

TRANSACTIONS
OF THE
PHILADELPHIA ACADEMY OF SURGERY

Stated Meeting Held May 7, 1923

The President, DR. JOHN H. JOPSON, in the Chair

TORSION OF THE TESTICLE

DR. ALEXANDER RANDALL reported the history of a youth, eighteen years of age, who first when fifteen, had an attack of rather severe pain in and slight swelling of the right testicle. The pain responded in about one hour to hot applications, and the swelling disappeared. Again during the same year he had a similar attack which required a hypodermic injection. This attack was over in about one-half hour. The testicle, however, he thinks, remained slightly larger after the attack. There was no further trouble until about three months ago, when he had an attack of dull pain in the testicle, which persisted for about a half hour. It was then normal until three weeks ago when, one week following trauma, the right testicle became painful and swollen, and somewhat reddened. The pain was dragging in character and persisted for about one week. It was treated with guaiacol and other ointments with no results. The testicle became about three times normal size, and this enlargement has persisted.

The right epididymis was enlarged to three times normal size, was firm, slightly irregular, not especially tender, except with deep pressure. Skin of scrotum seems adherent to tumor in the lower outer margin and there is a slight indication of redness at that point.

March 28, 1921, the affected testicle was removed. The removal of the testicle from the scrotum was hindered by a dense band of adhesion that grasped the cord as it entered the scrotum. It was necessary to cut this and to enlarge the incision downward in order to complete the enucleation.

On incising specimen in its long axis, the epididymis was found to be the seat of a generalized hemorrhage, its normal topography being lost in an extensive blood clot. No areas of suppuration were found. The testis itself is of a dark brown color, considerably necrosed and markedly friable. It was then realized that torsion of the testicle with gangrene was the lesion present, and it was possible to demonstrate complete twist of the cord, three-fourths rotated, at the point where the above-mentioned band was cut and immediately below the point where the cord was sectioned.

VESICAL CALCULUS

DOCTOR RANDALL presented a youth nineteen years of age, who supposedly contracted gonorrhœa in the summer of 1922, coincident with which he had pain and difficulty in voiding urine which has persisted and

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grown worse to the present time. The passing of a metal catheter elicited a rough grating sensation on entering the bladder. X-ray showed a peculiar shaped elongated shadow of a mass within the bladder. The bladder was opened suprapubically by Doctor Siter, February 19, 1923, and a calculus of uric acid nucleus and phosphate outer layers was removed. The calculus that was removed measures $6\frac{1}{2}$ cm. in length by $1\frac{1}{2}$ cm. at its greatest diameter, and grossly resembles a man's little finger in shape and size. It is definitely formed of phosphatic deposits and is of a peculiar comma-shaped curve. On the surface of the large bulbous end may be seen a surface area which is polished and suggests either foreign body or ebonization. Hemi-section of specimen shows a small round calculus lying in the bulbous end of harder character and darker color and probably of uric acid composition. It measures $2\frac{1}{2}$ cm. by 1 cm. The remainder of the calculus is of soft phosphatic salts in composition. There is no evidence of any foreign body.

Evidently there has been a renal calculus passed without the usual symptoms of pain, and probably causing the discharge which had been considered gonorrhoeal. It was felt that such a calculus formation could occur only by the lodging of this calculus in a diverticulum or one of the urinary passage ways with the rapid deposit of phosphatic salts about it and behind it. Certain it would be, that if it were lying free in the bladder cavity, it would form a concentric stone of oblong shape as is frequently seen.

Before the patient was discharged a cystogram was made on the 21st of March and reported as follows: "The bladder is apparently well filled with the opaque solution. There is a circumscribed bulging area on the left side and a smaller one on the right, possibly diverticula. The entire anterior urethra, the bulb and particularly the posterior urethra are markedly dilated." This plate showed the diameter of the posterior urethra to be at least 3 cm. in extent, and it is my opinion that this calculus had lodged at this location at the time of the onset of his first symptoms; it being likewise interesting to realize that its further growth had probably taken place in the course of the following six months.

BULLET IN THE BLADDER

DR. LEON HERMAN reported the following case: Colored man admitted to the Pennsylvania Hospital in January, 1923. Patient had been shot some hours before, a bullet of 32-calibre entering the right hip. There was slight hæmaturia, and on examination it was noted that there was some swelling above the pubes. The X-ray examination revealed the bullet in a position apparently superficial. Doctor Mitchell explored suprapubically and found a hæmatoma to the left side of the bladder extending to the pelvic floor. Digital exploration did not locate the foreign body. The wound was drained and the patient made a prompt recovery with slight leakage of urine for the first thirty-six hours after operation. The patient was not cystoscoped prior to operation because of an acute urethritis.

Following the above procedure, a second X-ray indicated that the bullet had changed its position somewhat. Under the fluoroscope, it

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was determined that the bullet could be moved by a finger placed in the rectum. Cystoscopy showed it lying on the floor of the bladder. The wound of entrance could be seen as a small, round reddened area on the right lateral wall of the bladder about one inch behind the vesical sphincter. The bullet was extracted through a suprapubic incision. Doctor Herman quoted Doctor Mullen of Idaho, as having had a patient in France, a soldier, who passed per urethram an ordinary rifle bullet, and Dr. Robert LeConte removed a stone from the bladder, the nucleus of which was found to be a grain of bird shot. The latter case was reported before this society some years ago.

VESICAL CALCULUS

DR. HERMAN presented a calculus which was removed from the bladder of a young man who was admitted to the surgical service of Dr. Robert LeConte in the Pennsylvania Hospital, complaining of great dysuria and frequency of urination. On examination it was found that he had extensive genital tuberculosis. The cystoscopic examination revealed what we thought to be a small contracted bladder. It was found impossible to get a view beyond the limits of the trigonum, and the presence of ulceration and intense inflammation of the bladder, together with the presence of advanced genital tuberculosis led us to conclude that we were dealing with generalized genito-urinary tuberculosis. The X-ray, however, showed the shadow of a stone, and the various examinations for the tubercle bacillus in the urine were negative. A suprapubic incision was made and this stone was extracted from what seemed to be the posterior pouch of a bladder divided by a septum. The latter may have been a greatly enlarged interureteric bar, but at all events it served to divide the organ into two compartments. The wound healed promptly and the patient left the hospital practically without bladder symptoms.

CALCULUS IN DILATED URACHUS

DOCTOR HERMAN presented a calculus to which was attached a history as follows: An Italian, twenty-four years of age, came to the out-patient clinic of the Pennsylvania Hospital complaining of dysuria and suprapubic pain. He stated that the diagnosis of bladder stone had been made ten years before. Cystoscopy revealed an intensely inflamed bladder and a small white object projecting from the orifice of a diverticulum at the summit of the bladder. The X-ray examination showed the presence of a very large calculus at the summit of the bladder. The stone was removed suprapubically when it was found that the urachus was markedly dilated and extended to the level of the umbilicus.

DR. CHARLES F. MITCHELL said that the first case reported by Doctor Herman was brought to the Pennsylvania Hospital with a bullet wound in the right buttock. He showed no abdominal symptoms and no blood was passed either from the rectum or bladder. Several days later a swelling appeared in the lower abdomen over bladder region and slightly to left immediately above Poupart's ligament. X-ray picture showed bullet lying about one-half inch within the abdominal wall. An incision

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was made over swelling and quite a large quantity of blood evacuated. There was no urine in the fluid and no sign or any extravasation in the tissues other than blood. The bladder wall seemed thickened and hemorrhagic. The bullet was not found and the operation terminated by simple drainage of the hæmatoma. He believed the bullet was lodged in the bladder wall at this time, and later ulcerated itself into the bladder where it was found at the second operation.

SPLENOMEGALY

DR. E. G. ALEXANDER reported a case of splenomegaly which he believed to be unusual both as to its size and for its long duration, without producing any marked constitutional symptoms.

He first saw the case on April 2 of this year in consultation with Dr. Peter P. Klopp, who had had the patient under his care since 1906.

The patient, a married woman, first consulted him in 1906 for an attack of diarrhœa, abdominal pain and vomiting. On examination he found the spleen enlarged to three or four times its natural size. The patient at that time gave a history of attacks of general itching of the skin, of dizziness, of rheumatic pains with swelling and redness of the joints, and occasionally of pains over the shafts of the tibiæ. A blood examination at that time showed a count of about 7,000,000 red blood-cells. By 1913, the spleen had doubled in size, and about this time the patient had several severe attacks of abdominal pain, nausea and vomiting and dyspnœa. In November, 1915, the patient passed blood and mucus by bowel for about five days. In 1916, the patient had several attacks of dizziness, general itching of the skin and leucorrhœa.

For the past few years has had attacks of palpitation and distress in the cardiac region. The spleen has continued to increase in size, extending at present to the pelvis. Doctor Klopp had never been able to elicit a history of venereal disease from the patient or from her husband, but in 1915, her husband had an attack of iritis which was most persistent. A thorough course of anti-syphilitic treatment had failed to produce any appreciable effect on the size of the spleen. Doctor Klopp had frequently seen the patient when she was quite cyanosed.

On April 3, 1923, the patient was admitted to the Episcopal Hospital for study; the hospital history is as follows:

M. McL., aged fifty years, female, married, white. Maternal grandfather and grandmother died of old age. Father died of a sunstroke and mother died at the age of thirty-two years during childbirth. There is no history of tuberculosis, malignancy or splenic disease in the family.

The only sickness she ever remembers having was typhoid fever at the age of sixteen years. Menses established at the age of sixteen, always irregular and scanty; menopause at the age of forty-two years. No history of any injury. Married at the age of twenty-one years, two children, both instrumental deliveries; one child died in infancy and the other died at the age of nine years of diphtheria.

When seventeen years of age she first began having pain in the left side (splenic region). Has had pain in this region off and on ever since.

Seventeen years ago noticed a "lump" in the upper left quadrant of the abdomen about the size of a baseball, and since then the "lump" has been gradually getting larger until the present time. No great pain at the time of admission, only a pulling down feeling due to weight of tumor; some tenderness at times due to pressure of the clothes. Has had attacks of abdominal pain, especially confined to this region. For the past two years she has been getting cramps in the calves of both legs, quite severe at times.

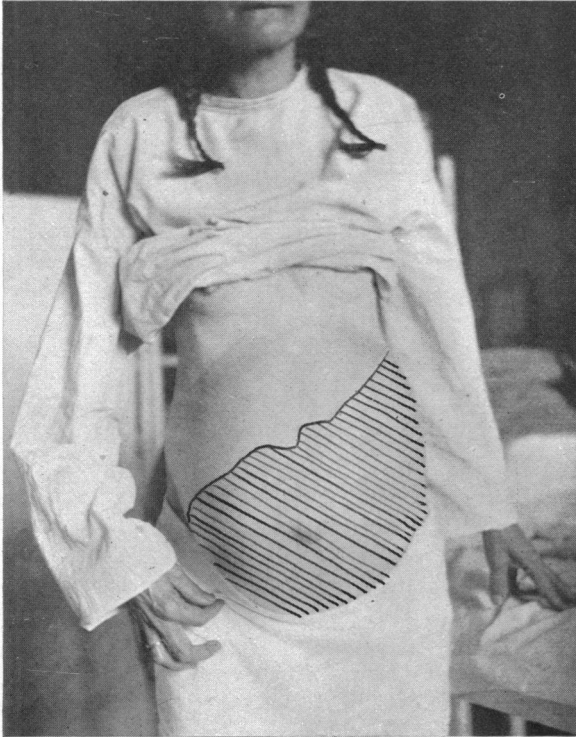


FIG. 1.—Mrs. M. McL., aged fifty years. Case of splenomegaly. Known duration, seventeen years. Dr. E. G. Alexander's case.

Has had attacks of swelling and redness of her joints and some pain over the front of her legs. Six years ago had much itching of the skin, especially following bathing; this lasted for about two years. Does not think she has lost any weight. She has been unable to control her bowels for the last six years; is able to tell when she is going to have a movement, but cannot control them. Has indigestion and belches gas. Is quite nervous. The appetite is about normal. Has had night sweats. Never jaundiced. Has had attacks of shortness of breath and dizziness. About eight years ago had an attack of abdominal pain, which was accompanied by the passage of blood from the bowels; this condition lasted about a week.

Her abdomen was greatly distended, somewhat spherical in shape and had the appearance of a nine months' pregnancy; the swelling is slightly more prominent in the left half of the abdomen; no pulsations are visible. On palpation a distinct solid tumor can be felt. The mass fills the entire left abdomen and the right lower quadrant. The surface is smooth and the right margin can be easily outlined and a distinct notch is palpable about midway between the umbilicus and the xyphoid cartilage. The mass has the outline of a greatly enlarged spleen. (Fig. 1.) It is somewhat movable, and is slightly tender in certain areas on palpation. No pulsation palpable. Liver is not palpable and does not

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seem to be enlarged. The patient complains of some pain over the abdomen on percussion. There is tympany in the right flank, but dullness and flatness over the remainder of the abdomen. There appears to be no ascites present.

The skin is dry, somewhat inelastic and appears to be scaly; there is no jaundice.

No œdema of the extremities; numerous brownish discolored areas over both legs. Pulse of moderate volume and tension.

The laboratory examinations were as follows: The urine was acid, light amber, specific gravity 1020, granular sediment, slight cloud of albumin, no sugar, epithelial cells, few leucocytes, 6 to 8 erythrocytes to H.P.F., urates, a few hyaline and granular casts, and bacteria present. The tests for bile and urobilin were slightly positive.

The phenolsulphonaphthalein test for the first hour was 35 per cent., and the second hour 20 per cent. Urine urea 25.20 mm.

The blood showed erythrocytes, 3,950,000; leucocytes, 7,680; hæmoglobin, 68 per cent.; polymorphonuclears, 84 per cent.; mononuclears, 4 per cent.; trans., 2 per cent.; lymphocytes, 9 per cent.; eosinophiles, 1 per cent.; one nucleated red blood-cell per 100. Considerable variation in size and shape of reds. Coagulation time $8\frac{1}{2}$ minutes. Blood urea 54.00 mm. Blood sugar 99.70 mm. per 100 c.c. Blood Wassermann positive plus 2. The erythrocytes showed an increased fragility and a diminished resistance. There was no evidence of malaria.

An examination of the feces showed a small amount of mucus, no ova or parasites present.

The X-ray examination by Doctor Bromer was as follows: "Chest showed moderate hilum thickening and peribronchial infiltration in both lungs, slightly greater than normal; this could easily be the result of some old infection; there is considerable enlargement of the heart shadow to the left." "The stomach is shoved far over to the right in the liver region; it has a flattened elongated appearance." "The duodenal cap lies almost on the right border of the abdominal cavity." "On the greater curvature are indentations which are felt to be in the same position as the splenic notch, of the large mass, evidently the spleen." "The 24-hour examination shows rather rapid movement of the meal; there is a slight amount of barium still to be seen in the hepatic flexure, which seems to be in about the normal position; the sigmoid and rectum also were filled and were not displaced."

During the patient's stay in the hospital she ran practically a normal temperature, pulse and respiration rate; she was bothered, however, with looseness of the bowels.

The patient refused to consider an operation and was discharged from the hospital April 21, 1923.

Of the known diseases which are accompanied by enlargement of the spleen, it seems that malaria, Hodgkin's disease, pernicious anæmia, leukæmia, hæmolytic jaundice, Von Jaksch's disease, cysts, malignancy and trauma can all be excluded. This leaves splenic anæmia or Banti's disease, Vaquez's disease, syphilis and Gaucher's disease as possibilities.

If the condition is one of Banti's disease, it must be in the first stage, but from the history given of so long a duration and the excessive size of the spleen, the evidence seems to be against that condition.

Is this a case of polycythemia vera? The 7,000,000 red count obtained by Doctor Klopp, seventeen years ago, with a history of cyanosis, would favor that disease; we now, however, have a secondary anæmia, and this disease must be ruled out, although I am unable to say if the polycythemia in Vaquez's disease finally gives way and is supplanted by a secondary anæmia. According to Moynihan, "Polycythemia begins in adult life in males and runs a progressive and fatal course, lasting a few years."

Syphilis of the spleen, of course, is a possibility; the only evidence we have of this disease is that of a plus 2 Wassermann.

Gaucher's disease does not wholly fit the case, although it comes nearer doing so than any of the other diseases mentioned.

The fact that he was dealing with a colossal spleen (and in Gaucher's disease we meet with the largest type of splenomegaly), that the patient is a woman, that it began in all probability in childhood, that there is no jaundice or ascites, and that the general health has been very little disturbed, even though the liver is not enlarged, he was inclined to believe it to be one of Gaucher's disease.

SEPTIC EMBOLI OF MESENTERIC ARTERIOLES

DR. E. L. ELIASON detailed the history of a man, aged twenty-seven years, who was admitted to the University of Pennsylvania Hospital, with diagnosis of acute appendicitis and peritonitis; operation performed same date, found perforated gangrenous appendix, with generalized abdominal congestion and cloudy fluid. Pelvic and local drainage established. Culture showed streptococci.

The post-operative course was stormy. For nine days the patient had recurring attacks of vomiting, passed but little or no feces, was much distended and had very slight peristaltic action, and enemata were but slightly effectual. Ten days after operation a small abscess was evacuated through the original gridiron wound by digital exploration. No improvement followed. Peristalsis still markedly diminished. Patient was nourished by glucose and soda intravenously. Fifteen days from the original operation, audible and later visible peristalsis appeared and vomiting recurred. Enterostomy through left rectus incision was performed.

The patient improved greatly at once, and the enterostomy was very effective.

On the twenty-third day a left-sided parotitis developed (staphylococcus hæmolyticus) followed on the next day by a hemorrhage from the enterostomy, the blood appearing from the lumen of the proximal loop.

These hemorrhages continued for six days at intervals and resulted in death, despite blood transfusions.

Autopsy Protocol, Internal Inspection, Intestines.—The edges of the enterostomy wound are clean. In the neighborhood of the gall-bladder

REMOVAL OF FOREIGN BODY FROM THE LUNG

there are a number of firm connective tissue bands which cause kinking of a loop of the small intestines. In the appendiceal region there is some matting together of small intestines to large intestine by recent exudate. a few drops of pus are present. The mesentery is normally fatty, and shows no gross changes. Intestines were removed and opened as usual. Enterostomy wound is present in the upper portion of the ileum. Beginning a few cm. above the wound and extending to the upper portion of the jejunum there are a number of ragged ulcerations, varying in size from several mm. to 2 cm. in diameter, situated usually at the line of mesenteric attachment, but occasionally found elsewhere and extending usually into the muscularis. About three dozen of such scattered ulcerations are found. These have not perforated, but their base is generally bloody. Dissection made to find any obstructed blood-vessels, but no evidence found that such exist. The lumen of the small intestines contains a considerable quantity of clotted blood, possibly 1500 c.c. of blood being present in the ileum. Below the enterostomy there is a superficial ulcer 15 mm. in diameter, round in shape and with clean-cut edges. This is said to be at the site of a rubber tube which had been pushed into the intestine through the surgical opening. No ulcerations such as have been described above are present. Below the enterostomy wound a large quantity of clotted blood is found, both in the small and the large intestines. The stump of the appendix and the immediate neighborhood are covered with a few drops of pus and some partially organized fibrinous exudate. The intestinal serosa otherwise is smooth, moist and glistening and nowhere coated with exudate.

Sections were prepared and examined histologically from the following parts: (1) small intestines, (2) liver, (3) spleen, (4) kidney.

Small Intestines.—Section is probably from the upper part of the ileum. At one portion there is a deep ulceration which extends well into the muscularis. The ulcer commences abruptly, its bed consists of a mass of necrotic tissue in which there are numerous plasma cells, polymorphonuclear leucocytes and occasional small round cells. Similar cellular material is present between the loosely arranged muscle fibres and between the gland tubules on either side of the ulceration. The serosa is stripped off, but there is here a moderate infiltration of similar character as the one described; the predominating cell is the plasma cell. There are no tubercles, nor areas of necrosis, such as are produced by the tubercle bacilli. The capillaries in the bed of the ulcer are moderately engorged, only small arterioles and venules are included in the section, and these possess normal walls and normal contents.

In the opinion of the pathologist the multiple ulcerations are due to embolic occlusion of small branches of the mesenteric arteries possibly by septic emboli following the infection of the appendiceal site.

REMOVAL OF FOREIGN BODY FROM THE LUNG

DR. D. L. DESPARD presented a man who had been referred to Dr. Chevalier Jackson by Doctor Gibbons at the Jefferson Hospital for the relief of a wound of the thorax caused by a premature blast which had driven a piece of coal through a wound of the left chest wall in June,

1921. The wound healed except for several sinuses which persisted, and three unsuccessful operations were done in the hope of removing the cause of their persistence.

An X-ray examination revealed a foreign body within the thorax lying near the anterior axillary line. On account of the great thickness of his chest a satisfactory picture was not obtainable.

At the operation April 4, 1923, the scar tissue of the previous operation was removed together with fragments of reformed ribs. There was a great deal of hemorrhage during this part of the operation, but very little after the thorax was entered, the lung being fibrous and bleeding very little.

By following the sinuses he was finally able to detect the foreign body with a probe. Following the probe with incision enabled me to enter the cavity in which the lump of coal was imbedded, and to deliver it. The coal proved to be about an inch long by about three-quarters of an inch thick.

As the patient had expectorated shreds of cloth at times, a careful digital exploration was made to detect if possible anything else within the chest of this nature, without locating anything. The finger when turned forward came in direct contact with the pericardium at about an inch above and behind the apex.

The patient expectorated a small amount of bloody mucus, but there was no distinct communication with a bronchus. The lung cavity was packed with iodoform gauze and the patient returned to his bed.

Five days later he removed the gauze and asked Doctor Clerf to explore the cavity with a bronchoscope through the chest wall. Upon doing so a small black spot was detected hardly larger than the head of a pin, which proved to be the end of a piece of cloth about an inch long by one-quarter of an inch in diameter and apparently plugging the lumen of a bronchus, as upon its removal there was very free movement of air in and out with each expiration.

The cavity was again packed with iodoform gauze, which was changed every day or so as the case progressed, and he was inclined to believe the use of this gauze may have been a factor, by stimulating granulation, in the rapidity with which the bronchus closed and the wound healed.

The patient's general condition is satisfactory and the wound has almost healed.

A PLAN OF MANAGEMENT OF CRANIAL INJURIES *

DRS. J. S. RODMAN and B. B. NEUBAUER said that much confusion has arisen concerning the terms concussion, contusion, and compression of the brain. When, as is so often the case, these conditions are complicated by other conditions such as intracranial hemorrhage there is still greater difficulty. It is frequently difficult, therefore, to draw a clear mental picture of the underlying pathology of these conditions and hence to decide which cases fall under these various clinical headings. It follows that without a "clear-cut" under-

* The following is offered at this time as a preliminary report on a plan now in effect at the Presbyterian Hospital, Philadelphia.

A PLAN OF MANAGEMENT OF CRANIAL INJURIES

standing of the pathology and, therefore, of these clinical conditions themselves, it is impossible to lay down adequate regulations for treatment. It was with the idea of attempting to clarify this atmosphere in their own minds that led them to discard the terms of concussion, contusion and compression for practical use. The grouping of brain injuries which they suggest in their place has at least the advantage of simplicity, a much needed factor in any attempt to substitute one classification for another in regard to these injuries. In fact classifications of disease or traumatic conditions in general have no value unless on the basis of such a classification a rational treatment can be built. This essential they believe is met in the grouping they propose.

In dealing with intracranial lesions, acute or chronic, caused by disease or trauma a most important factor to take into consideration is *intracranial pressure or tension*. In most of the chronic lesions, as brain tumors, intracranial tension is given the importance due, but such is not the case in acute brain injuries. It is their belief that acute intracranial tension is just as important as chronic intracranial tension. Much has been written of acute brain injury and we do not propose to quote from this extensive literature. But while acute intracranial tension is often referred to notably by Jackson¹ and Sharp² it seems that to few it is the one condition which means life or death to the patient. It has come to be their belief that this is so irrespective of whether we label these cases concussion, contusion, or compression. Fortunately, intracranial tension can be estimated by clinical as well as by a more exact means, namely the spinal manometer. Furthermore, each of these groups have definite indications for treatment based entirely on the presence or absence of increased intracranial tension. On this basis they now classify all cases of brain injury as follows:

Group No. 1. No increase in intracranial tension.

Group No. 2. Moderate increase in intracranial tension.

Group No. 3. Marked increase in intracranial tension.

In order to determine which of these groups the patient falls into the following observations can now be made, after the stage of surgical shock has been passed:

A. General examination including neurological findings.

B. Observation of the temperature pulse, respiration and blood-pressure every four hours.

C. X-ray of skull.

D. Spinal puncture, being careful to estimate pressure by means of the spinal manometer. As a result of examination the following types of cases will readily fall into one of these groups. Some will, of course, pass in progressive stages from one group to another.

Into Group No. 1 (no increase in intracranial tension) those cases will fall showing abnormal spinal pressure of 8 to 10 mm. of hæmoglobin and a normal or slightly elevated blood-pressure. To these essential findings may be added the less important ones of a normal or slightly elevated temperature, pulse

and respiration, primary unconsciousness either momentary or at most lasting for several minutes, followed by headache and dizziness. Normal eye grounds. The treatment of this group is, of course, non-operative and consists of A. Rest in bed (4 to 5 days). B. Ice-cap to head. C. Sedatives as needed.

These cases of Group No. 1 always recover unless some complication arises.

In Group No. 2 (moderate increase in intracranial tension) those cases will fall showing a spinal pressure from 10 to 18 mm. of hæmoglobin moderate rise in blood-pressure, moderate rise of temperature and pulse rate, and a normal respiratory rate. These cases may show the primary unconsciousness followed by dazing and headache mentioned above. To these mental symptoms may be added mild confusion or delirium after the period of unconsciousness has passed. The eye-grounds will show a congestion of the retinal veins. The indications for treatment in this group are again non-operative and will consist of: A. Rest in bed. B. Ice-cap to head. C. Elevation of head of bed. D. Therapeutic spinal puncture (5 to 10 c.c. of spinal fluid may be removed as often as necessary usually every 24 hours for several days or as much as is needed to reduce the reading of the spinal manometer to 8 to 10 mm. of hæmoglobin.

E. Intravenous injection of hypertonic saline (60 to 80 c.c. of a 15 per cent. solution) or magnesium sulphate by mouth. Because of the ease with which magnesium sulphate may be given this is perhaps more practical than the intravenous injections of hypertonic saline although the latter solution is quicker in its effect, and in the majority of the cases of this group it is only necessary to give one injection.

The majority of the cases of this group will get well unless some complication arises.

They believe that approximately 70 per cent. of all cases with brain injury will fall into one or the other of these two groups.

Into Group No. 3 (marked increase in intracranial tension) will fall into those cases showing a spinal pressure above 18 mm. of hæmoglobin an increased blood-pressure which will fall as this stage progresses. (Pulse pressure is much more valuable than systolic or diastolic readings; when the pulse pressure equals the pulse rate a good single indication for operative relief of tension exists). These cases will show a normal or slightly elevated temperature until the final stage (medullary œdema) when hyperpyrexia is present. The pulse rate will gradually become slower as well as full and bounding until it becomes subnormal as pressure advances until medullary œdema is present and then in this closing stage will again become rapid and weak. There will be stupor increasing to coma. The eye-grounds will show congestion of the retinal veins and uncommonly paling of the optic disk. (We believe that true choked disk does not occur in an acutely increased intracranial tension), but optic atrophy may develop later.

This group they believe calls for operative relief of tension in addition to

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the measures outlined in the preceding two groups. It is their practice to perform a subtemporal decompression on the right side usually with drainage and at times a bilateral subtemporal decompression.

They submit this classification of brain injuries with its indications for treatment for what it may be worth and as a preliminary report of their present views on this subject. These views are based on experience gained in the handling of such injuries largely at the Presbyterian Hospital in this city, as well as by one of them during the war. They have purposely omitted from this discussion such frequent complications of brain injuries as scalp wounds, fractures of the skull, intracranial hemorrhage, penetration of foreign bodies and localizing pressure on the brain from any cause, believing that these complications are operative indications in themselves, and that the operative management of these complications has now been well standardized in general. In closing they repeated their belief that it is intracranial tension caused by œdema which plays the important rôle in acute brain injury as it does so often in chronic brain lesions.

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- ² Sharpe, William: Canada M. A. J. Montreal, vol. xii, p. 761, Nov., 1922.