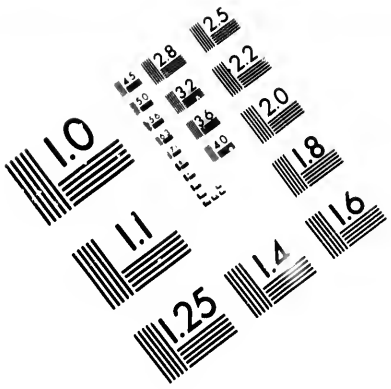

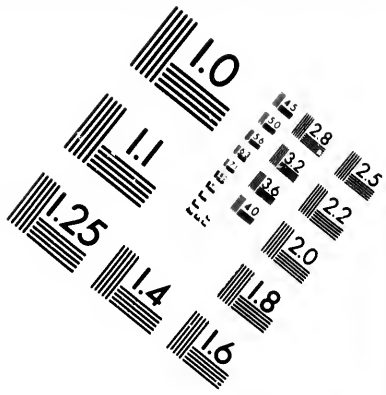

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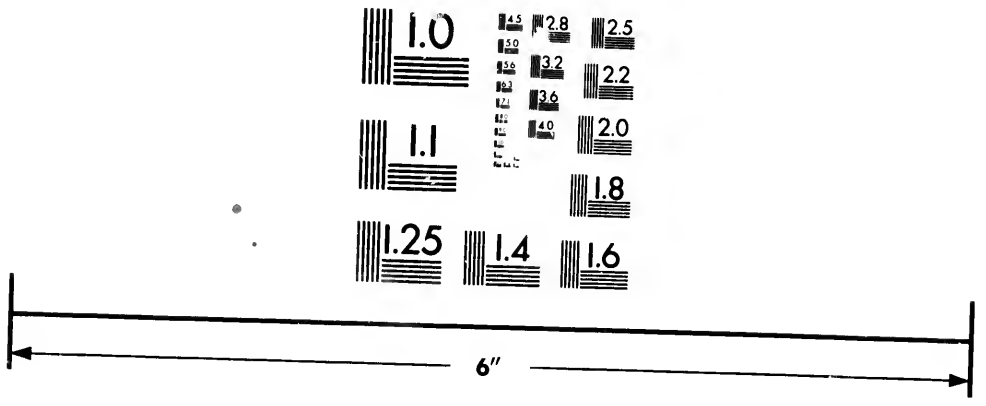

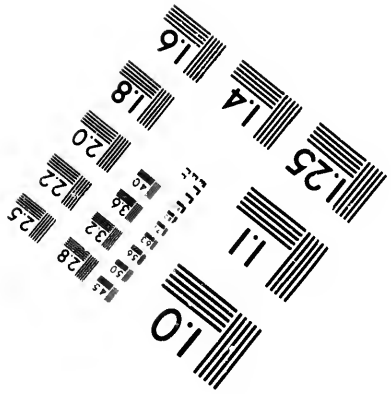

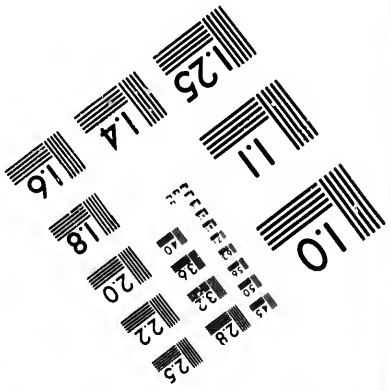

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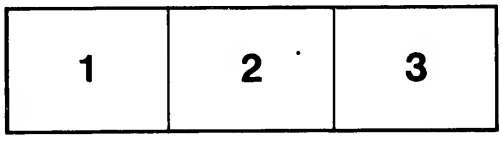

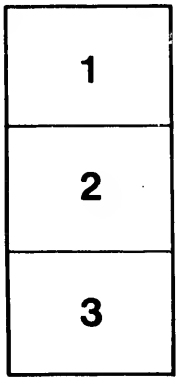

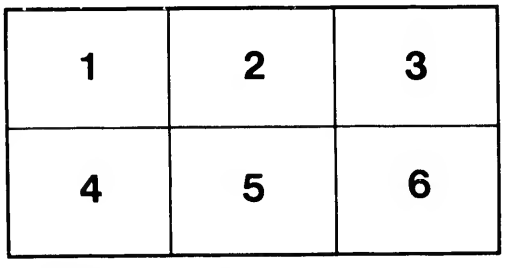

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COMPLICATIONS AND TREATMENT OF FRACTURE OF THE BASE OF THE SKULL.

BY

J. M. ELDER, B.A., M.D., C.M.,

Surgeon to the Montreal General Hospital; Lecturer on Medical and Surgical Applied Anatomy, McGill University.

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I intend only to speak of the "Complications and Treatment of Fractures of the Base of the Skull"; and even to do that briefly will, I fear, tax your patience quite enough, leaving aside the much wider, and vastly more interesting, subject of Fractures of the Skull in general. My reason for taking up this subject was, primarily, that I had under my care this summer, in my wards in the Montreal General Hospital, a rather remarkable series of Fractures of the Base—remarkable in the fact that no fewer than five were there at the same time, affording opportunity of comparative study—and also remarkable for the further fact, that they all recovered. I do not say this boastfully, for several of them should have died to preserve my prognosis. This series of cases, naturally, made me study up the subject of Fracture of the Base as I had never done before; and the good results of the routine treatment followed made me wonder whether we—as general practitioners—have not been too prone in the past to assume that this was a form of injury for which any treatment was useless, and that all we should do was to make a correct diagnosis, give a grave prognosis, and then fold our hands and await the result. Such an attitude, I maintain, in these aseptic days is quite as unjustifiable in the case of a fracture of the base of the skull as it would be in a compound fracture of the tibia, for instance.

I crave your permission to now refer shortly to the following seven cases of the injury under discussion, as I have excluded the cases of fracture of the vertex, which did not show any symptoms of having extended to the base.

Case I. Mabel S., aged 8, was brought to the Hospital on May 30th, unconscious, the result of a fall of 15 feet, striking head first. There was a large hæmatoma over left parietal bone, and also a depressed fracture above left ear. Blood was oozing from mouth, nose and left ear: pupils widely dilated: convulsive movements of left side of body, but no movements of right side. Pulse weak and compressible, face pallid, and respirations shallow. She shortly began to vomit small quantities of bright red blood and rapidly grew weaker. Examination with

* Read before the Canadian Medical Association, Toronto, August 31, 1899.

a laryngeal mirror showed blood dropping down from the vault of the pharynx, which would collect in the stomach, and be rejected from time to time. So that, in addition to the fracture of the parietal bone (or as a continuation of it), there was fracture through the middle fossa of the skull, involving both the ear and the naso-pharynx. As the child was bleeding to death, possibly from rupture of the middle meningeal artery at, or near, the foramen spinosum, I felt that something had to be done at once. I remembered some years previously helping my senior colleague, Dr. Shepherd, operate upon a case of fracture of the skull, in which he could not reach the point of bleeding from the meningeal artery, which was evidently ruptured at the foramen spinosum, and he very cleverly saved his patient by ligating the common carotid artery of that side. You will find the case reported at length in the *Brit. Med. Journal*, Vol. I., p. 905, 1896. It occurred to me that I should follow the same rule here, especially as my little patient was in no condition to stand any prolonged operation on the skull or brain. I hurriedly ligated the left common carotid artery and put the patient to bed. She was absent from the ward, in the operating room, only half-an hour. She regained consciousness on the third day. She developed thrombosis on the twelfth day ; first of the superior longitudinal sinus, followed, on the sixteenth day, by thrombosis of the left cavernous sinus, and, a little later, of the right cavernous sinus. The study of the various forms of squint thus produced was most interesting. These were the only untoward incidents in her recovery, as the depressed fracture of the parietal bone righted itself, as such fractures so often do in children. She left the hospital, perfectly well, in 26 days, and continues well. I show you a photograph taken four days ago.

Case II. George W., aged 36, was brought to the hospital on May 31st, having fallen down a hoist shaft. He was bleeding from right ear, nose and mouth, conscious, but complaining of great pain in the head. He had also a compound fracture of the right lower jaw, and two punctured wounds of the neck, one going into the mouth. The wounds in the neck were dressed and sutured, and a splint applied to the broken jaw.

In addition to dressing the wounds of the neck and of the mouth caused by the broken jaw, I gave precise instructions regarding cleansing and keeping as aseptic as possible all the cavities affected by the fracture of the base, and I shall detail these instructions later on, as they pertain to all these cases.

The patient convalesced rapidly, never had any fever worth mentioning, and left the hospital in eighteen days with all his wounds healed but a splint still on the broken jaw, which had quite united a little later.

Case III. Mrs. W., aged 31, on June 15th jumped from a moving elec-

tric street car, and struck her head on the pavement. On admission, blood was oozing freely from her right ear. Four inches above the occipital protuberance and one inch to the left of the sagittal suture, was a lacerated and contused wound of the scalp leading down to a depressed fracture of the skull (posterior part of left parietal bone). Two weeks previously she had been confined, and was in active lactation. She was dull and stupid, difficult to arouse, with both pupils dilated and sluggish to light. She vomited frequently, a slight trace of blood being found in vomited matter. The wound in the scalp was sutured and dressed but no effort was made to raise the saucer-like depression of bone underneath. The ear and nose were treated in the usual way, and the usual routine of diet, rest and cold applications to the head followed. The vomiting was most troublesome, and the patient was very weak before it ceased, having ejected a good deal of blood, the source of which I could not make out but suspected it entered the pharynx through the right Eustachian tube. Her temperature never went above 101° F., and she made a good recovery, being conveyed home on the eleventh day. I have since seen her, and she complains of nothing as a result of her accident.

Case IV. P. M. K., aged 43, was brought to the hospital by the police patrol, which had found him unconscious in the street. He was semi-conscious, inclined to sleep at times, and wildly delirious at others. He was in the ward for a week before we could find out his name or get any information whatever about him. Blood was trickling from both ears, and from nose and mouth. He vomited blood at different times in small quantities. He had paralysis of all muscles supplied by the left facial nerve, which was evidently involved in the Fallopian aqueduct. Closer examination showed a slightly depressed fracture of the left parietal bone, about one inch above the left ear. The ears, mouth and nose were treated as usual and ice was applied to the head. He was very delirious for a week, and suffered from retention of urine for several days. His mental condition then quite suddenly improved, but he still had deafness and facial palsy when he left the hopsital in three weeks. Dr. Stirling, assistant occulist and aurist of the hospital, reported rupture of both drum heads, and did not hold out much hope of regaining hearing in the left ear, as he feared the portio mollis of the seventh pair of nerves had suffered with the portio dura and was involved in some scar connected with the fracture through the petrous portion of the temporal bone. His temperature while in hospital never rose about 100° F.

Case V. L. C., aged 37, was brought to hospital unconscious, smelling strongly of alcohol, with both pupils dilated, right more than left, and blood oozing from the right ear, nose and mouth. There was a scalp wound over the occiput, but no fracture of the skull underneath ; the left nostril torn open to the cheek ; flesh wounds of the right hand and

right shoulder. The wounds were sutured, after cleansing, and then the cranial orifices treated as usual. For three days he was delirious, and the temperature rose to 101° F. on the fourth day, but then rapidly got better, and he left the hospital very well in eleven days.

Case VI. A. G., aged 29, was brought to hospital on July 23rd, having fallen from a moving train and struck on the head. Blood was flowing from the nostrils and left ear, and a very large hæmatoma was present over the right temporal and malar regions involving the right orbit. He was unconscious and vomiting blood occasionally. Bell's palsy of the left side of face, but no other evidences of paralysis. Breathing stertorous. The usual orders as to treatment were as well carried out as a public hospital ward would allow, and the patient made a rapid recovery, unconscious delirium being followed by intelligence and quiet, and the facial palsy disappearing. In fifteen days he was discharged, apparently perfectly well, but with the usual caution not to work hard or excite himself for another month. The temperature in this case never rose above 99° F., though he was wildly delirious for two nights, and had to have several hypodermics of Battley's solution.

Case VII. O. S., aged 21, was brought to hospital on the night of August 1st, semi-conscious, the result of a fall on his head into a culvert, and bleeding freely from the nose and left ear. The usual treatment was followed. He complained of great pain in the head, worse at night, and in spite of sedatives was very noisy. He began to improve on the fourth day, and on the sixth day his brothers insisted on his removal from hospital, and I have since heard that he made a good recovery.

In all these cases the following general plan of treatment was followed out as systematically as circumstances would allow :—

1. Rest in bed.

2. Quiet was enjoined, and preferably the patient should be kept in a dark room. In the private cases, only, could this be done.

3. An ice bag was kept to the head.

4. The affected ears were thoroughly syringed out with carbolic acid solution 1-60, and packed with iodoform gauze, over which was bandaged a pad of sterilized cotton wool. This was repeated as often as the cotton wool showed any moisture. The nose was sprayed every four hours with the following, taken from the Montreal General Hospital Pharmacopœia: ℞ Sod. biborat., sod. bicarb. aa. grs. iii, acid carbolic gr. i, glycerine ℥i, aq. ad ℥i. Sig. Use in the atomizer. In addition, the nostrils were plugged with sterilized absorbent cotton changed frequently.

Where a mouth wash and gargle could be used and was indicated by involvement of the vault of the pharynx in the fracture, the following was used every two hours :—℞ Pot chlor. gr. xlv., acid hydrochlr. m. xx, glycerine ℥iv, aq destillat ad ℥x. Sig. As a gargle and mouth-wash.

5. The diet was strictly fluid, and in many cases of unconsciousness, food was given *per rectum* for several days—peptonized beef juice and egg, with a little brandy, yielding very good results, given in this way every four hours. It is, I think, highly important to carefully nourish these cases of fracture by suitable diet.

But the question may naturally arise, can one always be sure that one has a fracture of the base to deal with. I cannot answer this better than by quoting a recent utterance of a London surgeon on this subject : "The signs of a fractured base are exceedingly equivocal, *and it is often only by a consideration of the whole picture* that a certain diagnosis can be made." (Rose & Corless Surgery, 1898, p. 464).

If one has, following severe injury to the head, (1) evidences of severe brain injury ; (2) bleeding from the cranial orifices which communicate with one or more fossæ of the skull ; and (3) if the presence of cerebro-spinal fluid can be demonstrated in the discharge from any of these orifices, it seems to be fair to conclude that one is dealing with a fractured base. More especially is this true if one finds, at the same time, a fracture of the parietal or tempora bones, as so often happens. These fractures of the vault, I am convinced, often extend to the base, but being linear and not compound, they require no treatment and so escape notice.

What are the dangerous complications of fractures of the base of the skull ?

1. *Hæmorrhage.*—The fracture may easily tear the dura mater and open some of the large venous sinuses, with fatal effect. This accounts for the great fatality following fractures of the posterior fossa of the skull (the drainage basin), as compared with either the middle or anterior fossa. Hæmorrhage, too, may also result (as in No. *I.* of the above series) from the fracture involving some of the arteries entering the base of the skull. The treatment must be directed to the control of this by any and every means possible.

2. *Sepsis.*—The fracture may become compound, opening into some of the cranial canals which communicate with the outer air; for example, the external auditory meatus, the Eustachian tube, the nose and naso-pharynx. Most fractures involving the middle and anterior fossæ of the skull communicate with some one or other of these cavities, and so are just as truly compound as the end of the tibia sticking through the skin, and here it is that modern antiseptic surgery should, and I claim does, give us good results when faithfully and intelligently applied. If the cracked skull is kept aseptic by proper treatment of the road leading to the site of fracture, it will heal as kindly and with as little constitutional disturbance as any other bone treated in the same way. It is not enough in these modern days, when one sees a patient who has received a severe

blow on the head, and has blood pouring from ears, nose and mouth with evidences of severe brain mischief, that the medical man should say : "Poor fellow ! A fracture of the base of the skull, I fear. Keep him quiet, and leave him alone." These fractures must be treated ; the hæmorrhage must be stopped, and to do this a careful search should always be made for its source.

I should certainly have lost the first of the above series of cases had I not taken this precaution, for there was very little external bleeding in her case, and yet she was really bleeding to death into the gullet. Having controlled the hæmorrhage as far as possible, our energies should next be turned to rendering the site of the fracture as aseptic as possible and adopting means to keep it so. Cleanse the cavity affected, and keep it clean by frequent washings and, where possible, by closing with some antiseptic absorbent dressings. Then the germs in the air will not be able to gain access to the fracture, and thence into the cerebro-spinal fluid or the venous sinus, causing subsequent septic meningitis which will nearly always be fatal.

Especially should one cleanse the external ear and keep it dressed antiseptically. This should be done on the affected side, even when no blood is issuing when you first see the case. The blood may be accumulating in the middle ear and escaping through the Eustachian tube and may later rupture the drum membrane and escape through the external meatus. Spray or douche the nose and naso-pharynx carefully, and then close the nostrils with cotton wool. Remember that the upper chambers of the nose communicating with the ethmoidal and frontal sinuses, are, fortunately, generally fairly sterile. And finally, use an antiseptic mouth-wash as frequently as possible. Control vomiting if at all possible. It is bad in many ways. It increases intra-cranial blood pressure, and thus encourages hæmorrhage ; and it is very apt to drive septic material into the posterior nares and the Eustachian tubes. Give nothing but liquid diet ; feed entirely by rectum for a few days, if necessary, and do not be afraid to give opium hypodermically or by rectum if the patient is violent and restless as they generally are in cases of brain injuries. I know there is a general prejudice against the use of opiates in these cases, but I have seen nothing but good follow the use of opiates where indicated, and think the patient quieted by opium has a much better chance of recovery than the patient who is wildly delirious ; and, above all, keep the patient from all excitement, whether of sight, sounds, or mental agitation. Do not allow a lot of anxious friends to ask the patient all sorts of questions ; exclude the pettifogging lawyer who is so anxious to take his case. There is nothing in what I have said that may not be carried out by any medical man living in this country, and cases in private practice should get on even better than those in a large emergency hospital ward with its noise, bustle and light.