man with a pseudo-arthrosis, secondary to an ununited fracture of the femoral neck, is a total economic loss. He is not such a loss with a firm stable hip properly arthrodesed.

SUMMARY.

(a) The extension method of treatment of fractures of the femoral neck gives results far too poor to justify its use.

(b) The Whitman method is simple, reliable and efficient, and has given good results in Whitman's hands.

(c) The author advocates a combination of the Whitman abduction and the Cotton impaction methods supplemented by an attempted overcorrection in reduction of the fracture, and the immobilization obtained by a double plaster spica. The abduction should be complete in all cases and weight bearing should be prohibited until the end of eight months. Such a method promises to prove a satisfactory solution to a most difficult surgical problem.

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WAR WOUNDS OF THE SINUSES WITH X-RAY PLATES.*

By HAROLD A. FLETCHER, M. D., San Francisco.

The problem of instruments for sinus work was a very hard one in France until just before the armistice. The specialist had at his disposal very little other than the regulation ear, nose and throat canvas roll, the regulation box of eye instruments, and a few things that he could obtain from the general operating sets. Just before the armistice our requisitions for additional special instruments were being filled.

One serious drawback to the army roll is that its originators absolutely forgot, or did not recognize, the existence of the ethmoid, frontal or sphenoid sinuses. They did, however, provide a satisfactory trocar and canula for the maxillary sinus. It is particularly disagreeable not to have a single forcep, curette or probe suitable for ethmoid and frontal sinus work; especially when so many influenza cases have a complicated frontal sinusitis; even more disagreeable when you get gunshot wounds of the sinuses, with retained fragments. So in reporting the following cases of gunshot wounds of the sinuses, let it be understood that in their treatment one might have done differently in their own office or hospital, and at least, could have done them with more facility.

Except those cases which are too severe to be moved from the evacuation hospitals, most of our cases arrived from two to six days after being wounded, and had from a few hours' to two days' stay in an evacuation hospital, after which a two to four day ride in a hospital train. During this time they could receive little or no surgical attention. All cases of course were infected.

The data we received with the patient was in the shape of brief notes on the field medical card; of treatment received in the evacuation or field hospital, and brief X-ray report. These cards were often illegible, through hurry, dirt and blood, but were important in showing approximately the diagnosis and what had been attempted.

In general gunshot wounds involving the sinuses are not hard to treat, unless there is great destruction of tissues necessitating plastic work, or where they are complicated with brain lesions or are connected with the orbital tissues. In the first place every one knows the tendency of the bones and mucus membranes of the nose, to knit and heal quickly. In the second place, the American soldier in France is an especially healthy and strong individual, whose wounds heal quickly. Where there is great exterior destruction necessitating future plastic work, it is of primary importance to secure drainage into the nose and as soon as possible to get the lining of the cavity either normal or filled in with tissue. In the case of connection of the sinuses to the cranial cavity, or orbital tissues, drainage must be secured and at the same time, care used not to excite the already partially or wholly walled off process to extend deeper. In fact, the treatment of these cases is just one of ordinary surgery, plus the guidance of the specialist in removing foreign bodies, cleaning up the debris, and maintaining drainage down into the nose, and controlling the exuberant granulations.

Case I. Sgt. K. 355th M. G.

Entered the hospital September 11, 1918, having been wounded on the morning of September 8th, a small piece of shrapnel having entered face 2½ cm. below the inner canthus of the right eye.

The wound was about 1 cm. by 1½ cm., infected and discharging muco-pus. Patient stated that when he blew his nose, air came through opening. Probe entered wound about 3 cm., touching rough bone most of the way.

Examination of nose shows swelling and inflammation around right middle turbinate. Septum markedly deviated to right. The following day X-ray plates showed a small foreign body in region of posterior ethmoids close to septum. Probing did not reveal presence of foreign and under fluoroscope probe could not be made to touch it.

Operation: Sub-mucus resection of septum to allow room for operating post ethmoids. The posterior tip of the right middle turbinale was removed with snare and forceps. The region of the post ethmoids was found somewhat macerated and covered with fresh granulations. The posterior ethmoid labyrinth was then opened and partially removed, after which by careful probing both under the fluoroscope, and by feeling, the foreign body was located and removed with forceps. The post ethmoids were then cleared up, and the surface sprayed with Dichloramine "T." A small loose pack saturated with D. C. T. was left in place and a similar drain placed in the external wound.

After treatment consisted of washing out the post ethmoids with borax solution through the

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external wound, followed by D. C. T. spray through the wound and nares. Keeping down granulations; and letting the external wound fill in from the bottom. Recovery was uneventful. The external scar was practically nil.

In concluding this case I might say that I had a struggle with the plastic surgeon, who almo.. insisted upon going after the foreign body throu- the external wound, which you can easily see would have been well nigh impossible, and would have left a large unsightly scar. He admitted his error afterwards.

Case II. Private R., G. S. W., right malar region.

This case was probably the most serious one I had to deal with.

He entered the hospital on October 15, 1918, having been wounded five days before, from a high explosive shell. One large fragment and several small ones entered the right malar region; the two largest ones passing inward and downward through the right antrum, through the nasal cavity then upward and outward through the left antrum lodging under the overhanging edge of the zygomatic process of the left malar and superior maxillary bone. The explosive force of the large fragment, traveling at such velocity, must have been very great; for both antra were literally macerated, as well as the septum and two inferior turbinates and the floor of the right orbit.

Examination showed both cheeks puffy and oedematous; an opening 2 by 1½ cm. over external surface of right malar bone. Probe passed downward through right antrum into nose. Both lower turbinates were macerated and large hole found in septum. A great deal of discharge from both nares and external wound, many loose bone fragments throughout course of channel, conjunctiva of both eyes very oedematous, and ecchymotic spots in right bulbar conjunctiva. Both pupils fully dilated and fixed as though with atropin. No light perception in right, and light perception only in left. Both discs swollen, right more than left, with hemorrhages in retina of the eyes.

X-ray examination showed several foreign bodies near site of external wound, and one large and one small one in the left malar region as mentioned.

Operation: Under general anaesthesia.

Incision below ant. root of left zygema about 1 cm. and foreign body located with needle probe and carefully dissected out. Opening into left antrum determined and enlarged. Left lower turbinate trimmed off and opening into antrum enlarged below. The right lower turbinate was adherent to septum and partly blockaded the opening in septum; was left in place.

Dakin's tubes were inserted from both right and left external wounds.

After treatment. For the first three days Dakin's solution was used in the usual manner, through both wounds, washing out through external nares. After that borax solution was substituted, the purulent discharge having ceased. For two or more weeks there was a good deal of mucous discharge, with frequent fragments of bone coming away, after which both wounds began to fill in. The oedema of the face and eyes disappeared quite rapidly after the operation. The eyes were protected from the light, as the pupils remained fixed and dilated. The optic discs swelling receded. The left eye improved from light perception to 20/100 when he was evacuated to the U. S. two months later. The right eye still remained blind. With the formation of scar tissue also, the right socket and bulb began to be retracted and there was no muscular motion of the muscles of the right eye ball. The left eye muscles were weak and limited in action. A month after the original operation I freed the m. m. of the right turbinate from the septum, leaving as much as possible on the septum which almost completely covered the perforation.

When evacuated two months after receiving, both wounds were well filled in, drainage being entirely through the nose on the left side, and mostly through the nose on the right. The right external wound, however, was still filling in.

This case as you can see was a very serious one, both from the extensive destruction and from the involvement of both eyes. It was the eyesight, which was the primary thing to save or improve, once the man was out of danger from shock and infection.

What the final outcome will be I do not know, but I did feel well satisfied with him when he left. Owing to the fact that the injury entered the bone without destroying many of the soft parts of the cheek, I believe he will be free from any disfiguring scars, from contraction; however, the right eye will continue to retract down and in for some time. That will be in the hands of the reconstruction surgeon.

Case III. Private T.

First seen, October 19, 1918, having received multiple shrapnel wounds on October 10th. All wounds had cleared up, except the one he was sent to nose clinic for at this time.

Examination showed triangular 1 by 1½ cm. opening at inner border of left eyebrow, which was discharging muco purulent material. Opening passed back into the ethmoid labyrinth and upward into frontal sinus. With porcelain pointed probe I could not detect the foreign body. Probe from below in ethmoids could be touched by probe through wound. X-ray located the foreign body in the ethmoid mass. Repeated attempts to locate foreign body with probes and remove through wound opening or through nares, failed even with fluoroscope, because instruments for operating ethmoids were unobtainable. The case was treated by irrigating through opening and spraying with D. C. T. after enlarging opening into nose in region of frontal duct. The discharge disappeared rapidly and the external wound began to fill in. I kept this open with difficulty for some time (two weeks) when I let it close. There was no inflammation or discharge in the nose from the region of the ethmoid or frontal. The scar was invisible in the hair line.

This patient was under observation for nearly two months after the armistice, reporting twice a week from the convalescent camp where he was being held; and there was no recurrence of inflammation, so I let the foreign body be, even after I received the proper instruments to work with. I explained to him his condition, told him to remember it if he ever had trouble afterwards.

Case IV. Corporal D.

Shrapnel through left side of nose just anterior to inner canthus of left eye. Report of operation in evacuation hospital, where a counter-opening in corresponding position right side made but foreign body not found. A through and through gauze drain had been inserted.

X-Ray examination showed foreign body about one cm. below inner ⅓ of right orbit in maxillary bone, but near surface.

Under local anaesthetic the foreign body was located through incision on right side, and was dissected and removed. Foreign body 1 by 1 by ¾ cm. ragged piece of metal. A large piece of frontal process of maxillary bone was found fractured and loose, but was left in place for contour. A small opening into right antrum was found after foreign body removed. Blood and mucopurulent material washed out of antrum.

Both right and left openings were sprayed with D. C. T., and then a gauze drain saturated with D. C. T. inserted in each side, after placing rubber tissue between septum and wall of nose, inside.

The after treatment consisted in letting the wounds of both sides fill in, keeping down granulation between the septum and lateral wall of the nose, and washing out the right antrum by means of a probe puncture. The antrum cleared up in a few days. Recovery was uneventful; the two small scars left were scarcely noticeable, appearing like the marks of "pince-nez" glasses. The loose piece of frontal process of the right maxillary was retained and healed in place leaving a scarcely palpable bump.

In concluding this paper I wish to mention several points that have impressed me in regard to sinus work of this nature.

In the first place the matter of waiting. In several cases where sinuses were involved in a wound the tendency was to operate, clean it up, trim it, do something. We found that more often than not, irrigating with borax solution or Dakin's, spraying with D. C. T. and waiting a few days, the operative procedure was made much easier by the cleaner field, and less inflammatory condition of the structures. This does not in any way mean that where existing complications indicate immediate operation, that operation should be put off. Furthermore, in one case shown here, and one other case, the case healed up without its being necessary to operate, the bodies undoubtedly becoming encysted.

Another thing in these cases is the tendency to do too much, to remove too much tissue. The cases are acutely infected but the radical removal of much tissue is not necessary. This is especially true of small pieces of bone, often loose, which may be needed for contour and if left in place aid in the ultimate result. Good drainage from a sinus of this nature usually does not mean the large openings made in the case of chronic diseases.

I have spoken of Dakin's solution in connection with this work. I was afraid to use it at first, owing to its irritating effect on the mucous membranes of the nose and throat. However, we found that we could get good results in those cases when there was a good deal of macerated tissue and discharge, by using it for about two days at the start, and then, when irrigation was still necessary changing to borax solution. The infection appeared to be curtailed by this procedure. If there were any signs of irritation of the mucous membranes we stopped Dakin's immediately. This irritation usually appeared on the third or fourth day, and was manifest by a grayish haziness of the surface, with a suggestion of red, deeper than normal, underneath.

Dichloramine T, as prepared in the weaker solutions for nose and throat, was found especially good in post-operative conditions, especially where the nose had to be packed. The gauze packing was saturated with D. C. T. and then used as a light pack. The preparation being in oil makes the pack easily removable. The beauty of the D. C. T. is that it retains its potency for many hours longer than Dakin's, and is less irritating to the nose. Used as a spray on post-operative surfaces we felt that it was exceptionally effective.

The difficulty in finding foreign bodies in the nose is known to all who have had to search for a pledgelet of cotton, or some other article lost in the cavity. The locating of pieces of shrapnel is so much the harder, being sometimes in a small cell or tucked away imbedded in the wall. We found that for pieces of metal the porcelain pointed probes were a great aid. These probes give a different grating feeling when touching metal than when touching denuded bone. I mention this although well known to many.

THE EXAMINATION AND CLASSIFICATION OF AVIATORS WITH SPECIAL REFERENCE TO THE EFFECTS OF HIGH ALTITUDES.*

By J. F. GRANT, Captain M. C., U. S. A.

OUTLINE.

Part 1. Introduction (slides).
- (a) General nature of the so-called Rebreather Test (slide 1).
- (b) Origin and History.

Part 2. The Physiology of Rebreathing and Aviation.
- (a) Adaptive changes due to oxygen want.
- (b) The special problem of the Aviator.

Part 3. Blood Pressure and Pulse Rate.
- (a) Technique and relation to oxygen want.

Part 4. Reaction of the Cardio-Vascular System to low oxygen.
- (a) Cardio-Vascular compensation for oxygen want.
- (b) Failure to compensate.

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