middle turbinal alone or associated with polypi had to be removed as part of the operation on account of intermittent symptoms of frontal retention, and in six of these it afterwards became necessary to open and drain the frontal sinus. Leaving intact the anterior portion of the inferior turbinal in no way interferes with the after-treatment, while it seems to afford protection to the newly exposed antrum from the respiratory current.

The results of the cases operated on in the above manner appear to show that the search for a drain to these cavities in the most dependent part is quite unnecessary. No anxiety need be felt as to the result in cases in which the antrum extends below the level of the floor of the nose, as it would seem that in these cases, as in others, the cilia of the rejuvenated mucous membrane gradually adapt their action to the position of the new opening. The only inconvenience I have known patients to suffer from a large opening in the nasal wall was in some cases of regurgitation of food through the nostrils in sea-sickness, when some particles became lodged in the antral cavity. The important thing in chronic antral suppuration is to operate as early as possible by a sufficient removal of the middle or posterior part of the external nasal wall and not to allow such cases to drift on to formation of nasal polypi and polypoid degeneration of the antral mucous membrane, which may need the much more severe and sometimes disfiguring radical operation.

PS.—Since the foregoing paper was written Mr. A. S. Underwood has published³ the results of his studies on the superior maxilla, which bear out fully the views expressed above as to the proper site for operation, as well as the objections to instruments like the burr.

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³ Brit. Med. Jour., May 15th, 1909, p. 1178.

APOTHECARIES' HALL OF IRELAND. — The quarterly examinations will begin on the following dates:—First professional, Monday, July 5th; second professional, Thursday, July 8th; third professional, Monday, July 12th; final professional, Wednesday, July 14th.