shortening of the affected side. No true arthritis was caused in this case, and the patient's general health has not suffered.

Dr. G. G. Ross related a case of which he had personal knowledge, that of an old lady who sustained an intracapsular fracture of the hip when she was 102 years of age. She recovered, and was able to walk afterwards with considerable ease, living until she was 106.

STATED MEETING, NOVEMBER 3, 1902.

The President, Richard H. Harte, M.D., in the Chair

PERFORATION OF AN INTESTINAL ULCER DUE TO TRAUMATISM.

Dr. George G. Ross reported the case of a man, aged fifty-four years, who, while loading a box on to a wagon, slipped and was struck by the box a slight blow on the lower abdomen. He at once experienced considerable pain, nausea, and vomiting. The pain increased steadily until the time of operation. When admitted to the German Hospital about two hours after the accident, he was profoundly shocked and was suffering great pain. The abdominal recti were rigid and the abdomen was retracted. Rectal examination negative; the flanks were tympanitic, and he gave no positive evidence of hæmorrhage. The tenderness was most marked over the lower half of the abdomen. Peristalsis was absent and he could not pass flatus. Purgative enemata were retained. His temperature was subnormal and pulse weak and running. Four hours after his admission his temperature had risen to normal, pulse 104, pain still severe, and the abdomen had begun to distend.

Median incision six inches long. There was some œdema of the abdominal walls. On opening the peritoneal cavity a sero-purulent, non-odorless fluid escaped, but no gas. The surface of presenting knuckles of bowel was injected and covered in places with flakes of lymph. Throughout the small intestines, small, yellowish-white, pearly bodies were noticed beneath the peritoneal coat.

The entire peritoneal cavity was thoroughly and completely irrigated with warm salt solution, the hand being introduced to manipulate the fluid and force it into all the pockets of the cavity, beginning below in the pelvis, then each iliac fossa, then beneath the stomach and spleen, and finally under the liver and between the coils of bowel. The small intestine was now withdrawn, and beginning at the ileocecal valve was wiped with gauze. About

twelve inches from the cæcum a perforation, large enough to admit a lead-pencil, was discovered. It was situated at the side of the bowel one-third of an inch from the mesenteric attachment. The edges of the perforation were everted, so that the mucous coat of the bowel was protruding through the opening. There was no blood in the peritoneal cavity and the edges looked ulcerated and not torn or lacerated. The opening was nearly round. Peyer's patches appeared normal, and, excepting the perforation, the pearly bodies, and some injection, the bowel seemed normal.

The hole in the bowel was closed by Lembert sutures, the pelvis drained by a glass tube, and several wicks of gauze placed so as to drain the iliac fossa. The convalescence was, on the whole, satisfactory. His bowels moved almost daily, and he passed quantities of flatus. The abdomen remained distended and painful for some days after operation.

Dr. Le Conte was of opinion that, from the characteristics which were found at the time of operation, the case must have been one of perforation due to traumatism, and not to ulceration. The fact that the abdominal wall was thickened and œdematous showed that there must have been considerable contusion; and also the fact that the mucous membrane protruded through the opening in the bowel would seem to indicate that the force had spent itself more on the peritoneal and muscular coats of the bowel than upon the mucous lining. Had the perforation been the result of an ulcerating or excavating inflammatory process, there would have been greater destruction of the mucous coat than of the muscular and peritoneal coats of the bowel.

Dr. William J. Taylor referred to a case which he reported some years ago of rupture of the bowel from the kick of a gun. This occurred while a young man was walking across a marsh hunting for snipe. The gun was accidentally discharged and struck him over the right iliac fossa, causing great pain, and making it almost impossible for him to get to his home, which was some distance away. The accident occurred on Saturday afternoon, and he was brought to Philadelphia on the following Monday, being first seen by Dr. Taylor about eight o'clock that evening, when he was found to be suffering from a violent general peritonitis. The abdomen was immediately opened, and when a slight adhesion between two coils of gut were separated with the finger, the contents of the bowel poured out. Upon examination

it was found that a round ulcer had formed, which had so perforated the bowel that it had become adherent to another coil, and the accidental movement of the finger was sufficient to rupture the slight attempt at repair. The patient died in the course of four or five days.

SPURIOUS MENINGOCELE.

Dr. Henry R. Wharton presented an infant, fourteen months of age, who, when six months old, received a fall, which is said to have resulted in a fracture of the right parietal bone. She was taken to a hospital near her home, and while under treatment there is said to have had a number of convulsions. She was admitted to the Children's Hospital in September of this year, six months after the accident, and presented the following conditions. She presented a fluctuating tumor the size of a hen's egg over the upper and posterior portion of the right parietal bone; the tumor could be reduced to some extent, but became more tense when the child cried, and transmitted pulsation could be detected. There was also noticed marked asymmetry of the face. Examination of the eye grounds was negative. The tumor was tapped and found to contain cerebrospinal fluid. Upon deep pressure a distinct opening in the skull, about two inches in length and one inch in width, at the base of the tumor could be felt with thickened edges.

The case appears to be one of spurious meningocele which has developed after a fracture of the parietal bone; the pathology of the condition is explained by a fracture of the skull, with simultaneous rupture of the dura mater and the effusion of blood beneath the pericranium, causing a hæmatoma which gradually becomes encysted and the subsequent replacement of the blood by cerebrospinal fluid.

The prognosis in these cases is unfavorable, as the tumor gradually tends to increase in size. Various forms of treatment have been employed,—pressure, repeated aspiration combined with pressure, extirpation of the sac, and closing the gap in the skull by an osteoplastic flap as practised in one case by König.

A spontaneous cure has resulted in some cases, and in early cases compression has been followed by good results. All operative methods of treatment have been followed by a high mortality.

Dr. Wharton said that this case seemed to him to be an

unfavorable one for operation on account of the large gap in the skull, and the difficulty of forming an osteoplastic flap of sufficient size to fill the gap.

Dr. De Forest Willard thought that in a case with so large an opening, and probably traumatism as the initial lesion, and with the absorption of the bone which is apparently taking place, any injection operation would be exceedingly unsatisfactory, probably fatal, and certainly not curative. He believed that an excision of the tumor would be followed by failure of reproduction, and that the only operation offering any hope of relief would be an osteoplastic plate covering the bone and giving support after operation. This operation he also felt would be attended by the same risks as any operation of that kind, but as the size of the tumor is constantly increasing and the size of the opening in the skull constantly increasing, he thought that it would be justifiable.

MARJOLIN'S ULCER.

Dr. J. Chalmers Da Costa read a paper on the above subject, for which see page 128.

EXTRADURAL HÆMORRHAGE.

Dr. John H. Jopson read a paper entitled "Two Cases of Extradural Hæmorrhage," for which see page 136.

A HOLLOW BONE-DRILL.

Dr. J. Torrance Rugh presented a bone-drill which he thought would obviate the necessity of groping about with a wire to find the hole made by it.

It is made in four parts, viz., a straight handle which has a hole running longitudinally through the centre; the "bit," which

Hollow bone-drill.

also has a hole drilled through it lengthwise and coming out about one-sixteenth of an inch from the lower end on one of the grooved sides; a set-screw, to hold the bit in place; and a trocar to close the lower opening, and so prevent the lumen of the canal from

being choked with bone chips. A short screw-thread holds the trocar fixed in its position.

After the parts are put together, the drill is pushed through the bone, the trocar is withdrawn, and the silver or other wire pushed through the centre of the drill and caught on the other side of the bone. The drill is then withdrawn on the wire, the trocar again inserted in its proper place, and the bone drilled on the other side. The trocar is then withdrawn, and the end of the wire inserted into the opening in the one side of the drill, and as the drill is withdrawn, the wire is pushed through with it and follows it, as it were.

The hole cannot clog or choke with bone-borings because of the trocar, and this most troublesome feature of all such instruments is thus overcome.

A TWIST DRILL BONE-NEEDLE.

Dr. H. Augustus Wilson exhibited a twist drill bone-needle which is an ordinary twist drill of commerce with an eye made in each end. It may be used like an ordinary needle or by means of the eye in the point by being passed through the bone, the suturing material inserted in the eye and withdrawn. To facilitate

Twist drill bone-needle.

the use of this bone-needle, a jeweller's vise was shown which is made with a hollow handle, so that the suturing material may be in place ready for use. This vise is readily sterilized. The twist drill bone-needle has the advantage of making a very small hole in the bone, which is necessary in suturing the smaller bones, for instance, the clavicle. By means of this needle any suture material can be employed.

CARCINOMATOUS CHANGES IN AN AREA OF CHRONIC ULCERATION, OR MARJOLIN'S ULCER.[1]

BY JOHN CHALMERS DA COSTA, M.D.,
Professor of Principles of Surgery and of Clinical Surgery in the Jefferson Medical College.

DURING the past year I have seen two cases of this rare condition. The first case was a woman sixty-eight years of age, who was a patient in the Surgical Ward of the Philadelphia Hospital. For many years she had suffered from what was regarded as a varicose ulcer of the leg. During the last six months the discharge had become very foul; the edges of the ulcer had become thick, everted, hard, and rose-colored; and a section of the margin of the ulcer shows that it was epitheliomatous. The patient declined amputation.

The second patient was a woman fifty years of age, and was seen in the Jefferson College Hospital. Her father died at the age of 105; her mother, at eighty-seven years. While pregnant with the last child, fifteen years ago, she developed varicose veins of both legs; from the left leg, in the region which now is the seat of the ulcer, there was a considerable hæmorrhage, and a sore. The latter healed after her delivery, and remained well until two years ago, when it again broke out. It healed up in a few weeks, remained well for a month or so, and then broke out again; since that time it has remained open. On two occasions she went to hospitals and had it burned with caustic. Eighteen months ago it was the size of a ten-cent piece; now it is seven inches in width and six inches in length. She has considerable pain in the bone of the leg, which is much worse at night. The ulcer at some spots has undermined edges, and is elevated at certain places on the margin; its border is hard and dense, and sections which have been removed for examination show it to be an epithelioma. The patient declined to submit to amputation.

The two cases cited above are instances of chronic ulcers of the cutaneous surface which became carcinomatous. The

characterization of this condition as Marjolin's ulcer I think to be proper, because it was first carefully studied and accurately described by Professor Marjolin, of Paris, over fifty years ago.

It is a very ancient and well-demonstrated belief that cancer may arise, and, in fact, is rather apt to arise, in an area of chronic inflammation; for instance, on the lip of a pipe-smoker, on the tongue of a lather or carpet-layer—who holds nails or tacks in his mouth—on the scrotum of chimney-sweeps and paraffin-workers, in a gall-bladder containing gall-stones, on the skin of the nose where the bridge of an eye-glass or of a pair of spectacles has rested, on the tongue where the sharp edge of a tooth has been in contact, and in numberless other locations. It has been demonstrated that a laceration of the cervix uteri or an ulcer of the tongue is likely to become cancerous, and that an ulcer of the stomach occasionally becomes so.

The question of the relationship between gastric ulcer and gastric cancer is very much disputed. Strümpell and others are positive that there is a causal relation between them; and Schmidt has pointed out that a cell-degeneration, identical or of similar character, is to be found about each of these lesions.

On the cutaneous surface of the body, it is a rare occurrence for an innocent lesion to become cancerous, although occasionally this does take place. There is, of course, a certain relation between innocent and malignant epithelial growths, in the fact that in both there is an excessive growth of epithelium. We find this excessive epithelial proliferation in warts, in Molluscum contagiosum, and in some syphilitic and tubercular lesions; but, although in innocent conditions there is epithelial overgrowth, there is never unlimited and unrestrained growth, and the multiplying cells grow outward, as a rule; and even if they grow inward, they do not infiltrate tissues, and do not abolish the normally clear division which exists between derm and epiderm.

We have seen an area of chronic eczema on the left hand of a locomotive engineer become cancerous. It is this hand that habitually rests upon the throttle-valve; and the throttle-

valve is often warm, or even hot. We have seen cancer arise from a wart, from the scar of a burn, from the margins of an anal fistula. Nevi and moles occasionally become cancerous; but, as a rule, the malignant growth which springs from either one of these is sarcoma rather than carcinoma. We have never seen a carcinoma arise from a corn, although it has been alleged that it sometimes does so. That it occasionally arises from an old area of lupus, a syphilitic ulcer, or an ordinary chronic ulcer of the leg is undoubted.

When a cancer arises from an ulcer, it is not to be supposed that the connective tissue of the ulcer has been converted into epithelium. The proliferating epithelium of a cancer must spring from pre-existing epithelium; hence, it sometimes comes from epithelial elements, such as sweat-glands or hair-follicles, that lie undestroyed among the granulations of the ulcer, or, what is more common, from the edges of the ulcer itself. In the vast majority of instances, a malignant growth that arises in an area of ulceration on the cutaneous surface begins at some point on the margin of the ulcer.

The fact that malignant growth can follow chronic irritation is not proof positive that the irritation is its direct cause. A great many hold that in such a case the ulcer is not directly converted into a cancer, but that the chronic irritation in the ulcerated area simply allows of the admission and favors the destructive action of some cancer germ.

It is certainly not proved, at the present time, that cancer is due to a germ, although many of the ablest students and observers are of the opinion that it is. There is no theory as to the cause that is really capable of explaining all the phenomena of cancer. Beside the fact that regions that are irritated or injured are particularly prone to develop cancer, the parasitic theory has gained support from the observation that metastases take place; and that it may be possible to inoculate the growth into the lower animals, or that an accidental inoculation may take place at another part of the body of the individual who is suffering from the disease. But there is considerable doubt as to the real cancerous nature of many of the

tumors that have been transplanted from one animal to another; and, further, a great many different parasites have been alleged to cause cancer. Many supposed parasites are, however, really cell-degenerations; and, whereas yeasts and blastomycetes may exist in a carcinoma, it is very doubtful whether they are causative.

Gaylord and others strongly maintain that protozoa are the cause, but their experiments seem to have failed to demonstrate absolutely that epithelial cells were not transferred. There is no doubt that epithelial cells can be transplanted. We carry this process out deliberately in skin-grafting; and yet we do not assume that a parasite exists because the transplanted cells grow. It is equally possible to transplant the embryonal cells of cancer; and if they take root and grow, this is no proof that parasites are present.

The existence of metastases seems, at first glance, to be strongly suggestive of a parasitic influence. These secondary tumors are, however, not due to the proliferation of lymphatic structure in that region, as would be the case in an ordinary infection; but they are the result of the transfer of epithelial cells from the primary focus, the deposition of these cells in the lymphatic tissue, and their multiplication in this tissue. As Nicholas Senn says, a parasitic origin is improbable from histology and histogenesis; and the secondary tumors are not due to the growth of pre-existing lymphatic structures.

In view of the possibility that an ulcer of the cutaneous surface may become malignant, it becomes highly important that every chronic ulcer should be subjected to a thorough study for the purpose of making a careful diagnosis. As previously stated, in any chronic ulcer malignant change is most apt to appear at the edges, and persistent and increasing induration should excite suspicion. Of course, in the ordinary indolent ulcer there is a great mass of scar tissue, which often fastens the ulcer to the bone; but this mass of tissue does not have a local beginning, as it seems to appear and advance equally at all parts of the edges, and also at the base of the ulcer. Then, again, the edges, though thick, are often smooth and are usually

free from tenderness. The most chronic form of indolent ulcer is known as the callous ulcer; and this ulcer, unlike a malignant growth, is distinctly sunk below the cutaneous level. Its entire border is hard and knobby. It is not tender, and the appearance of the ulcer varies scarcely at all from week to week or from month to month.

When a carcinomatous change takes place in a chronic ulcer, induration usually begins at a portion of the margin and spreads slowly, progressively, and inexorably; although, even after it has existed for a considerable time, we may find but one-third or one-half of the margin of the ulcer to be malignant, the balance of its edge being non-malignant. In fact, it is extremely rarely that the entire margin of a large ulcer is converted into malignant disease; it requires a long time to effect this.

An important fact to remember is that, whereas very chronic, simple ulcers are rarely tender or painful, in malignant disease there is both induration and pain. This pain, as Paget long ago pointed out, is of a hot, scalding, or darting character.

The discharge of a chronic ulcer which becomes cancerous is increased in amount and becomes ichorous, and marked bleeding may occur. A foul, and even stinking, discharge, containing visible masses of destroyed tissue, is a usual feature.

Again, as Paget has likewise shown us, we find, here and there, on the margins of such a malignant growth, spots where apparent healing has occurred; but this is not due to the healing of actual cancerous tissue, but to the fact that non-cancerous regions have healed or that portions of the malignant growth have sloughed out, leaving a non-cancerous bed which will heal.

When the growth has attained a considerable size, we shall find that its base and margins are densely indurated; that the patient suffers from shooting or burning pain in the ulcerated area; that the floor is uneven, and frequently of a warty appearance or like a cauliflower; and that there is a profuse, stinking, and bloody discharge.

At some time or other the anatomically related lymph glands are bound to enlarge; although this seems, as a rule,

to be late, probably because the previous induration has blocked up the lymph channels.

The most difficult case in which to make a diagnosis is one in which there has been great pre-existing induration of a chronic ulcer, and the knobby induration of the cancerous change is not appreciated and differentiated for a considerable time. In every doubtful case of chronic ulcer, portions should be removed from the margins and be studied by a skilled pathologist.

And right here a caution should be put forth. In two cases a pathologist reported carcinoma of the tongue, but recovery followed the administration of antisyphilitic treatment. In one case of ulcer of the leg a pathologist declared the condition to be cancerous, but Dr. Hearn and I were doubtful, and specific treatment effected a cure. Such mistakes sometimes arise because of the common belief that embryonal or atypical epithelial cells justify always a diagnosis of cancer, and yet healing sometimes occurs even when such a finding has been made.

What really does justify a declaration that carcinoma is present is the unrestrained multiplication of epithelium as shown by the infiltration of the apparently sound tissue at the margin of the growth. The finding of the pathologist is of the greatest value if proper material is sent to him to study. When the surgeon removes a bit of a growth for microscopic investigation, it should be large enough to make many sections, and should include not only a portion of the obvious growth, but also a portion of the adjacent and apparently healthy tissue.

If a carefully made clinical diagnosis is not in accord with the microscopist's diagnosis of carcinoma, no such radical operation as amputation should be performed until the situation has become clear and the diagnosis positive.

When a positive diagnosis of cancer arising in an ulcer of an extremity is made, there is only one proper operative treatment; *i. e.*, amputation well above it, and the removal of anatomically related glands, even if another incision has to be

made to accomplish this. For instance, if dealing with an ulcer in the middle of the leg, we should amputate well above the knee, and should then make an incision into the groin that will permit us to remove the inguinal and femoral glands. That a condition such as this is very rare is shown by the fact that the elder Gross, in more than a half-century of surgical experience, saw only three cases of ulcer of the leg that required amputation.

Marjolin's ulcer may be greatly benefited by the X-ray; hence, before considering amputation try this agent, if glands are not obviously enlarged. The late period at which glandular enlargement is apt to occur makes this plan hopeful.

In an advanced case in which operation is refused, the X-ray may still be of service in lessening the rapidity of the growth, checking discharge and hæmorrhage, and subduing pain.

DISCUSSION.

Dr. Henry R. Wharton stated that his attention was first directed to this condition by a case which he had seen some years ago in the University Hospital under the care of Dr. Ashhurst, the ulcer occurring in the cicatrix of a gunshot wound received in the War of the Rebellion. The case presented all the characteristics which Dr. Da Costa has enumerated. The ulcer was inflamed and painful, and the discharge therefrom was most offensive. Since that time he had seen three typical cases of Marjolin's ulcer, one of which developed in the cicatrix of a gunshot wound also received in the War of the Rebellion, which came under his care at the Presbyterian Hospital, and in which amputation of the leg was performed. Another occurred in a colored woman sixty-three years of age, being located in cicatrized tissue back of the knee, which had resulted from a burn received at the age of twelve years. A few years previous, when the woman was fifty years of age, there developed a fungous ulcer. In this case an amputation of the thigh was done. Another case occurred in a woman seventy years of age, who gave a history of an ulcerated leg since she was twelve years of age, which had suddenly broken down, involving the leg to the knee-joint. In this case amputation of the thigh was done. These cases all terminated satisfactorily, and, although some of them have been under observation for a number of years, there had been no return of the disease.

Dr. G. G. Davis stated that if by Marjolin's ulcer was meant any malignant growth following ulceration of the extremities, he felt it was a very remarkable thing that Gross should only have seen three cases in his lifetime. If such was his experience, we would be led to think that these cases are extremely rare. He stated that personally he did not think malignant growths occurring on previously ulcerated surfaces were so extremely rare as this experience of Gross would seem to indicate. He remarked that a few months ago he amputated one leg for carcinomatous growth of the heel following an injury and ulcer which had existed for a couple of years, and he also felt sure that he had seen other cases of this character.

EXTRADURAL HÆMORRHAGE FROM RUPTURE OF THE MIDDLE MENINGEAL ARTERY.

BY JOHN H. JOPSON, M.D.,
Surgeon to the Children's Hospital and the Bryn Mawr Hospital; Out-Patient Surgeon to the Presbyterian and Episcopal Hospitals.

My object in this contribution is to report two cases of rupture of the middle meningeal artery and compression of the brain by an extradural clot, with operation and recovery, and a third case in which the symptoms closely simulated those of extradural hæmorrhage, but in which operation showed it to be absent. These cases all came under my observation in a short space of time, and, as I had previously encountered but two similar cases in my own experience, I thought they might be of sufficient interest to make this report.

Case I.—*Fracture of Skull; Extradural Hæmorrhage from Rupture of Middle Meningeal Artery; Fracture of Tibia and Fibula; Lacerated Wounds of Face, Mouth, and Scalp.*

W. C., white, aged nine years, was admitted to the Children's Hospital, April 22, 1902, with a history of having a short time before fallen from a freight-car on which he was playing. When admitted he was conscious, but somewhat irrational, and was still suffering from shock. His temperature was 98° F.; pulse, 92, but of rather poor volume. He was bleeding freely from a wound in the chin about two inches long, which communicated with the mouth. The upper lip was torn from the gum and superior maxilla, almost opening the nasal cavity, and the left cheek was cut internally by impaction against the teeth, two of which were broken. There was a slight lacerated wound of the scalp in the posterior parietal region on the right side, not extending to the bone, and around and above it a considerable hæmatoma. Palpation in this region gave a distinct sense of depression in the underlying bone. The left tibia and fibula were fractured transversely in their lower third, and the lower fragments and foot were drawn backward at a considerable angle by the action of the calf muscles. There was no paralysis of face or limbs; the pupils were equally

contracted. He vomited freely after admission. The boy was etherized, and the fracture of the leg reduced, the tendo Achillis being divided subcutaneously to facilitate reduction and prevent subsequent deformity; and the foot, leg, and knee fixed with double lateral splints of binder's-board and placed in a fracture-box. The wounds in the face and mouth were sutured. A diagnosis of probable fracture of the skull was made, but, as the depression seemed moderate and the symptoms rather those of concussion with shock than compression, surgical interference was postponed. The patient reacted well from the shock, pulse dropping from 120 on the evening of the 22d to 76 the following evening, but the temperature remained slightly elevated, ranging from 100° to 101$^{3}/_{5}$° F., and his mental condition being dull during the day and somewhat delirious at night. He was roused with difficulty. The pupils were equal and contracted; there was no paralysis. He vomited a couple of times on the 25th and 26th. The hæmatoma over the right parietal region continued to increase in size. While there were distinct evidences of cerebral irritation, it was difficult to separate them from those naturally due to the shock and concussion, complicated as they were by his other injuries.

On the evening of the 26th, however, after a bad night and day, his pulse suddenly dropped to 48, and operation was at once decided upon. Dr. Wharton, who had seen him several times with me, assisted me. Incision evacuated the contents of a large hæmatoma in the parietal region, and revealed a moderate depression above and behind the right ear about three-fourths of an inch in diameter; and running from this, parallel to the median line, was a fissure several inches in length crossing the parietal and penetrating the frontal bone. An extradural clot presented itself after removal of a fragment of the depressed area, which it filled, and from which it extended forward. It was gradually uncovered by cutting away the bone on either side of the fissure with rongeur forceps, until its anterior limit was reached about four inches in front, where the middle meningeal artery had been torn. The clot was about three-fourths of an inch thick and about two and one-half inches wide. After removal, there was free hæmorrhage from the region of the vessel, which was only checked by packing with gauze strips, as the bleeding vessel could not be isolated. The brain was much depressed by the very large clot,

but the dura was uninjured. The packing was brought out at the anterior portion of the wound, a gauze strip laid in the posterior angle, and the remainder of the wound sutured. The patient was slightly shocked, but soon rallied. The next day his pulse varied from 92 to 100, and temperature fell from 101⅖ to 100⅜° F. His mental condition at once began to improve. The restlessness and delirium abated, and while he was very dull and slept a great deal for several days, he was easily roused, and at the end of this time regained fully the possession of his mental faculties. No paralysis was present at any time before or after the operation. On May 1 he was again etherized and the packing removed. There had been considerable oozing after operation, and there was some fresh bleeding from the region of the vessel, which was controlled by a little packing, which was removed three days later. The greater part of the wound healed by first intention. The temperature remained slightly elevated for a week, between 100° and 100½° F.; but his condition gave us no anxiety after the operation, and his convalescence was uneventful. Medication consisted in calomel one-tenth grain every three hours, with bromides for restlessness, and strychnine after operation.

CASE II.—*Contusion of Head; Rupture of Middle Meningeal Artery; Extradural Hæmorrhage; No Fracture of Skull.*

D. C., aged thirty-three years, Italian, was admitted to the Presbyterian Hospital, July 1, 1902, at 5.30 P.M. He had been struck on the left side of the head by a piece of cable, from the breaking of a derrick that morning, knocked down and stunned. He either did not lose or soon regained consciousness, and refused to go to the hospital, but did not resume work, walking with assistance to a shanty near where he was employed. In the afternoon, several hours later, he became unconscious, and was hurried in the patrol to the hospital. He was admitted in an unconscious condition. There was a contusion, with an underlying hæmatoma and two slight superficial lacerations of the scalp about four fingers'-breadth behind the left eye and a similar distance above the zygoma. The temperature was 96° F., pulse 48, respiration 24 and irregular. The pupils reacted to light. There was a slight protrusion of the left eyeball and œdema of the lid on same side. The face was not noticeably drawn. During examination he resisted with the left arm only, although he was able to make indefinite movements with the right arm and to move both legs. There

was a very distinct partial paresis of the right side. He made no attempt to speak and seemed to recognize no one. I saw him at 8 P.M. Coma was now more profound. The pupils were fixed midway between contraction and dilatation, the left slightly larger than the right; neither reacted at all to light. Temperature 98⅖° F., pulse 68, respiration 20. No movements of extremities at all. Condition otherwise as given above. There was a sense of depression in the left parietal region, which led me to think we would find a fracture. The patient was at once prepared for operation and ether was found necessary. During preparation he moved the right arm and leg a little, showing paralysis was not complete. A semicircular flap was reflected over the contused area on the left side and the bone exposed, covered by a hæmatoma of external origin. No fracture was discovered. I had been led by his history and symptoms to suspect a rupture of the middle meningeal artery, and when I found no fracture, determined to trephine over its location and examine it. The incision was enlarged anteriorly, and the crown of a medium-sized trephine applied, with the pin over a point two fingers'-breadth behind the external angular process of the frontal bone, and three fingers'-breadth above the zygoma. The button removed was grooved by the vessel, which was bleeding in its immediate neighborhood, and a dark clot filled the opening.

The trephine opening was then enlarged in a backward and downward direction, the artery spurting in the wound, following the direction of the clot. An unsuccessful attempt to tie the artery was followed by easily checking the hæmorrhage by packing a couple of small strips of iodoform gauze between it and the edge of the bone. The clot was then followed backward, and an opening in the bone three inches by one and three-fourths inches in its widest diameters was necessary to remove the clot, which extended at least three-fourths of an inch beyond the edges of this opening, was about three-fourths of an inch thick, and was removed with some difficulty by a sharp spoon. After its thorough evacuation, the much depressed dura was found apparently uninjured; a gauze drain was laid in the opening and brought out at the posterior angle. The two small pieces of gauze controlling the vessel were brought out at the anterior extremity and the wound sutured. Immediately after operation, and before he was removed from the table, the patient moved the right arm and leg freely; both pupils

reacted to light, and the character of the respirations was much improved. Temperature, 99⅘° F.; pulse, 92; respiration, 20.

Consciousness was rapidly restored, and the following morning, July 2, his mind was clear and he talked freely. Temperature, 97° F.; pulse, 72; respiration, 15. No paralysis noted. His improvement after this was rapid. The temperature was slightly subnormal, varying from 96⅕° to 98⅘° F. for seven days, when it became and remained normal. On the fourth of July it was noted that the right side of the face was a little flaccid during whistling or smiling. The wound was dressed on the fourth day, found clean, and the packing removed. There was a little oozing from the anterior angle. The mental condition was normal from the morning after operation. The slight facial paralysis had disappeared by July 8. The patient was with difficulty persuaded to remain in bed for two weeks, and was discharged July 22 with a very small granulating area at the anterior angle of the wound; the rest healed solidly, although with moderate depression present.

CASE III.—*Contusion of Head; Concussion of Brain; Cortical Irritation, probably due to Minute Hæmorrhage or Laceration.*

H. W., white, aged nine years, was admitted to the Children's Hospital on the evening of April 19, 1902. He had been struck a short time before by a trolley-car; was unconscious when picked up, and remained so for five minutes. He was in a semistuporous condition when admitted, and very irritable on examination. He presented a contusion, with much swelling over the left supra-orbital region. The pupils were dilated, pulse small, and skin clammy. No paralysis. He vomited twice while still in the receiving ward. I saw him at this time and made a diagnosis of concussion. Soon after this, and when sent to the ward, he became totally unconscious, and about one-half hour later developed muscular twitching, confined to the right side of the face, lasting for a couple of minutes, and at the same time vomited freely. About ten minutes later he had a convulsion, preceded by twitching of the right side of the face, and then involving the right arm and leg and lasting for about fifteen minutes, the left arm and leg being affected during the latter part of the time also. The child remained unconscious, and a third convulsion occurred while he was being prepared for operation, beginning on the right side and becoming general, although the movements were more marked on

the right side throughout. There was external strabismus in the left eye; pupils equal and contracted. Breathing stertorous; pulse, 104; temperature, normal. Dr. Wharton saw him with me four hours after admission, and we decided, in view of the urgent and very alarming symptoms, to operate. Examination of the shaven scalp showed only the contusion in the left supra-orbital region. A flap was reflected at this point, and no fracture found. The right side of the face was now paralyzed, but the child seemed to be regaining consciousness. I trephined over the region of the middle meningeal artery on the left side, using the measurement already mentioned, but allowing for the age of the patient. The artery was at once exposed unruptured and with no clot to be observed. The opening was enlarged in a posterior direction over the motor area with the rongeur forceps, and the dura found apparently uninjured, with no evidences of fracture or subdural clot. During this time the right arm and leg continued to twitch. Bearing in mind those rare cases in which the symptoms of cortical irritation are on the same side as the lesion, a small semicircular incision was made on the right side, and a small trephine used to uncover the right middle meningeal artery. This was also found uninjured where exposed under the button, and the latter was at once replaced and the wound sutured. The first wound was sutured, a small gauze drain being inserted. As we had failed to find the cause of the alarming symptoms, the probable diagnosis was either a laceration of the brain, or minute hæmorrhage into the cortex. Following operation the symptoms rapidly ameliorated. The temperature rose to 102° F., falling by the next morning to 100⅘; pulse, 104; respiration, 24. There had been no more convulsions, and his mental condition had improved rapidly and was quite clear. The facial paralysis had disappeared, pupils were equal, strabismus gone. On the 21st his temperature fell to normal, and did not rise above 100 afterwards, and the improvement in his general condition continued. He slept a good deal for the first two or three days, but exhibited no other special symptom. The wounds healed by primary union. He remained in the ward for several weeks, during which time he exhibited no ill effects from his injury, when he was discharged apparently cured. His medication consisted of calomel and bromides for the first three days and then bromide alone for several days longer, with small doses of digitalis for two days after operation.

In the first case reported the line of fracture crossed the anterior branch of the artery and explained its laceration. In the second case, where there was no fracture, the contusion was sufficient to rupture the vessel, a possibility well recognized. Tillaux showed that the adhesions between the dura mater and skull were weak in the temporal fossa, and this in fact constitutes the "zone decollable" of Marchant, and would favor rupture. The presence of perforating branches from the vessel which pierce the skull and are liable to be pulled upon when the elastic skull springs back after momentary depression by a force perhaps insufficient to fracture it (Steiner[1]) also exposes the vessel and its branches to dangerous traction.

As regards the symptomatology of these cases, in the first case the classical clinical picture of extradural hæmorrhage was absent, the symptoms being more those of fracture of the skull with concussion or injury of the brain. The leakage of blood through the fissure into the subaponeurotic space probably relieved the pressure on the brain for a time and accounted for the preservation of consciousness and absence of paralysis. Gubler,[2] in a study of a large series of cases of fracture of the vault of the skull from Krönlein's clinic, reports a case in a boy four years of age in which there was apparently a rupture of the middle meningeal artery, a fracture of the skull, and a hæmatoma under the scalp communicating with the interior of the skull. The case recovered without operation. He quoted four analogous cases from Wiesman, two of them in children (observed by Holmes and Golding Bird), and explains the cause of this phenomenon in early life by the intimate adherence of the dura mater to the skull at this time. The temperature, slightly subnormal at first, then moderately elevated, was more suggestive of hæmorrhage, this being a common feature according to Phelps.[3] The slow pulse is not always observed with epidural clot, but in this case the sudden drop to 48 before operation was significant of cerebral compression.

In the second case, that of the man, the clinical picture was most complete. The initial stunning, the interval of consciousness followed by rapidly deepening coma, with subnormal

temperature, slow pulse, stertorous breathing, and contralateral hemiplegia, and with dilatation of the pupil on the affected side, made up a symptom-complex which scarcely admitted of other interpretation.

In the third case the diagnosis of hæmorrhage, while less certain, was, I think, justifiable, and trephining strongly indicated. There was a history of loss of consciousness, followed by its partial restoration, and then in a short time a deepening coma with severe convulsions starting on the opposite side from the injury, and followed by paralysis of the face on that side. The exact nature of the lesion remains unknown, but it seems probable that there was a slight hæmorrhage or laceration in the motor area. In two of Phelps's cases of cerebral contusion there were general convulsions, and in both he found large pial hæmorrhages, with in one case intense congestion of the dura and in the other a limited contusion of the temporal area. Muscular twitching and general convulsions were observed by him after both hæmorrhage and contusion, but he regards such motor disturbances as more characteristic of contusion, as paralysis is of hæmorrhage. Cortical irritation causing convulsive movements and due to hæmorrhage contributed to correct diagnosis in a case reported by W. J. Taylor.[4] The second trephining on the other side was indicated by the apparently desperate condition of the boy and by the possibility of that rare condition, as yet unexplained, of collateral palsy to which all authors allude, although some regard it as apocryphal. The rapid amelioration of symptoms after operation may have been due in part to relief of intracranial tension by trephining. The measurement which I used for locating the trephine openings and exposing the anterior branch of the artery in the second and third cases, two fingers'-breadth behind the external angular process of the frontal bone and three fingers'-breadth above the zygoma, is one which I have frequently tested on the cadaver, and corresponds in my own hand very closely to the measurement formerly recommended by Treves,[5] viz., one and one-half inches behind the external angular process of the frontal bone and one and three-quarters inches above the

zygoma. It makes the point of exposure a little higher than Krönlein's,[6] which is the one favored by Plummer[7] after an exhaustive series of tests, and the one Treves[8] now furnishes, and which is located on a line drawn through the supra-orbital ridge parallel to Reid's base line at a point from three to four centimetres behind the external angular process. Plummer found all the measurements recommended for exposing the posterior branch to be unreliable, but Steiner's as open to the least objections. This locates it at a point where a line drawn horizontally through the glabella is intersected by a vertical line running just in front of the mastoid process.

Steiner[1] and Plummer[7] both suggested the applicability of an osteoplastic flap exposure of the vessel which would render unnecessary these exact measurements, avoid the necessity of more than one opening, and the necessary leaving of large gaps in the skull, such as are indispensable to a thorough removal of a large clot and perfect control of hæmorrhage. This method has been used several times for this purpose, as Plummer[9] describes in his second article on this subject, where he reports two cases operated upon by the Hartley-Krause method in his own hands, with exposure of the clot, and recovery in one case, death in the second case being due to complicating injury of the brain. That the method is of value seems certain; but it seems to me that in cases of great doubt as to the existence of a hæmorrhage or fracture we should not always forego preliminary exploration by incision of the soft parts or even the application of a small trephine over the anterior branch of the artery.

REFERENCES.

[1] R. Steiner. Archiv für klinische Chirurgie, xlviii., 1894, p. 101.
[2] R. Gubler. Brun's Beiträge zur klinischen Chirurgie, xiii., 1895, p. 475.
[3] Charles Phelps. "Traumatic Injuries of the Brain and its Membranes," New York, 1897.
[4] William J. Taylor. Therapeutic Gazette, October 15, 1894.
[5] F. Treves. "Surgical Applied Anatomy," Third Edition, 1888.
[6] Krönlein. Deutsche Zeitschrift für Chirurgie, xxiii., 1886, p. 209, and Brun's Beiträge zur klinischen Chirurgie, xviii., 1895, p. 466.
[7] S. C. Plummer, Jr. Annals of Surgery, xxiii., 1896, p. 540.
[8] Sir F. Treves. "Surgical Applied Anatomy," 1901.
[9] S. C. Plummer, Jr. Annals of Surgery, xxxvi., 1902, p. 591.

DISCUSSION.

Dr. J. Chalmers Da Costa referred to a case which had come under his care some time since. It was that of a man suffering from an injury to the skull by being hit on the head with a blackjack, after the administration of knockout drops. Incision into the wound revealed a fracture of the skull and extensive hæmorrhage from a parasinoidal sinus, which was controlled by gauze packing. The patient did well for a number of days. Primary union was complete, except there was a very small fistula. Ten days after the operation the patient became violently insane, imagined that he was being beset and prosecuted, had terrifying hallucinations, and became worse and worse. Da Costa then became doubtful as to how many pieces of gauze he had put in the wound. He could not remember how many he put in, but he knew only one piece had been taken out. By means of a small probe he was finally able to secure a thread through the sinus that remained, and then removed a piece of gauze twelve inches in length. This case indicates the necessity for extreme care in always noting down the number of pieces of gauze put in a wound for the control of hæmorrhage. The speaker referred to the case of a man who was run down by a bicycle fiend. The man was brought into the hospital speechless and suffering from an injury of the scalp above the external angular process on the right side. He was either unable or refused to write, but made curious signs with his fingers, which were found to be the deaf and dumb language. Another inmate of the institution who understood the sign language was brought into the room, and on attempting to converse with the patient, it was found that he only spoke three words, "how," "what," and "when," which he repeated with his fingers. When asked his name, age, residence, how he was hurt, etc., he would invariably make these same signs with his fingers. The man was operated on and a bit of bone was found driven into the third frontal convolution. When the man returned to consciousness, his wife, who was also deaf and dumb, was there, and he conversed with her with perfect freedom, and the question has presented itself to the mind of the speaker whether the sign language was located in the third frontal convolution on the right side, as seems to be indicated by this case of aphasia to signs, as it might be considered.

Dr. Henry R. Wharton stated that in his opinion one point which should never be lost sight of in these cases of extradural hæmorrhage was that where the typical symptoms might be located, the hæmorrhage might be from another source, as for instance the symptoms occurring in the right side when the hæmorrhage was in the lateral sinus. He reported the case of a boy who fell some distance and struck the right side of the head, and within twelve or fifteen hours developed typical symptoms of extradural hæmorrhage. Following the external symptoms, a trephining operation was done, including the small fissure of the skull, which was followed backward until the seat of the hæmorrhage was found and an immense clot of blood removed. The hæmorrhage was controlled by packing, and the patient ultimately recovered. In suspicious cases it was thought to be always well to bear in mind the possibility of the lateral sinus being the seat of the hæmorrhage.

Dr. Taylor stated that in one case which he had reported, a man had been standing at the head of a stairway down which he fell. A history was given of his unconsciousness for a short time, that he recovered sufficiently to get up and walk into a room and sit down, but that in a few minutes he became again unconscious and was sent to the hospital. When first seen he was apparently paralyzed on one side, and had convulsive movements on the other. As he had only one eye, it was impossible to compare the pupils, but his single one was contracted. A trephine opening was made in the skull on the opposite of the paralyzed side in the region of the anterior branch of the middle meningeal artery, but no clot whatever was found. Immediately another trephine opening was made on the opposite side of the head at a corresponding point, and a large extradural clot was discovered. Evidently this clot had produced sufficient irritation to the dura to cause the convulsive movements. The man never regained consciousness and died. It was now learned for the first time that he had been paralyzed on one side some time before the accident, and at the autopsy an old blood-clot was discovered on the brain. The question of diagnosis was here very much complicated by the conditions and by a faulty history.

Dr. G. G. Davis stated that it was interesting to bear in mind, in reference to the cases of extradural hæmorrhage not from the middle meningeal artery, that they can take place without any fracture being present. He had been inclined to doubt the possibility of this occurrence, but referred to a case which was reported in the *New York Medical Journal* three or four years ago, in which a surgeon diagnosed and evacuated a clot in one of the parietal regions, in which there was absolutely no evidence of a fracture. Since that time he has seen the record of another case in one of the British journals, which would seem to establish the possibility of the occurrence of this condition beyond a reasonable doubt.

Dr. T. R. Neilson stated that he had a number of times to control hæmorrhage from the middle meningeal artery or its branches. He felt that packing by means of gauze is best adapted to intracranial hæmorrhage from the venous sinuses, as he had proven by personal experience on a number of occasions. In hæmorrhage from the middle meningeal artery his practice has been to control it by ligature, not tied over a hæmostatic forceps, but passed around the vessel threaded in a small, full curved needle. Reference was made to a case in which he had found it necessary to plug the foramen spinosum in order to control the hæmorrhage, the vessel being torn across as it emerged from the foramen. The plug used was a match-stick sterilized by boiling. In reference to the removal of clot, he stated that he believed it could be done more easily and more quickly by means of a stream of water from a syringe than by any instrument.

Dr. John H. Jopson stated that he believed the method recommended by Dr. Neilson, of controlling the hæmorrhage by means of the ligature, was the best in the cases where it could be practised; but in the first case this was absolutely impossible, as several of the branches of the vessel were apparently torn, and a considerable amount of packing was required. In the second case, a very little packing checked bleeding most satisfactorily, and more bone would have had to be removed than was done to have used the ligature method.

As to the possibility of the production of hæmorrhage without fracture, he believed that that point had been emphasized by Jacobson. As long ago, however, as the time of Charles Bell, he pointed out, if you take a cadaver and strike it a heavy blow on the skull and then inject the carotid artery, you can find evidence that the dural artery or its branches has been ruptured.

The question of the removal of the clot was considered an

important one, and it was recommended that an opening should be made in the skull of sufficient extent to thoroughly uncover the seat of the hæmorrhage, reference being made to a case in which a trephining operation had been done, the clot syringed out, but the true source of the hæmorrhage never uncovered or controlled, and death resulted from further compression of the brain.

STATED MEETING, DECEMBER 1, 1902.

The President, RICHARD H. HARTE, M.D., in the Chair.

HIP-JOINT AMPUTATION FOR TUBERCULAR DISEASE OF THE FEMUR.

DR. DE FOREST WILLARD presented a woman, fifty years of age, who was admitted to the Presbyterian Hospital, October 21, 1902, with the history that for forty-two years she had had tubercular ostitis of the left femur,—first at knee, then thigh, then hip. Numerous sinuses had formed from time to time at various points in the thigh, sometimes healing, then reappearing. One year ago she fell, and either broke the femur at lower end or tore the ligaments at the knee, so that the leg now bends outwardly at an angle of forty-five degrees to the femur; limb perfectly useless. Pus discharging sinuses at various points between knee and hip-joint. Increased pain and discomfort both at lower and upper ends of femur. The tissues throughout the entire thigh dense and indurated from tubercular deposit. Knee-joint rigidly fixed. As the limb had been useless for years, and as there was no possibility of her ever employing it for locomotion except with crutches, the patient readily consented to a hip-joint amputation.

Operation.—Three Wyeth's pins used, anterior one entered below anterior superior spinous process, and emerged near the vulva, passing close to pubic ramus and beneath femoral vessels. Around the head and point of this pin was carried ovally an elastic tubing, thus compressing the femoral vessels independently of the encircling tubing, which was afterwards applied. The anterior flap was made irregular in shape to avoid the pus sinuses; the femoral vessels were tied with catgut before disarticulation of the joint; posterior flap also cut and vessels tied, as the tissues were densely infiltrated. Upon removal of the tourniquet, less than one drachm of arterial blood was lost, the only hæmorrhage being the venous blood in the leg itself, which, on account of the pathologic conditions, had not been pressed out by elastic bandage. Wound closed with silkworm gut, posterior drainage being provided for by an independent opening through the buttock.