THEESIS
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on

FOURTEEN CASES OF

COMPOUND FRACTURE OF THE SKULL.

By

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(M.B. C.M. Ed. 1882.)

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Medical Officer to Wesselton Compound Hospital,
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Notes on Fourteen Cases of Compound Fracture of the Skull.

The first thirteen cases were treated in the Hospital attached to the Wesselton Mine Compound. The fourteenth case was treated in the General Hospital Kimberley and was the result of an assault.

The first five cases resulted from blasting accidents or from the falling of lumps of blue-ground from the roofs of chambers in the underground workings in Wesselton Diamond Mine.

The next seven cases resulted from injuries received during a prolonged tribal fight between the Transvaal Basutos and the British Basutos in the Wesselton Mine Compound. There were 1,200 combatants on one side and 800 on the other. There were 59 casualties, including several cases of compound fracture of the skull, compound fractures of the leg, scalp wounds, and lacerations and bruises of various parts of the body.

The six cases (Nos. 6 - 11) were operated upon on the 26th December, 1909. The first case was placed on the table to be shaved and scrubbed at 9.15 a.m. and case eleven was dressed and removed from the operating table at 12 noon; the six operations having taken exactly 2 hours and 45 minutes.

Case /
Case 12 was injured in the same fight, but was not found till Monday evening, the 27th. He was operated on next day, the 28th December, 1909.

Cases 13 and 14 are mentioned on account of their interest in connection with the question of diagnosing whether an injury and fracture of the vault of the skull includes its whole thickness and the consequent decision as to whether trephining is advisable in all cases of compound fracture of the skull.

The first 12 cases were operated on in the theatre of the Wesselton Mine Compound Hospital, Dr S. Wicks was the Anaesthetist and used Chloroform. The assistants were two white male dispensers, and three black ward boys. After operation the patients were removed to the surgical ward on a stretcher and put to bed and watched till recovery from the anaesthetic was complete.

In all the Cases the heads were shaved after bleeding had been stopped by pressure with forceps or ligature, and the skin was well brushed with warm solution or mercurial solution 1:2000., then the head was washed down with sterilized Boric lotion which was also used during the operations. The swabs were of cotton wool prepared with every anti-septic precaution.

All the instruments used were sterilized before use.
use and placed in sterile Boric Lotion. Each assistant had his duties definitely allotted and used all antiseptic precautions. The head was placed on a mackintosh covered with a towel wrung out of mercurial solution 1:2000.

The native ward boys held the patient and brought the lotions and held dressing trays and receivers.

In each Case Silk-worm gut threaded in a fully curved needle was used to stitch up the skin wound. The first dressing was of Cyanide gauze next the wound and cotton wool outside, both from sterile covered dishes. The bandage was applied as necessary.

These 12 Cases were all adult native males. The exact age of a native is very difficult to obtain; they have no idea of time as we count it. The youngest, "Jack Modifan" was about 24 and the rest were older, one "April" being about 45 years of age.
CASE 1.

Cheddy, was admitted with 5 or 6 others to Hospital; they had been injured by a fall of blue-ground. On arriving at the Hospital he was thought to be dead. He was pulseless and had a deep wound behind the right ear, which was not bleeding and had been dressed by first aid.

After the other accident cases had been attended to /
to, he was again examined and found to be breathing. On being placed on the table and carefully examined, it was found that there was a wound behind the right ear about $2\frac{1}{2}$ inches long, extending along a line from near the middle of the ear backwards towards the occipital protuberance. It was down to the bone and there was only very slight oozing of blood. There was some blueground in it. On washing the clot and ground out the skull was found to be fractured, and a shelf of bone pushed right inwards and forwards, the upper segment of the fracture was driven in nearly an inch, leaving the lower posterior part with a straight edge. The fracture was about 2 inches long.

He had some spasmodic movements of his limbs, when placed on the operating table, and both pupils answered to light. He was slightly anaesthetized and the skin raised to get a better view. The posterior and deeper part of the depressed bone was being wedged up by the Elevator, when a profuse flow of blood escaped, this piece was gently replaced and the bleeding stopped. It was dark venous blood.

An attempt was then made to elevate the anterior segment, which was successfully done and a fair-sized piece was removed altogether, but some oozing of dark blood continued. The posterior and internal segment was then elevated from the front and /
and rapidly removed and it was found that the Lateral Sinus was opened along its course for quite one inch. This was immediately stopped by the thumb being introduced. It was then plugged with Iodoform Gauze fairly firmly. Care being taken to push the gauze well under the edges of the bone all round as smoothing off was impossible. The bleeding stopped and the wound was dressed and the patient's pulse was found to have improved, but 5 m. liq. strychnia was given Hypodermically, and some morphia ¼ of a grain ordered to be given if the patient became very restless; and to be repeated with some more strychnine, same dose if the patient continued to be restless.

After various cuts and scratches on other parts of the body were attended to, the patient was put to bed. He had a dose of the morphia which enabled him to have a peaceful night. He took liquid nourishment and passed urine naturally that night. Next morning he had regained consciousness and was not restless and his pulse was good. Calomel gr. 5 was given and the bowels opened well that day and he took nourishment well, and did not seem to recognize that there was any need for quiet.

The wound on the Scalp was left alone for two days, and on the third he was again anaesthetized and the plug of gauze removed but there was a very free gush of venous blood still. This was controlled by /
by the finger till the wound was well washed with warm mercurial lotion (1.8000), then it was dried and again plugged. His general condition remained good. The Temperature had risen slightly during parts of each day, but never above 100°F.

On the sixth day he was again anaesthetized and the plug removed, and there was only a small oozing from the anterior part of the wound, but an attempt to complete the operation of Elevating and Smoothing the depressed parts of the bone caused a greater flow of blood; and it was found necessary to again plug with Iodoform gauze firmly and pushing some under the rough edges of the bone as before.

After two days of uneventful progress and lower rises of Temperature, he was again chloroformed and the plugs removed. This time all bleeding had ceased and the upper and anterior portions of depressed bone still left, were elevated and removed, the rough and sharp points all round smoothed off with the lenticular and the elevator. During this part of the operation the brain was noticed rapidly rising through the rent in the Dura Mater, along the course of the Lateral Sinus and interfered considerably with the freedom of the smoothing operations. The opening in the skull was about 1½ inches long by about 1 inch. It was irregular in outline and had its long axis from the protuberance towards the ear.
When the bones were satisfactorily levelled and smoothed, the brain had risen to the level of the outer surface of the skull and it appeared that Hernia Cerebri was imminent.

It was evident some method must be found of retaining the brain inside the skull till good union of the skin was achieved and the Dura Mater given time to heal over. A length of coarse catgut was taken out of the packet, just as it came from the manufacturer, and as it was firm and resilient, it was thought that by doubling it and redoubling it often enough till it was broad enough to be pressed under the skull on either side, it would form a fine mesh and would retain the brain under the skull; this was done but the mesh was not fine enough, and another length of coarse catgut was similarly treated and pushed in above that already in situ, only its strands at right angles to the first mesh.

The result was watched for a time and it was found that there was no further bulging of the brain. The wound had been already well washed, and the skin edges were brought into apposition and firmly stitched together, leaving a small drainage tube at the posterior and inner corner.

The wound was dressed next day and everything seemed to do well. There was very little discharge and the tube was removed. The temperature was normal and /
and the condition of the patient very good. Progress was uninterrupted till the 16th day, then the stitches were removed. Most of the skin round had healed but anteriorly there was a part not healed as also the small piece posteriorly where the drainage tube had been inserted. On slightly elevating the anterior part of the upper skin flap, it was found that most of the catgut had been covered up by what seemed to be granulation tissue projecting through the absorbing catgut mesh, and where the skin had come in to close contact there was firm tissue union forming between this granulation tissue and the under surface of the scalp. This opening in the skin was treated by scarifying the edges and stitching firmly together.

After this stitching the patient next day had two Epileptiform fits but there was no rise in temperature and no paralysis or any other untoward result.

Progress continued good and the wound healed entirely. On the 22nd day the remaining stitches were removed and the patient was allowed to sit up. On the second day after sitting up, he had one fit the same as before but not so severe. The seizure was general and seemed to begin in the upper extremities and pass downwards. He continued to get up and in a few days began to walk about. A week after the second fit he had another which was slight and of the /
the same character as the previous ones. He had no
headache and no discomfort at all.

He had no more fits and continued to gain strength
and was discharged to go to his home after 4 weeks
time. He had for a fortnight been doing some light
work about the wards and was quite well to all ap­
pearance when he left hospital.

CASE 2.

JOHN was admitted to the Hospital on the evening
of the 5th October, 1908, suffering from a compound
fracture of the skull. There was a wound of the
scalp over the left frontal Eminence and just above
the Eminence there was a cup shaped depression of the
skull. It was the result of a blow from a stone
falling from the roof of a chamber in the mine.
TEMPERATURE CHART by Mr. Geo. Chas. COLES, M.R.C.S.

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REMARKS.

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On admission the patient was in fair condition with no signs of compression. The wound was washed thoroughly and dressed and he had a good night. On the 6th October he was anaesthetized and the depressed parts of the bone were found to be covered with periosteum. It was decided to trephine and a small circular opening was made in the skull behind and to the outer side of the depression. The piece excised overlapped slightly over the edge of the depressed surface. A pair of angular bone forceps was used to cut off the portions of the skull next the fracture.
fracture in order to obtain a good leverage to raise the depressed parts, which were covered with periosteaum. Then the angular elevator was introduced and the depressed portions carefully levelled up; when this was completed a bullet prob was bent and passed under the whole surface to feel for any irregularities none being felt, the wound was washed out with sterilized water and the skin round stitched up with silk-worm gut. The wound was dressed and the patient put to bed. There was no discomfort, no vomiting and the patient had a good night. He was given 8 grains of Calomel, which moved the bowels much too freely, having about 20 motions next day. On the third day his temperature rose to 100 but the patient complained of no discomfort and showed no signs of mischief from the wound. The wound was dressed next day and all found satisfactorily healing and no swelling or puffiness. The diarrhoea had improved. Progress was good and the stitches were removed on the 7th day, the wound having healed by first intention.

He got up on the 12th day and after spending about a fortnight with no symptoms of any discomfort, he was discharged again into the Compound.

He resumed work in a fortnight's time.
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**Remarks:**
- Operation on October 12th.
CASE 3.

MLOCKI was admitted to the Hospital at the same time as the previous case. He had an injury on the top of the head in the middle line. There was a cut of about 2 inches along the middle of the top of the scalp. It was down to the bone exposing the Sagittal Suture and there was a sharp edged fracture at the anterior end of the wound, where the bone was depressed to half an inch and the wound was full of clot and blueground.
When the wound was cleaned, it was found that the depressed bone had carried down a part of the inner plate of the skull, leaving the outer plate of bone over-hanging considerably. The depressed portion was broken up. A pair of angular bone forceps was used to cut away the over-hanging bone and thus enable the elevator to be used to remove the depressed portions. On its introduction there was a free oozing of venous blood. The whole depressed pieces about the size of a shilling came easily up and out of the wound and the Superior Longitudinal Sinus was found torn right across at the anterior edge of the wound. The bleeding was stopped by the finger and the inner table levelled and smoothed off all round and the wound was plugged with Iodoform Gauze. One stitch was put into the scalp at the back of the wound and tied.

The patient's temperature was up to 100.2° that evening; he was given 5 grains of Calomel and had a good night, passing water well. Next morning a Seidlitz powder produced free evacuation of the bowels and his temperature was down to 99°. The plug was left in for three days; on removal, the bleeding had stopped and the wound was washed out and further stitched, leaving a small aperture for a fine gauze drain.

On the 4th day the temperature was normal and the patient felt well. The gauze drain was renewed every day.
day and the wound washed out with boric lotion till on the 9th day after the operation, the discharge on the dressings, which was only a slight sanecous oozing had stopped, the wound was then dressed without the gauze plug. By the 16th day the wound had healed entirely and the patient was allowed up. He was discharged on the 25th day in good health.

CASE 4.

APRIL (male adult) was admitted on the 10th February 1909 in the evening with an injured head. On removing the "First Aid" bandaging there was found a lacerated wound right over the occipital protuberance. The wound of the skin was stellate and right down to the bone. One cut passed forwards about 1\frac{1}{4} inches and another to the right and downwards for about one inch from the prominence, another to the left and slightly upwards about an inch. Blood was oozing freely from the wound. The whole of the vault of the skull had the appearance of being pressed inwards from either side and the crown of the head was like the roof of a house with somewhat of an elevated ridge running down the middle of the top of the head and the sides were slightly compressible. The general condition of the patient was bad. His pulse small and tense and he was suffering from shock.
On examination of the wound it was found that there was a fracture of the skull, which consisted of a portion of bone about 2 inches wide, driven in about 1/2 inch at its posterior edge, laterally and anteriorly the skull bones were moveable. The more superficial and anterior depressed portions were much broken and were easily removable, and were elevated and extracted. When the deepest portion was being elevated a large hole was found in what must have been
been the Torcular Hierophili, for there was a great
flow of dark venous blood. The bone was removed by
forceps at once and the hole in the sinus filled with
a finger while examination was rapidly made for any
portions of rock or grit or any other foreign sub-
stance.

The upper and anterior portions of bone were
moveable en mass and even the lateral parts would
give no resistance for a fulcrum in elevating the
depressed portions. The lowest part of the bone
at the back was firm. It was impossible then to do
any more than plugging the sinus with Iodoform gauze
firmly, and putting on a dry dressing.

On the temperature being taken after being put
to bed it was found to be 100% Far. and pulse very
weak and rapid. He was given a saline enema of 2
pints with 2 oz. of brandy, and was fed regularly
during the night with nutritious liquid food. He
was given 5 grains calomel in the morning of the 11th,
which acted in the evening. He passed a comfortable
night and in the morning there being no oozing, the
wound was left.

His temperature rose to 100.6% that evening.
Next day it came down slightly and on the 13th February
the 3rd day, the wound was dressed under chloroform
and the sinus was still slightly patent and bleeding
at the very lowest part of the wound. The gauze
plug /
plug was again used and the patient passed the two consecutive days comfortably; though his temperature fluctuated between 96.8 and 100.6°, he showed no signs of discomfort and had no pain.

The wound was again dressed under chloroform on the 16th when bleeding was found to be stopped, and the bones were attended to and smoothed and elevated as nearly as possible to the normal though this was difficult to do because the whole mass of bone in front and to the sides appeared to be moveable. When the gauze plug was removed this time and the bones were being smoothed off the brain kept bulging up through the opening in the skull and added greatly to the difficulty of the proceeding, as the opening in the skull was irregular in shape and some of the outer table overlapped considerably over the inner table and in several places the inner table was rather sharp still. Just as preparation was being made to close the wound up, a probe was passed down for exploration of the deepest part of the wound and a foreign substance was felt, which on removal proved to be a piece of hard blueground, round and about the size of a french bean.

On removal of the bit of blueground and after washing up the wound, it was found necessary to try the same expedient as described in Case 1. A piece of coarse catgut was doubled on itself till it became a mesh of catgut of about 2½ inches square and this was
was pushed under the bones all round and over the dura mater and the bulging brain. The wound was watched now for some time and the brain no longer bulged but pulsation of the catgut could be seen. The skin wound was then drawn together by silk-worm gut sutures and two openings left, one at either side for drainage, into which a small gauze plug was inserted; then the wound was dressed with Cyanide and bandaged firmly.

For eight days afterwards the gauze drain was gradually lessened and the wound washed out. The temperature rose to about 100°F at nights. After that the temperature became normal and the gauze drains were discontinued. The patient sat up for food and the drainage wounds became smaller.

There was a small amount of purulent discharge, very thin and perfectly sweet. It was evident there was some necrosed bone to come away. But it was not possible to tell which piece it was. For about three weeks more the temperature remained normal and the patient was allowed to sit up for a short time every day.

For the past 4 weeks his bowels had been acting normally and all functions were healthy and he had a good appetite. The whole wound had healed except a small opening at each end about one inch on either side of where the protuberance would have been. The probes discovered necrosing bone at both openings and led to the same piece evidently, which was anteriorly /
anteriorly situated and was the part which had not been
removed but it was still perfectly firm. During
these four weeks, he was able to read in his own lan-
guage and hear well and seemed quite convalescent.

This condition lasted about another 14 days, when
his temperature ran up to 100°. The next day it
was normal, then in the evening of the next day the
7th April, it rose to 102°. He showed no signs of
any serious trouble anywhere. He did not even com-
plain of a headache and there were no signs of mischief
in his eyes, and during the next four days the tem-
perature came by lysis to normal again.

It rose again to 100° on the 20th April. Then
for a week it was normal and as it was thought the
bone necrosed would be able to be removed, an in-
cision was made over the skin above where the probes
pointed and a piece of necrosed outer plate of skull,
about the size of a shilling was removed. The
sinuses were scraped with a small sharp spoon and well
washed out. These wounds healed all except a small
sinus about $\frac{1}{2}$ an inch in length at the right outer
aspect. This condition lasted for fully four weeks.
The sinus did not lead to bone but did not heal.
The patient was somewhat scorbutic, his gums being
spongy on admission. Then he began to complain of
dimness of vision and a pain in the eyes and head
and the retina appeared slightly inflamed in both
eyes and on the 27th April his temperature began to
rise /
rise. It continued to rise notwithstanding all treatment of the wound, such as scraping the small sinus and frequent dressings; as the temperature rose, he became dull of perception and the pain in the head increased. Meningitis was diagnosed but it was evidently basal. Then he had signs of rigidity of limbs and neck, showing spinal inflammation as well.

All possible medical treatment was tried. He had several polyvalent antistreptococcus injections but to no avail. He died on the 16th May: having been three weeks ill with the meningitis.

A post mortem was held. A skin flap was carefully lifted up over the site of the injury and it was found that the sinus stopped short of the fibrous covering which had formed, and was now fairly firm over the cavity of the bone.

On removing the vault of the skull, it was found that the dura mater was adherent at the wound and that there was evidence of slight congestion of vessels over the surface of the brain, where the dura mater adhered was at the right of the laceration through the Torcular Hierophili. The superior longitudinal sinus was occluded by fibrous tissue and it was not possible to trace in the fibrous tissue, where the lateral sinuses began. There was no communication at all between the outer surface of the fibrous septum that covered the opening in the skull and the inner side /
side of the skull cavity or the under surface of the dura mater. The dura mater could be separated from the skull and its fibrous septum by careful dissection. It was evident that there was no communication with the sinus or the outer wound, from the inside of the skull or dura mater. This was very particularly noted as the case being the result of an accident, it was necessary to decide whether the meningitis was caused by the accident or was due to some condition resulting from the accident; but on removing the brain the whole of the base was deeply inflamed and there were flocculent slimy patches round the roots of the optic nerves and all the way below the cerebellum. The ventricles were full of fluid which was milky and the vessels were congested. This inflamed condition passed down the cord.

It was judged to be a case of idiopathic cerebro spinal meningitis, supervening on the surgical case. There were some cases of that ailment in the medical ward at that time.

The examination of the vault of the skull revealed evidence of a very serious fracturing of the bones composing it. Starting from the seat of the depression which was now a hole in the back part of the cap removed in the post mortem, a fracture extended along the sides of the skull below the parietal eminence on either side, extending through part of each /
each squamous portion of the temporal bone and extending about one inch into the frontal bone on either side and the sagittal suture had been rent apart. The portions of bone, at the lambdoidal suture still left, were also loose.

The patient was a fully grown man of 45 years of age at least in whom complete ossification must have taken place. About a week afterwards the cap of the skull, removed at the post mortem had separated, when dry, into several pieces, the separations taking place at the seats of fracture already described.

CASE 5.

JACK MODIFAN was admitted to the Hospital on the 24th November 1909, in the afternoon with depressed fracture of the skull, at the right side of the back of the head between the occipital protuberance and the right ear about 2½ inches long. He had several cuts on the scalp on the right side above the ear and on the temple. There was very free oozing of blood from the right ear. The right malar bone was fractured and displaced downwards and this fracture communicated with a deep laceration pressing 2 inches downwards and forwards into the cheek. There were several abrasions and cuts over the shoulders and back.
# Temperature Chart

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**Remarks:**

Published by T. Brettell & Co. 61 Rupert Street, London W.
On first examination the patient was in such a collapsed state that it was decided to postpone any operation for elevating the depression till the pulse had rallied and some consciousness might return, especially as there was fracture of the base of the skull. During the evening the pulse revived and consciousness returned and by the morning it was decided to /
to proceed to operation.

The wounds had all been dressed and the skull prepared and the fractured malar replaced and retained by a pad of lint supported by strapping. The bleeding had stopped from the right ear, though there was still a serious and slightly sanguous discharge. The dressings on the laceration on the back of the skull were blood stained and on their removal some very dark blood slowly oozed out from the deepest part of the wound. It was found that there was a sharp edge of bone below and that the upper part of the skull for about 2 inches had been driven forwards and downwards for about ⅛ of an inch. The piece thus depressed was in several fragments and could be easily picked out with the forceps and elevator. It was found that the outer plate was loose from the inner plate in some of the pieces.

On removing all the fragments and levelling the sharp edges of the inner plate, there was found a small tear in the lateral sinus. The wound was plugged with iodoform gauze and stitched up sufficiently to allow removal of the plug and a view of the wound in the sinus. All other injuries were attended to; and it was found that the malar bone was in good position, and it was not wired, but as some small stones and mud were found at the bottom of the laceration in the cheek, these were removed and the wound washed /
washed out and a drainage tube was inserted. The wounds were all dressed with cyanide gauze and cotton wool and bandaged.

The patient on being put to bed had a good pulse and was breathing evenly and seemed comfortable. There was no vomiting and the next day the bowels opened well and liquid nourishment was taken freely and, when in the afternoon intelligence returned it was found, that the patient was absolutely deaf and spoke without any idea as to the loudness of the voice.

On the 26th, the first day after the operation in the evening the temperature rose to 100.6 but the bowels were well moved and it began to come down again. The plug was left in till the next day the 27th, when it was removed and the bleeding had stopped. A small drainage tube was placed in the opening and the wound dressed. The patient asked for solid food and was put on low diet.

Up to the previous day there had been some slight ecchymosis round the lower eyelid of the right eye, due to the bruising of the cheek, but on this morning the upper lid of the right eye and both the lids of the left eye were very much ecchymosed, the left more than the right; this increased all next day, till the left eye was almost occluded. This blood evidently came from the inside of the skull.
skull. The patient could read and, when he could open his eyes wide enough to read, he stated on enquiry that he had no headache but that his cheek was sore.

The wounds were all dressed regularly and the cheek was irrigated with a solution of dioxygen. The temperature rose at nights for some days but progress was uninterrupted and the wounds all healed, except the head and face wounds, and the eyes became normal. The head and face wounds continued to discharge very slightly for a longer time.

He got up on the 17th December 1909 and was allowed to sit outside but not to walk. In another four days time he was allowed to walk about in the sun and out of it as he liked.

Two pieces of necrosed bone were removed on the 10th and 16th January and these were from the anterior part of the wound which had been elevated and not removed.

The wounds healed entirely and he was discharged on the 28th January, 1910.

CASE 6.

SEFULA was admitted on the 26th December 1909 with a compound fracture of the left frontal bone about an inch external to the middle line on a level with the frontal eminence. On clearing the bone, it /
it was found that there was a very slight semicircular depression about the size and depth of the root of the thumb nail as it joins the matrix. The periosteum was pushed back from the normal skull sufficiently to allow a small trephine crown being removed, the trephine overlapping the depression. On getting well down into the diploe, the outer plate was removed and the diploe carefully examined: it was found that it was perfectly normal, that there was no /
no sign of crack or crushing of the diploe anywhere and the wound was washed out and the skin stitched up.

For two days after the temperature was up to nearly 100 but came down on the third day and there was no further trouble. The stitches were removed on the 7th day and the patient got up on the 14th day and has continued well.

CASE 7.

JACK BASUTO was admitted with depressed fracture just above the left eyebrow. The wound was star shaped but had its greatest length parallel to the eyebrow. The bone was depressed shelving from above downwards and backwards leaving a sharp ridge just about an inch above the edge of eyebrow.

On separating the flesh from the edge of the depressed bone it was found that the broken bone was in segments. These were removed and the exposed dura mater was intact. The upper surface of the orbital plate was plainly visible just where the lower edge of the fracture was, in fact the difficulty was to get the inner plate of the lower edge of the broken bone smoothed satisfactorily because it was curving backwards to form the orbital plate. This was managed and the wound washed out and the skin stitched over and dressed.
The case continued satisfactorily, the temperature after the second day keeping normal till the evening of the 30th, the 4th day it rose to 100. Next morning it rose to 100.6. One or two stitches were removed and some sanguinous discharge escaped. A drainage tube was inserted; there was puffy induration of scalp and of forehead. He was isolated and given /
given polyvalent antistreptococcus 10c.c. three
times, and lig. Ferri Perchlor. m. 25. four hourly.
His temperature was reduced and the general condition
of the patient continued good. There was a slight
discharge for some three weeks, lessening in quantity
every day.

The wound continued to discharge and small frag­
ments of bone came away, but gradually healed up with­
out any discomfort to the patient. He got up on the
16th day and walked about on the 25th and was discharg­
ed on the 28th January, 1910.

**CASE 8.**

**MAHATIE** was admitted on the 26th December 1909
with lacerated scalp over right parietal bone, about
$1\frac{1}{2}$ inches from the crown of the head and parallel to
the line of sagittal suture. It was about three
inches long and on examination led down to a severe
depressed fracture of the skull about $2\frac{2}{3}$ inches long.
The flesh was driven in between the inner segment and
the outer depressed portion.
## TEMPERATURE CHART by Mr. Geo. Chas. COLES, M.R.C.S.

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### DISEASE

- Malaria

### Dates of Observations

1. **Temperature Chart**

2. **Pulse per minute**

3. **Respirations per minute**

4. **Urine**

   - O.S.
   - S.S.
   - G.R.

### Remarks

- None

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Published by T. Brettell & Co, 51 Rupert Street, London, W.
Under chloroform the wound was washed and cleansed and the flesh turned out from the fracture; it was found that the fracture began \( \frac{1}{2} \) inch behind coronal suture and extended 2 inches into the frontal bone. The depression was \( \frac{3}{4} \) of an inch in depth on the inner side of the fracture and the outer plate was shelving over the depressed portion. This was cut off with bone forceps till the edge of the depressed fragment could be elevated, then all the portions /
portions that were loose were removed and the rest leveled up to the normal curve of the skull. Some of this was removed also as it was found to be separated from the inner plate and was uncovered with periosteum. When the whole was smoothed and carefully washed out, the dura mater was examined and found to be intact. But there was no pulsation under it. The periosteum was brought down over the bone and the scalp wound closed with sutures. The wound was dressed and the patient put to bed.

When awaking from the anaesthetic the patient was comfortable and moved all his limbs normally and the bowels acted well. The temperature rose next evening to 100.4. He complained that evening of pain over the left shoulder and scapular region but moved his fore-arm and hand well. Next day he said his shoulder was stiff and that he could not lift his arm at the shoulder but the pain had moved down to the forearm. There was distinct inability to move his shoulder at all or lift his arm to his head. His scapular muscles and movements were defective. The temperature went up 101.2; in other ways the patient seemed doing favourably. The wound looked well.

Next day there was a slight return of movement at the shoulder joint and of the scapular, but the forearm could not be moved nor could the hand or fingers and the pain had entered the hand. His temperature /
temperature rose to 100 that day, and the next, on the 31st, the sixth day, the elbow could be moved but the wrist and fingers were quite paralysed; the pain had ceased and the temperature had gone down. The stitches were removed on the 7th day and as there was a slight bulging, a probe was introduced and a dram of sanguous semi purulent fluid escaped. A small tube was introduced and the dressings changed to boric fomentations, applied twice daily. The temperature continued to rise in the evenings for two days to 100, but gradually became more normal. It rose to 100 on the evening of the 7th January, 1910 for no apparent reason. The discharge from the wound was lessening and the tube was removed on the 10th January. The paralysis of the hand and wrist still continued; till on the 16th January, he began to find power gradually return in the wrist and slight movements of flexion of the fingers were noticable.

The movement of the wrist and hand had not improved to any extent but the wound had healed on the 24th January. His temperature remained perfectly normal all through and his appetite remained good. He seemed perfectly well in every way but for the condition of the wrist and hand.

He was discharged on the 10th February, 1910.
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| Pulse per minute | | | | | | | | | | | | | | | | | | | | | | |
| Respiration per minute | | | | | | | | | | | | | | | | | | | | | | |
| Urine O/S, Sp Gr | | | | | | | | | | | | | | | | | | | | | | |

**Remarks:**

Published by T. Brettell & Co. 51 Rupert Street, London W.
CASE 2.

TSCHONA was admitted on the 26th December 1903 suffering from a severely lacerated scalp. The whole scalp was covered with intersecting gashes and cuts, about twenty different gashes were counted including a large flap-like wound at the back of the head. It was three inches long across the back of the head extending 1½ inches on either side of the occipital protuberance; from this wound the skin was separated from the deeper structures, some two inches down the neck.
All over the crown and the sides of the head there were cuts of all shapes and sizes and depths. Most were on the crown of the head. The deepest was about an inch and a half to the left of the middle line and about an inch in front of the line joining the two parietal eminences. It communicated with several other wounds all round it, and led down to a very deep depressed fracture.

When the head had been shaved and cleansed, all the wounds were stitched up and the bleeding controlled, except in the case of the central wound in which some small portions of brain were found outside the deepest fragment of bone and this piece was separated from the rest and seemed driven down into the brain substance.

The cuts were all stitched up and the bleeding controlled at once on admission about 2 a.m. At 9.15 he was put on the table and chloroformed and the wound leading to the fractured skull carefully examined. The whole fractured surfaced was nearly three inches long anteroposteriorly, transversely it measured about 2 inches. The central fragment of depressed bone was not connected with any other portion of bone. On the outer side there was a mass of tissue jammed in between it and the piece of skull still intact. So the inner side brain tissue was protuding between it and the other depressed portion. This deepest portion /
portion was about the size of the back of the last joint of the forefinger. The tissues were separated and pulled out from between the bones and cut off as they were so much bruised, and the elevator was easily introduced and the pieces of depressed bone tilted up sideways till the forceps could seize and withdraw them. This deepest portion was found to have carried with it a piece of the dura mater, which was attached to a sharp edge; and the whole piece with the piece of the dura mater had been pushed right into the brain tissue. The other fragments were then elevated and removed and the rough edges smoothed.

There was very little oozing of blood and as one or two small pieces of brain tissue were very loosely attached, they were snipped off. An attempt was made to stitch across the dura mater but the hole was too large. The whole wound was washed out thoroughly with hot sterilized boric lotion, which stopped all oozing. Then some coarse catgut was folded on itself till a mesh was formed and this was introduced between the skull and the dura mater covering over the lacerated brain. As the meshes of the catgut were too large another strand was folded up and placed so that the strands of the second crossed the strands of the first at right angles; and now the whole dura mater and brain tissue were completely covered over with a thin mesh of catgut. Then the periosteum and the deep foscia were drawn together and stitched with /
with continuous catgut suture; but it was found that some of these tissues were also wanting, this hyatus was filled in by a crossing and recrossing of catgut suture. Then the skin was stitched up completely.

On recovering from chloroform the patient seemed fairly well. The pulse was good but he was dull and heavy and remained so for some days. The temperature rose for two days above 101, and reached 102 on the third day. On the fourth day the skull became swollen and puffy and he was isolated with the other case and given antistreptococcus (polyvalent) 10 c.c. three days consecutively as in the other case; he also took Lig. Ferri Perchlor. m. 25 four hourly. The stitches of the various wounds were removed on the eighth day.

The swelling and puffiness and the temperature gradually subsided until the ninth day, when it was normal. The temperature with the exception of the 13th day, when it rose to 101 continued normal. Some of the cuts around the central wound suppurated. They were well irrigated with boric lotion after that, and then once a day, after being thoroughly dried, dioxygen solution was injected into all suppurating points. The discharge which had thus come out from the central wound and other points, gradually ceased.

The patient never showed any sign of paralysis.
or any affection of his mental faculties. From the fifth day he took his food well and at the end of the second week desired to get up and walk about. He was allowed to sit up in bed. His scalp was fairly seamed with scars. The wound over the fracture had a very slight watery discharge on the 16th January. His condition continued to improve and he helped in the ward work on the 22nd January and was discharged on the 31st January.

CASE 10.

JASAR was admitted to Hospital on the 26th December 1909 suffering from a compound depressed fracture of the skull which was oozing dark venous blood. The seat of the fracture was on the right side of the skull beginning about the coronal suture and 2 inches to the right of the sagittal suture and extending diagonally towards the middle line in front. The fracture extended 2½ inches forwards in the frontal bone. On the outside at its broadest part it was 1½ inches wide tapering off at either end. Before operation the patient had three violent epileptiform fits.
It was found that on the inner side of the injured bone...
The outside wound was enlarged enough to enable manipulation, and the tissues which were crushed between the bones were freed and the periosteum pushed back sufficiently to gain a good view of the injured bone. It was found that on the inner side of the wound, there was a considerable depression of a segment of bone and that the inner plate was split off further than the break in the outer plate, making the /
the size of the inner plate injured larger than that of the outer plate.

The depressed portion was very much broken. With a pair of curved bone pliers the outer plate of bone projecting over the fracture was cut off till a good view was obtained of the edge of the depressed inner plate. An angular elevator was inserted and with the aid of forceps a piece of the depressed bone was removed, then the whole depressed portions were elevated and removed, and what was loose or interfered with the smoothing and levelling of the inner plate was also removed. The dura mater was uninjured except for a small puncture of the longitudinal sinus at the extreme anterior angle of the fracture. The wound was washed with sterile boric lotion and a small iodoform plug placed against the bleeding sinus. The wound was brought together with silk-worm sutures and dressed. There were no fits after the operation.

There never was any rise of temperature at all. The plug was removed next day and the wound dressed. The stitches were removed on the 7th day, when the wound had healed. There was no paralysis of the left arm.

The patient got up on the 14th day and has done quite well since and was discharged on the 24th January 1910.
CASE 11.

JIM was admitted to Hospital on the 26th December 1909 suffering from a compound fracture, much comminuted, of the left parietal bone. The injury was situated internal to the parietal eminence and extended for about 2 inches forwards parallel to the sagittal suture.

In this case the bone was so broken at the bottom
of the depression, that after clearing away the soft tissues between the segments of bone, it was an easy matter to elevate and remove all the fragments. On the outer side, where the skull curved naturally the bone was simply raised and the under surface smoothed, but it was found that there was a very free flow of arterial blood. The point of bleeding was recognised and with the finger under the bone, it was found possible to feel the groove of the branch of the middle meningeal artery. A pair of fine pointed dressing forceps was passed along the finger and crushed against the vessel and pulled towards the edge of the wound along the groove of the artery, this lessened the flow. This was repeated and the flow became so slight that a plug of gauze was then pushed in.

After washing out the wound with sterile boric lotion it was stitched up, leaving the plug projecting. The plug was removed on the second day after the operation and with the exception of the evening of the second day, when the temperature rose to 100.6 there has never been any trouble or anxiety. The wound healed well: stitches were removed on the 8th day and on the 15th day the patient got up and has continued well. He was discharged on the 22nd January.
CASE 12.

JIM MADAL was admitted on the 27th December with a compound depressed fracture of the skull. The injury was over the left frontal bone, just behind the frontal eminence and internally to it. He had been injured in the tribal fight by a stone early on the morning of the 26th, and had returned to his cabin and had lain down on his bunk without any dressing or covering of the wound. When found on the evening of the 27th, the wound was filthily dirty and covered with flies, and he was in a very weak state. It was thought best to clean the wound and surrounding tissues and apply antiseptic dressings for the night and to operate it the next morning.

On the morning of the 28th, the parts were well scrubbed and the dirty edges of the wound well scraped and washed, as well as the whole wound.
# Temperature Chart

**Name:** John Smith

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**Remarks:**

Published by T. Brettell & Co. 51, Rupert Street, London W.
It was found that there was an irregular laceration of the scalp, starshaped leading to an elongated depression of the skull with the bone much broken up into small pieces. The depression was rounded in shape and was somewhat larger than a shilling. The periosteum was pushed back and the outside wound enlarged sufficiently to allow of the removal /
removal of the depressed bone. This was easily done with the elevator and forceps. The dura mater was very flat, gray and dull looking but was intact. There was much oozing. A gauze plug was introduced to control the oozing from the doplee, which was considerable and the wound well cleaned again with mercurial 1:2000. It was washed out after with sterilized boric lotion and the wound stitched up and dressed.

The patient before the operation was able to answer enquiries made, but very sluggishly. On the afternoon of the operation, when he had come round from the anaesthetic, it was found he could only say \( E \), the equivalent of yes. He seemed to understand but was quite aphasic. His temperature was normal all day.

However, next morning his temperature had risen to 102.2 and he seemed decidedly ill. It was found that his left lung was consolidated and that he was bringing up prune-juice sputum. He was treated for Pneumonia, by posture and medicine, but his temperature rose in the evening to 103.6.

The wound was dressed and the plug removed on the morning of the 29th, and everything looked clean and well. The patient's condition seemed worse than was accountable from either the lung condition or the depression of the skull. The pulse was rapid and /
and wiry, the breathing was not laboured but seemed very shallow. The temperature continued to be about 102 for the next three days. His bowels were well opened; the urine was highly coloured and had traces of albumen. He took his nourishment well.

The lung condition did not improve and the amount of expectoration lessened instead of increasing in amount, after the postural treatment. He was then on the 31st December placed back again to the normal position.

He died on the 2nd January 1910, on the morning of the sixth day after the operation.

The post mortem revealed the rounded hole in the skull and underneath a small thin blood clot over a loose flabby greyish dull dura mater. On cutting that membrane, some bloody pus very fluid escaped, and over Broca's Convolution, the brain was found to be covered with thick purulent lymph and the whole surface acutely inflamed and with purulent discharge.

The left lung was found to be very black and solid and on opening into it, it was full of congealed black blood. This condition was well marked in the front part of the middle lobe, but the rest of the lung was in the condition of oedema. There was dark blood in the vessels but there were gassy bubbles of tinged bloody fluid oozing out.
Just under the skin, between the 4th and 8th ribs in the nipple line on the left side there was extravasation of blood, but there was no mark on the skin. Death here resulted from acute meningitis, probably hastened by the bruised lung, which rapidly became oedematous.

The postural treatment of pneumonia is, raising the foot of the bed 9 inches, and keeping the patient lying well forward on the face as far as possible, on the healthy side. Should both sides be affected, he is rolled over from one side to the other every two or three hours. This treatment has been found of great value in cases where there is a large amount of blood stained frothy expectoration and especially in those severe cases where the fluid is prune-juice in colour.

CASE 13.

Mention of case of head injury, death from bleeding into abdominal cavity.

In the tribal fight at Wesselton Compound, a native among many others, had several bad cuts on the head; I examined his cuts and one was down to the bone in the region of the lambdoidal suture on the right side. On examination a very narrow irregular crack was felt but the bones were naturally rounded.
rounded and there was no depression around the

There was no flattening and the wound was
stitched up. This native along with many others,
who had scalp wounds and other cuts and lacerations,
was sent out of the Wesselton Compound to another
Compound to quieten the disturbance. He had not
complained, when seen by me, of any further injury.
Next morning, Monday, he walked three miles to the
other Compound; on the Tuesday morning he was re-
ported ill and removed to hospital and died that
afternoon.

The post mortem revealed hemorrhage into the
peritoneal cavity from a much lacerated liver. The
cause was a split rib, which, only on certain move­
ments, pierced the liver. On opening the skull it
was found that under the cracked outer surface about
the lambdoidal suture, the inner plate of the skull
was slightly cracked and inverted towards the brain.
The dura mater was uninjured and there was no sign
of any brain injury at all; there had been no in­
flammatory condition of the dura mater due to scratch­
ing of the edges of the inner plate.

CASE 14.

MARTHA. In Kimberley General Hospital a colour­
ed woman of Griguia descent was brought in by the
police /
police with a long cut on the left side of the back of the head, just internal to the parietal eminence. The cut was 2½ inches long and down to the bone and into it.

On examining the bone injury with a toothpick, it was found to go in fully 7 millimetres. Trephining was immediately decided on; the patient was prepared and a small trephine crown five millimetres in diameter was removed. It was a trying case because with a good trephine one did not seem to get through the skull. After a long time the crown was extracted intact. The edge of the circle of the trephine was made to pass through the original cut in the skull. When the crown was examined, it was found that the injury had not penetrated through the inner plate at all, but had just reached through the diploe.

The thickness of the skull was just over 10 millimetres and the injury reached 8 millimetres. The injury had been inflicted with an American axe.

The patient made an uneventful recovery.
In all these cases of compound depressed fractures of the skull, the operation of trephining was only performed in two instances, that of Sepula, case 2, and John, case 6.

In case 2, trephining was adopted because at one edge of the fractured and depressed bone, the bone was well covered still with what appeared healthy periosteum and was merely bent in and not fractured at its middle portion. The fracture began abruptly towards the anterior parts of the depression. Here it was felt to be safe to trephine and elevate from outside of the injured portion because previous experience had taught the difficulty of gauging when the trephine was through the whole thickness of the bone, when there was a portion of a fractured segment included in the circle of the trephine crown. In several cases operated on many years ago, after the trephine crown had been removed, it was found that the dura mater had been scratched and cut through even, where the fractured bone had nipped up a piece of the dura mater. It was impossible to tell by the toothpick in these cases when one had come to a piece of dura mater thus pinched up between the fractured piece of depressed bone and the sound bone. In this case the trephine crown overlapped where the bone was not fractured but merely bent.
In case a trephining was used for diagnostic purposes, to ascertain if the depression had affected the diploe or the inner plate at all. This case will be referred to later in considering the question of trephining in medicolegal cases of compound fracture of the skull. In all other cases of this series, which were operated on for depression of portions of the skull, the procedure was simply that of finding out some spot where the elevator could be introduced, either for lifting up one edge of a depressed fragment of bone or for lifting up the whole piece, as was found feasible and safe. If it was not possible to lift up a whole piece an edge was tilted up and seized by a pair of forceps and gently withdrawn. Should no point of vantage be found because the depressed fragment or fragments were shelved under the healthy bone, then portions of the superincumbent bone were cut off with curved bone forceps till leverage could be obtained. One advantage of this direct method of attacking the injury is, that, when there is injury to a sinus the injured sinus is in direct view and can be at once treated, and as the portions of broken bone are being carefully prised up the condition of the subjacent dura mater can be seen and examined.

If any portion of bone has pierced the dura mater care can be taken to prevent enlargement of the /

52.
the wound and the tearing of any portion that may be nipped up between the edges of the fracture as might easily occur in elevating from a trephine opening outside the wound. Then also this method is more rapid and one is able to tell absolutely what the condition of the bone is, that is being elevated, and whether the edges of the inner plate all around are perfectly smooth.

In most instances all portions of depressed bone were removed altogether. In those cases where this was completely done healing was more rapid. In several instances as in those of April (case 4), Jack Modifan (case 5), Jack Basuto (case 7) and Tschona (case 9) some bone at the edge of the depression was left in position after elevation, as it appeared to be healthy; in all these cases these fragments necrosed and came away and greatly impeded rapid recovery.

The cases of Cheddy (case 1), April (case 4) and Tshona (case 9) are of interest from the method adopted to retain the brain inside the skull cavity and to prevent Hernia Cerebri. The idea was to introduce under the bones and over the protruding brain some absorbable substance that would retain the brain in situ and at the same time give the opportunity of forming a permanent covering which would cover the edges of the bone and form a pad sufficiently firm /
firm and elastic to retain the brain and protect it from the outside.

The results were amply satisfactory.

In Chaddy's case the site of the healed wound was not at all depressed and yielding like in the ordinary trephine wound star; but was firm, and felt as if there was a thick pad of tissue between the skin and the brain, the same occurred in Tshona's case.

The post mortem results in April's case verified the fact of the firmness of the tissue filling up the hole in the skull, and the complete covering of the edges of the bones.

The catgut used was the coarsest manufactured and sent out in sealed sterile packets. It is firm and forms a good mesh and takes a long time to completely absorb, when not moistened first in hot water.

Cases 8, 13, and 14, form an interesting series. No. 8 had a depression of about 2½ millimetres at the deepest part and yet the diploe was not cracked at all, but appeared perfectly normal when the trephine crown had been lefted off. He has made a perfect recovery.

No. 13 had a linear crack in the skull close to the lambdoidal suture on the right side. There was no suggestion at all that the crack had gone through the whole thickness of the skull. There was no flatness of the bones and both sides of the crack were of the same level, yet the post mortem showed plainly /
plainly that the inner plate was not only cracked but its edges were turned in towards the dura mater.

No. 14 had a deep cut right into the skull to the depth of eight millimetres and yet was not through the whole thickness of the skull, it being ten millimetres in thickness.

In the two cases Nos. 8 and 14, where there was every indication of the necessity of trephining, it was found to be unnecessary, and in the case No. 13, where indications led to the avoidance of the operation, it proved to have been needful.

It seems to be wise in all cases of fracture of the vault of the skull to make an exploratory trephine opening in the skull, where there is any doubt of injury to the inner plate, and to investigate the full extent of the injury.

Case 13 died of haemorrhage into the peritoneal cavity, but had the head injuries been the only ones, it is more than probable that trephining would have been necessary subsequently, judging from the condition of the fractured inner plate at the side of the fracture of the skull.

It is interesting to contrast the onset of typical purulent meningitis in the case of Jim Madal, No. 12, and that of the onset of the basal meningitis, which occurred in April's case, No. 4. In the first case there was a sudden and acute rise, and the maintenance
maintenance of a consistently high temperature, while in the second, the temperature rose gradually to its height like the commencement of a constitutional fever, such as Typhoid.

In the second case the pathological conditions were those of a case of Cerebro Spinal Meningitis.

In the first case there was purulent matter at the site of injury and not down the cord and very slight evidence of any inflammation at the base of the brain.

Visiting Surgeon to Kimberley Hospital,
Medical Officer to Wesselton Compound Hospital.
Medical Officer to Post Office and Police Forces.