from its introduction. In regard to the Stimson method for recent dislocations, the underlying principle is the same as that which he had been applying in old dislocations. With regard to the disabling limitation of movement after the reduction of old dislocations, if the dislocation has existed for many months before reduction, the chances for a complete return of function are small. He would not say that it is impossible to get it. The return of function will be more rapid and will more nearly approach the normal after a non-operative reduction than after an operative reduction, as a rule. The underlying cause of the difficulty is essentially the same as for the corresponding condition found after the reduction of recent dislocations, *i.e.*, the stiff and painful shoulder of which so much has been written in recent years. The cicatricial contraction at the site of the capsule tear in the axilla will be more unyielding after the reduction of the old dislocations than after the reduction of the recent. He had, in a considerable number of cases of the latter variety, broken up this resistance by forcible manipulations under ether, without trouble and with very satisfactory results.

He had had very little experience with recent dislocations, since these are usually reduced by the family physician or the hospital interne, so that in discussing the abduction method he had confined himself to the old dislocations.

The superiority of the abduction method should be more evident in the reduction of dislocations of the shoulder associated with fracture of the surgical neck of the humerus, just as the Allis method is superior to the Bigelow method in the corresponding condition at the hip. The Kocher method may have the advantage in the reduction of recent dislocations, without an anæsthetic, in very powerful individuals. Such patients can resist more effectively the simple, direct pull in abduction than a series of more or less complicated movements as in the Kocher method, although the general spasm may effectively resist all these.

STATED MEETING, HELD NOVEMBER 4, 1912

Dr. Gwilym G. Davis, President, in the Chair.

STAB-WOUND OF THE HEART; RECOVERY AFTER SUTURE.

Dr. Charles F. Mitchell presented a colored man, 59 years of age, who was brought to the Pennsylvania Hospital by the patrol at 5 P.M., July 30, 1912, having received a stab-wound of the left chest a short while before. He had been drinking heavily, and there was a marked odor of alcohol on his breath. His previous history was negative, except that he always used alcohol to excess. He was admitted to the service of Dr. Richard H. Harte, in whose absence Dr. Mitchell was called upon.

On admission temperature was normal, pulse 90 to the minute, while breathing was rapid and rather labored. There was no sweating, lips and conjunctiva blanched, heart sounds regular, but rather faint. Arteries atheromatous, marked arcus senilus. Area of cardiac dulness not increased. Right chest normal, but signs of pneumothorax over whole left chest. There was some dulness of left chest posteriorly. In sixth left interspace in anterior axillary line was a stab-wound, about 1½ inches in length, from which bright red blood was flowing.

From above symptoms and physical examination a penetrating wound of the chest was diagnosed with probable injury to the heart. At 6.24 P.M., 1 hour and 24 minutes after admission, the patient was given ether preceded by ethyl chloride. The field of operation was sterilized with 3 per cent. iodine solution and wound in interspace enlarged. Left lung was found collapsed. The sixth rib was then divided and retracted, and immediately a large opening was found in the pericardium. The edges were rough and the wound appeared to be more like a tear than a clean cut. There were a number of clots found in the pericardium, which when removed showed a transverse cut in the heart, from which at each systole there flowed bright red blood. The cut in the heart was about one inch in length, apparently in the left ventricle about an inch above the apex. A

curved intestinal needle, threaded with fine Pagenstecher thread, was then passed through the cardiac muscle and tied, the ends being left long and used as a tractor in the introduction of the second stitch. When the second stitch was tied, it was found that the wound was completely closed and the hemorrhage from the heart stopped. The pericardium was then partially closed, after its cavity had been washed out with normal hot solution. A small gauze drain was left in the wound and the retractor holding the rib withdrawn, and the wound closed with silk-worm-gut sutures. There was no hemorrhage from the chest or pericardium, and no ligatures were used during the operation.

Previous to the operation the patient was so well stimulated by the alcohol already imbibed, that he did not require any stimulation, either before, during, or after the operation. He apparently left the operating table without any symptoms of shock, his temperature being 96.4°, pulse 88, respiration 32. Time of operation 22 minutes. During the night he was given a sixth of morphine hypodermically, but this is all the medication he received. The following morning his temperature rose to 101°, pulse remained about the same (92), respiration 36.

On August 2, three days after admission, he developed delirium tremens, and was irrational for a couple of days. On August 5 a to-and-fro friction rub synchronous with a heart-beat was noted to the right of the sternum at level of the third rib. This disappeared in three days. There apparently was no increase of cardiac dulness or other signs of cardial effusion. Temperature at this time was 100°, pulse 100, respiration 28. Drain was removed on August 17. Patient sat up in bed at this time. On August 21 dulness in the left chest posteriorly, with distant breath sounds, was noted over this area. Temperature 102.3°, pulse 124, respiration 28. On August 26 chest was aspirated and about eight ounces of a dark reddish, clear fluid evacuated. Upon culture this was found to be sterile. On September 14 chest was again aspirated, but only a small quantity of the same sort of fluid obtained. From this time on, patient rapidly improved. Signs of fluid in left chest diminished and when patient left the hospital on October 19 there was but slight dulness over left chest posteriorly, probably due to a thickening of the pleura. The heart at this time seemed to be

slightly pulled to the left, apex beat being in sixth interspace one inch to the left of the nipple line. There were no murmurs present, sounds regular but a trifle rapid. Dr. Mitchell added that so much has been written of late as to the treatment of heart wounds that it does not seem necessary at this time to go very deeply into this subject.

Konig[1] in his article on "Technic for Access to Suture of the Heart," gives a full discussion on this subject, and Poole,[2] gives a most exhaustive study of the technic, as well as the bibliography of recorded cases up to the year 1912. He has succeeded in tabulating 77 cases of heart suture, which added to those already tabulated in 1909 by Peck totals 236.

Ranzi[3] gives Rehn the credit of publishing the first successful case of heart suture in 1896, and has collected 223 operative cases with a mortality of 53.3 per cent. He adds to this number three cases of stab-wound and also three of gun-shot wound of the heart, who were operated upon in Von Eiselsberg's Clinic at Vienna, but only one of which recovered. He mentions in the successful case, that five hours intervened between the time of injury and operation, and states in naming the time of the the operation that the anæmia was not very marked.

Bircher[4] reports a case of gun-shot wound of the heart which healed under conservative measures alone, and also reports a case of multiple stab-wounds of the heart requiring operative treatment, which case recovered. He goes on to say that only one stab-wound was found at the first operation and the second wound required suture twelve hours later. At the time of the second operation the wound first sutured showed that firm repair had already begun to take place. He states that conservative measures seemed more promising for gun-shot wounds, and intimates that operative procedures are necessary in all cases of stab-wound.

It is needless to say that all stab-wounds of the heart require surgical intervention, and that all wounds in the neighborhood

[1] Deutsche Zeitschrift für Chirurgie, vol. cxii, Nos. 4 and 6.
[2] ANNALS OF SURGERY, April, 1912.
[3] Weiner klinische Wochenschrift, Vienna, Dec. 14, vol. xxiv, No. 50.
[4] Archive für klinische Chirurgie, Berlin, vol. xcvii, No. 4, pages 831–1075; last indexed, April 27, page 1318.

of the heart should be explored, as this is the only positive method of determining the extent of the injury done.

When the symptoms of extreme shock accompany a wound of the chest in the cardiac region, the diagnosis is fairly sure of an injury to either the pleura, pericardium, or heart, but this cannot fully be determined without exploratory procedure; as in the case above cited, the symptoms were those of an injury to the pleura, whereas at operation we found not only the pleura injured, but the pericardium and heart as well.

As to the method of operating in these cases, I do not believe that any fixed rules can be laid down other than those of expediency. Usually the enlarging of the original wound (Peck) and the division of the costal cartilages, the retraction of which will allow a good exposure of the heart, is all that is required. Kocher and others suggest various flap methods. Kocher divides the fifth, fourth, and, if necessary, the third costal cartilages, while Wilms recommends the intercostal incision, as it can be much more quickly performed than the various flap methods. In the majority of heart wounds the pleura is injured. Sauerbruch says that 80 per cent. of the cases are so complicated.

As to the suture material, either well-vaselined silk, chromicized catgut, or Pagenstecher may be used. In our case Pagenstecher thread was the one selected. No doubt the use of the differential pressure apparatus is of great advantage in the administering of the anæsthetic, but when this apparatus is not available, ether, by the drop method, is the most efficient method.

The pericardium may or may not be completely closed. If there is much injury it is better to partially close it by interrupted sutures and carry a small drain down to the opening that is left so as to drain the excessive serous discharge which is apt to occur as a result of the traumatism. Drainage of the pleural cavity may or may not be done at the primary operation; it depends on the likelihood of infection. In doubtful cases it should always be performed. Poole says it is better to delay drainage until infection has occurred and then to perform a secondary thoracotomy.

Dr. Francis T. Stewart remarked that it was an error to give credit to Rehn, of Frankfort, for the first suture of the heart. Farina and Cappelen each operated in 1896, but the patients died. In 1897 Rehn published the first successful car-

diorrhaphy. So far as he was aware there had been 11 cases of suture of the heart in Philadelphia, one by Dr. Mitchell, two by Dr. Gibbon, one by Dr. Bradbury, one by Dr. Billings, one by Dr. Harte and five by himself, nine of these having been cared for at the Pennsylvania Hospital. As to the diagnosis, in the beginning it is often a matter of doubt. He had explored a number of thoraces for wounds and had found only five cases in which the heart was wounded, although in many a wound of the heart was suspected. Simply from the degree of shock no conclusion can be drawn. He remembered one case of stab-wound over the heart which appeared as if there must be a wound in this organ, but it was found on examination that the knife had not penetrated the thorax, the patient suffering only from emotional shock. In some of the cases in which the thorax is penetrated the heart is seriously disturbed because of so-called concussion of the heart, the heart being merely bruised. This is more frequent in gun-shot wounds. In several cases that he had explored the pericardium had been wounded but not the heart, but the symptoms were indicative of a wound of the heart. The most reliable symptoms, when they exist, are those of compression of the heart (cyanosis, distention of the veins from pressure on the auricles, etc.). These symptoms are not conclusive, however, because effusion of blood into the pericardium may result from wounds of the vessels of the pericardium or the great vessels at the base of the heart. The site of the wound is usually over the heart, although in some cases it is in the axilla or even in the abdomen. No conclusions can be drawn from external bleeding, because serious bleeding may proceed from a wound of the internal mammary artery or from the intercostals. The diagnosis can be assured only by exploration. His own custom in these cases has been to incise the skin; if the wound penetrates the muscles, to incise the muscles; if it penetrates the thorax, to enlarge the wound throughout its entire depth and to expose the pericardium; if a wound is found in the pericardium, to enlarge that wound, perhaps by resection of a rib above or below, or both. But if, on exploration, the symptoms of a wound of the heart being present, it is found that the pericardium has not been wounded, or no wound is discovered, then the pericardium should be punctured with a

needle, because, although one who has had no experience in this class of surgery may think it easy to determine whether or not blood is in the pericardium simply by inspection, it is not always an easy matter, as has been proved by several reported cases. If there is doubt after a needle has been put in the pericardium, this membrane should be incised in order to allow full exploration. As to the method of exposure, it is a matter of expediency. The size and shape of the incision or flap must be determined by the situation of the external wound and the situation of the stab in the heart. If a flap, consisting of one or more ribs, is turned inward, the pleural cavity will always be opened. If a flap is turned up or down double section of the intercostals is necessary. Whenever possible the flap should be turned outward, toward the arm. In this way, if need be, the pleura can be separated without injury, and the exposure made extrapleurally, as in one of his cases, a wound of the auricle, where he was able to make a large flap, to push off the pleura, which was not wounded by the knife, to expose the pericardium over a wide area, and to suture the wound in the heart without injury to the pleura; the patient made a rapid recovery. If the pleura is wounded infection usually follows. About one-half of the cases die of empyema of the pleural cavity or pericarditis or infective myocarditis, etc., so that if infection can be avoided the number of recoveries will be vastly increased. Of those that recover, about one-third do so in spite of infection. Of the five cases operated on by himself three recovered, two in spite of infection. As surgeons now recognize that wounds of the heart should be sutured and it has been demonstrated that the hemorrhage can be controlled, the greatest problem is to learn how to prevent the infection. He mentioned three things as being of some value in this direction. First, the rapid disinfection of the skin with iodine. In most of the cases he had operated on he used soap and water, alcohol, and bichloride of mercury, which takes a little too long, if done properly, and is not very sure if done hurriedly. With a 10 per cent. tincture of iodine solution the disinfection can be done rapidly and certainly. In the second place, if possible, drainage should be avoided; careful hæmostasis should be made and clots removed, as those which remain either form adhesions or encourage infection. If empyema arises later it can be drained. Third, that the presence of air in the pleural cavity must if possible be avoided, at least after operation. He did not know of any case having been operated on with the positive or negative pressure apparatus. In his last case he intended to use a home-made Auer-Meltzer apparatus, but the different parts could not be assembled quickly enough. The question arises, however, as to whether suction upon or distention of the lung may not increase the bleeding. If a positive or negative pressure apparatus is not at hand, the air in the pleural cavity should be removed by aspiration, after the wound in the chest is closed. A pleura full of air contains a large number of bacteria, which, after they have settled on the pleura give rise to infection. If the lung can be expanded the chances of infection will be less. In one case in which he opened the thorax for exploration, finding a wound of the lung and not of the heart, the patient was treated in this way and recovered without difficulty or infection.

Dr. W. Joseph Hearn said that a few years ago a colored woman was brought to the Jefferson Hospital one morning with evidence of puncture of the heart (stab-wound), and one of his medical delegates examined her carefully with the stethoscope and was satisfied there was leakage from the heart and suggested immediate operation, which he attempted. He made a U-shaped incision, turning the two bows of this flap toward the sternum, and avoided cutting the mammary vessels. He made an incision through which he could almost put his hand, and after washing out with salt solution, found an opening one inch long in the pericardium; the pericardial wound was enlarged sufficiently to see there was no wound of the heart, merely a scratch, which had been made by the point of the knife. It was simply a wound of the pericardium into which he put 2 or 3 sutures, closing the wound without drainage. The woman 2 years later died of phthisis. His method of exposure gave a good view of the heart without much hemorrhage. The only difficulty encountered in sewing up the pericardium was the heart movement.

PERIRENAL HÆMATOMA.

Dr. John Speese read a paper with this title.

Dr. Francis T. Stewart remarked that he had never seen a spontaneous perirenal hæmatoma, but when Dr. Speese read

his explanation of the tympanites it reminded him of the tympanites of other renal lesions, particularly of renal colic, which must be purely nervous in origin. On two occasions he had been asked to operate on a patient for intestinal obstruction who was found to be suffering from renal colic, and recently he had seen another case of the same character.

Dr. Charles H. Frazier was reminded of a case presented by him to the American Medical Association five or six years ago. This was a young man 25 years of age, who was brought to the hospital 36 hours after the onset of his illness, believed to be suffering from an acute abdominal lesion. Upon examination after admission there was found board-like rigidity of the right side, exquisite tenderness on pressure midway between the appendix and gall-bladder, and also tenderness, but not to the same degree over the right kidney. There was marked acceleration of the pulse, leucocytes were 25,000, and an elevated temperature was present. An exploratory incision was made in the right rectus, nothing was found in the peritoneal cavity and the wound was closed. An incision was then made over the right kidney. A very large perirenal hæmatoma was exposed. Drainage was introduced and the patient made an uneventful recovery. The hemorrhage was attributed to a cortical tubercular lesion. The patient had pulmonary tuberculosis.

AN APPROACH TO THE HYPOPHYSIS THROUGH THE ANTERIOR CRANIAL FOSSA.

BY CHARLES H. FRAZIER, M.D.,
OF PHILADELPHIA.
Professor of Clinical Surgery in the University of Pennsylvania.

Though the real advent of surgery of the hypophysis dates back little more than a half a decade—it being the last of the cerebral structures to come within the scope of surgical therapy—nevertheless in this short space of time rhinologists and surgeons have given much attention to this small and until recently very inaccessible organ, and have developed various methods of approach on the cadaver and the living subject with varying degrees of success. The hypophysis, situated as it is deep in the sella turcica and hemmed in by such important structures as the cavernous sinus, the optic tracts and chiasm, and the internal carotid artery, has for a long time been considered a *noli me tangere* by the surgeon. Indeed, in 1882, Hyrtl described even the sphenoidal sinus as being entirely beyond the reach of hand or instrument.

The incentive to surgical intervention in this particular field must be attributed to Pierre Marie, who in 1886, in a monograph on acromegaly, first suggested the etiologic relation between acromegaly and perverted function of the hypophysis. The constantly increasing number of experiments demonstrating the vital importance of this organ, and the many observations, notably Fröhlich's, of the various symptoms complex, caused by perverted function of the pituitary and amenable in only a transitory measure to internal remedies, including organotherapy, have added greatly to the impetus to surgical intervention. Like all other intricate procedures, the operation for exposure of the hypophysis is passing through various stages of evolution, becoming constantly less complex and at the same time less mutilating, until I think I may say with

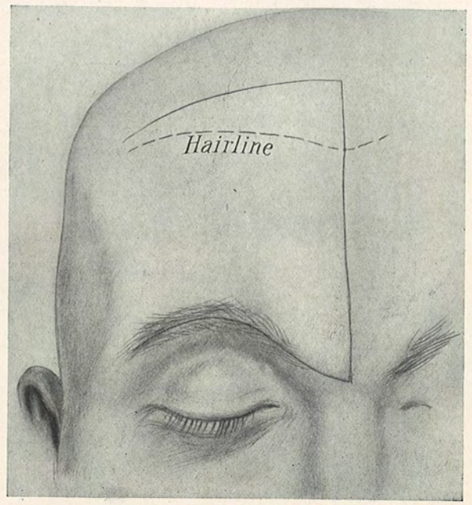
perfect accuracy that I found the operation, according to the technic which I am about to describe, as easy of performance and as devoid of difficulties, though somewhat more complicated, as that on the Gasserian ganglion.

There are two principal modes of attack: the intracranial and the extracranial, each having been modified to suit the needs and the convenience of the various operators. By means of the former, the hypophysis may be reached either through the middle or the anterior cranial fossa, and the operation may be performed extradurally or intradurally.

In 1893, Caton and Paul (*Brit. Med. Jour.*, 1893, p. 1421) conceived the idea of removing a hypophyseal growth through the middle cranial fossa by elevating the temporosphenoidal lobe, but as it happened the patient died before the operation was performed. Horsley (*Brit. Med. Jour.*, 1906, i, 323) later removed a cyst of the hypophysis by this method, and recommends early incision of the dura. Dahlgren is also reported to have operated successfully through the middle fossa, but no details of the operation are to be found. Paulesco, Cushing and Caselli have used a very similar method in their experimental work. In 1910, Silbermark (*Wien. klin. Wchnschr.*, 1910, xxiii, 467) developed a temporal intracranial method on the cadaver, consisting of a bilateral craniectomy—the counter-opening allowing dislocation of the temporal lobe without danger of compression. This operation, however, has never been performed on the living. While this method has proved very successful in canine and other experimental hypophysectomies, it seems scarcely adapted to man except in very rare instances, such, for example, as when a cyst or tumor of the pituitary extends into the infundibular region, and little attention has been given of late to this procedure.

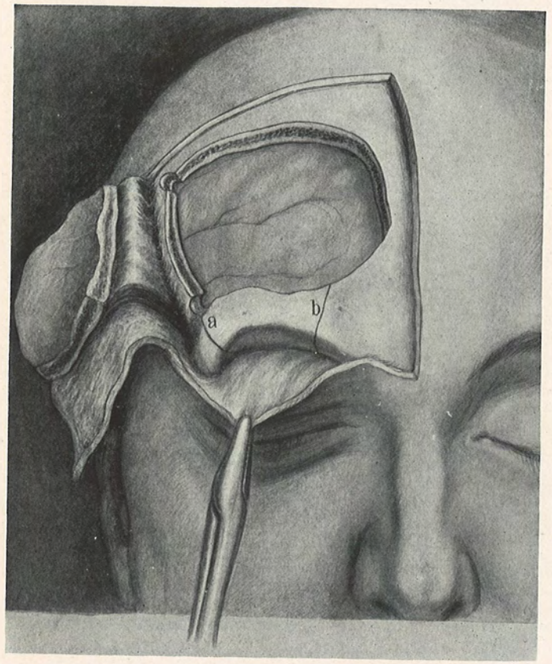
Krause (*Deu. Klin.*, 1905, viii, 1004) was the first to suggest approaching the hypophysis through the anterior cranial fossa, by resecting the frontal bone and proceeding extradurally until the lesser wing of the sphenoid is reached, at which juncture the dura is incised and the hypophysis

FIG. 1.



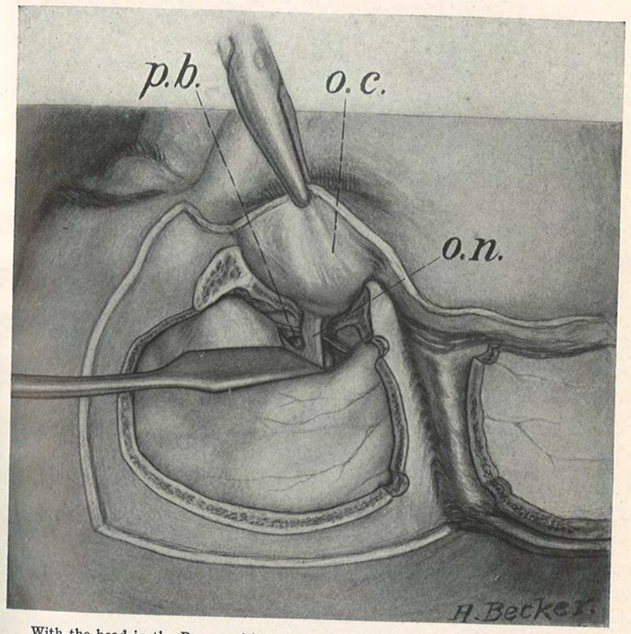
Drawing showing the relation of the incision to the eyebrow and the hair line.

FIG. 2.



Showing the reflection of the osteoplastic flap and between lines (*a*) and (*b*) the portions of the supra-orbital ridge to be resected.

FIG. 3.



With the head in the Rose position, after the supra-orbital ridge and what remains of the roof of the orbit have been removed, the frontal lobe is elevated with a retractor and the orbital contents are displaced downwards, exposing the optic nerve and immediately to the left of it, the pituitary body; *o.c.*, orbital contents; *p.b.*, pituitary body: *o.n.*, optic nerve.

easily exposed. Borchard (*Centralbl. f. Chir.*, 1908, lxvi, 332) tried to remove a hypophyseal tumor by the above method, but was obliged to abandon the operation because of hemorrhage. Kiliani (ANN. SURG., 1904, xl, 35) elaborated Krause's technic somewhat and advocates immediate incision of the dura. In 1908, McArthur performed an operation somewhat similar to Krause's with an unsuccessful outcome. He has since modified his technic, but has not to my knowledge practised it on the living subject. Last year Bogoiavlensky (*Jour. de Chir.*, 1912, viii, No. 4) performed the first successful operation through the anterior cranial fossa by a method very much like Krause's.

Most of the operations thus far have been by extracranial methods, and the surgery of the hypophysis is usually said to have its advent in 1907, when Schloffer performed his first fairly successful operation, approaching the hypophysis by the extracranial and transphenoidal route, though the experimental work of König, Löwe, and especially Giordano had paved the way for the development of Schloffer's technic. The latter, however, was somewhat crude and mutilating in character, and it has remained for others to alter and refine it. Thus, in chronological order, we find Kanavel (*Journal A.M.A.*, Nov. 20, 1909) and his intranasal operation, in which the nose is reflected upwards; Halstead (*Surg., Gyn.*, and Obstet., May, 1910) and his oronasal operation, in which the incision is made in the mucous membrane beneath the upper lip; and Hirsch (*Jour. A. M. A.*, vol. lv, p. 9) with his endonasal method. The latter is the operation of choice of all the transphenoidal methods, the conspicuous feature of which is the submucous resection of the septum and vomer, thus minimizing the danger of infection. During the past year Chiari (*Wien. klin. Wchschr.*, 1912, xxv, 1) performed two operations by a slightly different technic. He makes an incision from the inner edge of the orbit along the outer margin of the nasal bone down to the maxillary process. The eyeball is then drawn outward, the posterior part of the nasal septum and the sphenoidal septum are resected, and the hypophysis exposed. The disfigurement, Chiari claims, is slight,

as only a small portion of the nasal framework is removed. Still a different method has very recently been devised by Biehl (*Zentralb. f. Chir.*, 1912, Jan. 6) in experimental work, consisting in a suprahyoid pharyngotomy. By drawing aside the soft palate with the tenaculum, the base of the skull covering the nasopharynx up to the bifurcation of the septum is bare. The soft parts are pushed aside, under wall of the sphenoidal sinus opened, floor removed, and hypophysis readily exposed. This gives a broader approach than most extracranial methods, and has been found by Biehl very successful on the cadaver.

With one and all of these transphenoidal operations, however, there are two serious injections: One, the inevitable risk of infection from the mucous membrane. This has proven the determining factor in almost all of the 30 fatal cases. The second objection is the rather contracted avenue through which one must work to reach the sella turcica, and difficulty in securing an adequate exposure of the sella turcica and contents. The variation in size of the sphenoidal cells is a disturbing factor. When of comparatively large dimensions exposure is not so difficult; quite as often one will find cells of small dimension, through which exposure is correspondingly contracted.

I am very much in doubt whether eventually the transphenoidal route will be the operation of choice, and although there are some conditions in which this method will have to be resorted to, I believe in the future preference will be given to the intracranial route through the anterior cranial fossa. With this in mind, I have endeavored to elaborate a technic which will make the exposure of the hypophysis as feasible as the exposure of other basal structures, such as the Gasserian ganglion. The procedure, which I resorted to lately, seems to me the safest and most rational that has come to my notice. The operation consists essentially in the reflection of an osteoplastic flap from the right frontal region, in the removal *en bloc* of the supra-orbital ridge as suggested by McArthur with a portion of the roof of the orbit, later to be replaced, and in rongeuring away what remains of the roof of the orbit down to the optic foramen. With the elevation of the frontal lobe and

the depression of the orbital contents, a free and adequate exposure is secured, and there remains only to make a short incision in the dura to lay bare the cavity of the sella turcica.

In a case referred to me recently by Dr. Franklin E. Murphy, of Kansas City, the patient, a young man of twenty-three, had been a normal child up to the age of fourteen, when he was struck with a rock over the right temporal region. Two years later, he grew perceptibly weaker, his weight began constantly to increase, and he was gradually losing the sight of his right eye. When he first came under my observation in July, 1912, his appearance was that of a thickset boy of fifteen or sixteen, with very marked panniculus adiposis. The genitalia—infantile in type—suggested a child of ten or twelve. He had an enormous appetite, and was suffering from severe headaches and occasional nausea. The ocular disturbances had advanced to a state of complete right temporal hemianopsia. Aside from these marked glandular symptoms, the X-ray findings were very suggestive of pituitary trouble. As the latter showed no material deepening of the sella turcica, I felt that the lesion would be readily exposed from above. Under intratracheal anæsthesia, the operation was carried out in the manner above described. As soon as the anterior clinoid process was reached, a transverse incision, two centimetres long, was made in the dura across from one anterior clinoid process to the other and about a centimetre above the base of the skull, and with a retractor suitably placed there was seen projecting upward between the optic tracts what proved afterward to be a pituitary cyst. The cyst was opened and evacuated. The operation was devoid of any serious difficulty, and afforded a splendid exposure of the region of the sella turcica.

This method,[1] which is a modification of McArthur's, has certain advantages over the latter's; chiefly, in that the reflection of the osteoplastic flap from the frontal region admits of greater elevation of the frontal lobe and a correspondingly freer exposure of the deep-seated structures. This is a point of considerable importance. Secondly the portion of bone to

[1] Since the reading of this paper this operation was repeated in a second case with equally gratifying results.

be resected, including the supra-orbital ridge and a portion of the orbital roof, is of smaller dimensions. As this bone must be replaced for cosmetic reasons, its nutrition will be more readily supplied than the larger fragment of McArthur's operation, and necrosis is less likely to occur. This infrafrontal route deserves careful consideration in the selection of methods for hypophyseal operations. The presence or absence of a scar in the median line of the forehead is a matter of little consequence compared with the importance of selecting a method which ensures a minimum of risk to life with a maximum of exposure.

While it is still a matter of speculation which of the two methods, the extracranial or the intracranial, will become the conventional procedure, for the time being at least the operator should be influenced by the contour and conformation of the sella turcica. Ever since Oppenheim in 1899 discovered that enlargements of the sella could be reproduced by the X-ray and correlated with an increase in size in the gland itself, the radiograph has held an important place in the diagnosis and later in the mode of removal of tumors in the uncinate region. Thus, when the radiograph shows the sella deepened and encroaching upon the sphenoidal cells with a narrow orifice, access to the hypophysis from above, that is by one of the intracranial routes, is difficult and preference should be given to the transphenoidal method, in which the approach is made from below. When, however, the sella, whether deepened or shallow, has an enlarged orifice, showing its contents have encroached on the brain and not the sphenoidal cells, the transphenoidal method is practically impossible and one of the intracranial routes is indicated. In eleven out of fourteen deaths following a transphenoidal intervention (*Toupet, Revue de Chir.*, 1912, vol. xxxii, No. 6) autopsy showed that the tumor had encroached upon the intracranial space. It is very likely that the outcome in these cases might have been quite different had the intracranial method been applied.

Thus, we see there are cases in which the intracranial method is positively indicated and should be given preference. It gives a broader avenue of approach and lessens danger of infection.

Dr. John H. Jopson mentioned a case of fracture of the skull in which the line of fracture extended to the roof of the orbit and the patient developed a panophthalmitis. Dr. Shoemaker, who performed the enucleation, stated at the time that this condition was a not infrequent complication of fractures involving the orbit. It had occurred to him that in the operation described by Dr. Frazier, some such pathological condition in the eyeball might result.

Dr. Charles H. Frazier remarked, in response to what Dr. Jopson had said of involvement of the orbit, that great care should be exercised in separating the periosteum from the roof of the orbit before any attempt is made to remove the bone. The periosteum is quite thin there and may be readily torn unless one proceeds cautiously. It is rather presumptuous at this juncture to say that the transfrontal method of approach will be preferred to others, particularly the transphenoidal route. He could not, however, help but feel that surgeons will never become accustomed to working through such a long and contracted avenue as is necessary when approaching the sella through the sphenoidal sinuses. For the nasal specialist who is accustomed to open and drain the sphenoidal sinus, it may be a simple matter to go a step further and remove the thin shell of bone which forms the floor of the sella turcica. Or if nothing more than the removal of the floor of the sella, a sella decompression, is contemplated, the transphenoidal route may be given preference; but if one wants an exposure of the sella turcica sufficient to enable one to see the character of the lesion to be dealt with, some method other than the intranasal method of approach will be found to be absolutely essential.

FORMATION OF AN ARTIFICIAL VAGINA BY INTESTINAL TRANSPLANTATION.

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ABSENCE of the vagina may be congenital or acquired, if one can define a loss as an acquisition. In the former the internal organs of generation generally share in the aplasia, but not infrequently the ovaries are present and functionally active. In obliteration of the vagina consequent upon cicatricial contraction the result of traumatism, operations, cauterization, or the severer forms of vaginitis, the uterine cavity and the ovaries likewise may have been destroyed or the uterus and the ovaries may have been removed, but in many instances they remain unaffected physically and physiologically. The functions of the vagina are to drain the menstrual fluid, to serve as an organ of copulation, and to act as a birth canal. If the vagina is absent and the internal organs of generation are healthy, there is no question as to the necessity for the creation or the restoration of the vagina, first and above all to permit the retained menstrual fluid to escape, and second, if the patient is married or contemplates marriage, to allow sexual intercourse. It is doubtful whether any artificial vagina would serve as a birth canal. Of course one could, instead of building a vagina, suppress the menstrual function by removing the uterus or the ovaries or both the uterus and the ovaries, but all would agree that these organs should be preserved unless their condition demands their removal. If the internal organs of generation are absent or functionally inert, should a vagina be formed merely for the purpose of sexual intercourse? This is the question with which we were confronted in the case herewith reported.

The patient, a woman aged forty-three, entered the Penn-

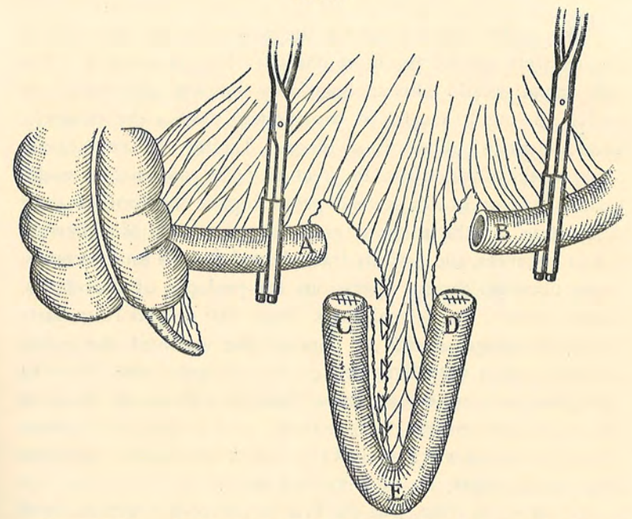
sylvania Hospital August 30, 1911. Seven years before admission a panhysterectomy had been performed in a neighboring hospital for carcinoma of the uterus. The bladder was accidentally torn or cut during this operation, and several attempts were made subsequently to close the resulting vesicovaginal fistula, all, however, without success. Upon examination the vagina was found to measure about two inches in depth and two inches in width. At its upper end was an opening, the size of a quarter of a dollar, leading into the bladder, which was markedly contracted and somewhat inflamed. After several superficial ulcerations which were present in the vagina had been induced to heal, we attempted to close the fistula in the following manner: The entire vaginal mucous membrane was excised, except over an area on the posterior wall corresponding in size to the opening in the bladder. The posterior vaginal wall was then separated from the rectum, and sutured to the anterior vaginal wall with catgut sutures, the undenuded area being fitted to the opening in the bladder. The perineum had been split to facilitate these manœuvres, and the split, together with the space existing between the rectum and the new floor of the bladder, was now closed with buried catgut sutures, and a few sutures of silkworm-gut emerging on the skin of the perineum, thus obliterating the vagina. In separating the posterior vaginal wall from the rectum, scissors had to be used freely because of the large amount of scar tissue resulting from a previous perineorrhaphy, and during one of the snips the rectum was unexpectedly wounded. The small opening in the rectum was immediately sutured and gave no further trouble. The bladder was drained for 10 days by means of a retention catheter passing through the urethra. At the end of two weeks, there having been no leakage in the meantime, an assistant, without orders, irrigated the bladder because of the turbidity of the urine. Following this a small urinary fistula, finding exit on the perineum, was discovered. During the day the patient passed most of the urine through the urethra, but at night there was a constant dribble. The patient left the hospital, and returned at the end of three months asking that the vagina be reopened. She was content to endure the leakage of urine, but

stated that she must have a vagina or her husband would desert her. At first we demurred, but her pleadings were so earnest that we consented on the condition that the other members of the Surgical Staff agree with her as to the necessity for the building of a new vagina. Drs. Harte, Hutchinson, Gibbon, and LeConte, of the Hospital Staff, and Dr. Binney, of Kansas City, who was visiting the hospital at that time, examined the patient, and all unhesitatingly took sides with her, one of the gentlemen stating that any operation destined to preserve the marital relations and keep the home intact was not only justifiable but mandatory. We selected intestinal transplantation as the method most likely to give an enduring success. The nature and the possible dangers of the operation were explained to the patient, but she was not to be frightened. Loss of life meant less to her than the loss of her husband.

Accordingly the operation was performed, November 16, 1911, before the Congress of Surgeons of North America, which met at that time in Philadelphia. The patient was placed in the lithotomy position, an incision made between the labia, and a space created between the bladder and the rectum by blunt dissection, which space was cautiously deepened until the peritoneum had been opened. A temporary tampon was then inserted, the patient placed in a horizontal position, and the abdomen opened by a longitudinal incision above the pubes. Our idea was to use, instead of the small intestine, the sigmoid flexure, because of its larger size and the absence of digestive juices, but finding its mesentery too short we were forced to select a segment of the ileum. A coil not far from the cæcum was drawn from the abdomen and found to reach well down over the pubes without tension. Both limbs of this coil, which measured about ten inches, were ligated and severed from the remaining small intestine, upon which clamps had been placed, and the ligated ends invaginated with silk sutures, the free ends of the ileum being united end to end by simple sutures. The mesentery attached to the distal (cæcal) half of the isolated loop of intestine was now ligated and divided, so that there should be no tearing of the mesentery when the loop was drawn down to the vulva, and so that the site of anastomosis would not be dragged down into the pelvis and thus predispose to kinking

(Fig. 1). Long forceps were now passed up through the space between the bladder and the rectum by an assistant, and the piece of intestine which had been severed from its mesentery drawn out through the vulva. The vesical peritoneum was next sutured to that of the sigmoid around the transplanted intestine, and the wound in the anterior abdominal wall closed. The patient was again placed in the lithotomy position, that part of

FIG. 1.



Segment of ileum (C E D) isolated, the ends C and D ligated and invaginated, and the mesentery along the distal half (from C to E) tied and cut. The end C was drawn out through the space between the bladder and rectum, the bowel at E attached to the vulvar orifice, and the excess (from E to C) cut off. The ends A and B were united by end-to-end anastomosis.

the ileum lying against the opening in the bladder fixed in position with catgut sutures, thus closing the fistula, the intestine protruding from the vulva (*i.e.*, that portion which had been severed from its mesentery) cut off, and the open end of the intestine sutured to the vulvar orifice. The new vagina was filled with gauze, so as to press its walls against the walls of the space between the bladder and the rectum.

The convalescence of the patient was uneventful, except that after a few days urine began to trickle from a small opening just below the urethral orifice. One year later the vagina admitted the index and the middle fingers for their entire length, and was performing the function for which it had been designed. Although there was still some leakage of urine the patient expressed herself as satisfied with the result, and refused further interference for the repair of the fistula.

The earlier operations for the formation of an artificial vagina were among the most unsatisfactory in surgery. The new canal would almost invariably become obliterated or useless, owing to cicatricial contraction, despite the energetic employment of dilators or plugs. Lining the raw cavity between the bladder and the rectum with epithelial or endothelial flaps or grafts seemed promising at the time of their application, but the ultimate results were failures. Mackenrodt, in two instances, successfully transplanted flaps of mucous membrane obtained during operations for prolapse of the uterus. Others turned in dermal flaps from the neighboring parts (Abbe, Burrage, Beck) or papered the walls of the newly formed vagina with Thiersch grafts. Stoeckel and Von Ott split Douglas's cul-de-sac, drew flaps of peritoneum down to the vulva, where they were sutured, and packed with gauze. When the gauze was removed the vagina contracted. Dreyfus ingeniously made use of a hernial sac.

Gersuny, in 1897, was the first to utilize the rectum, or at least a part of it. He fashioned a pedunculated flap, attached above, from the anterior wall of the rectum, sutured this flap beneath the bladder, and then closed the wound in the rectum. The sphincter ani was cut, so that there would be no constipation and interference with healing. The anterior vaginal wall was thus covered with epithelium, which, it was hoped, would finally extend over the entire raw surface. Two cases were treated in this manner. One had, at the end of ten months, a vagina completely lined with epithelium which admitted the index finger; the result in the second case is not known.

In a third case of the same kind small grafts of epithelium were placed also on the posterior wall of the new vagina. A rectal fistula followed but finally healed, and at the end of five and a half months the vagina measured 9 cm. long and 7 cm. in circumference. Pupel operated in a similar way, with a rectal fistula and narrowing of the vagina as a result. Amann modified the Gersuny operation by forming the rectal flap into a tube, a procedure requiring an unusually large rectal ampulla. Shubert cut the rectum at each extremity, closed the upper end, displaced the rectum forward, and sutured the sigmoid to the sphincter ani. Four months later the result was satisfactory, except for a tendency to narrowing at the vulvar orifice. Albrecht did the same sort of an operation, except that he used the sigmoid instead of the rectum. Sneguireff resected the coccyx, severed the rectum at its upper part, sutured the lower end of the upper segment of bowel into the wound, thus establishing an artificial anus, and closed upper end of the rectum, which was then used as the vagina. Most writers heap reproaches on this operation, for obvious reasons.

All continental writers, with the exception of De Bovis, give Häberlin (1907) the credit for suggesting transplantation of the small intestine for the purpose of forming an artificial vagina. As a matter of fact, the operation was devised by J. F. Baldwin, of Columbus, Ohio, in 1904, and first performed by him three years later. Since this time he has operated upon three additional cases, using the small intestine in each instance. Baldwin's method consists in opening the abdomen and drawing a coil of ileum down to the vulva by means of forceps, introduced through the space previously created between the bladder and the rectum. The upper ends of the coil are then severed and each end closed by an inversion suture, the continuity of the remaining bowel being restored by end-to-end anastomosis. The abdomen is then closed, the patient placed in the lithotomy position, the loop of bowel, still held with the forceps, opened and sutured to the skin, and each limb of the loop packed with gauze.

Thus there are two vaginas, the septum between which is removed in ten days or two weeks by clamp pressure. In addition to the four cases reported by Baldwin the small intestine has been employed in six instances to form an artificial vagina, thus making ten in all. Stoeckel (1912) and Abadie (1912) each proceeded in substantially the same manner as Baldwin. Mori (1909), Mueller (1910), and Halbans (1912) isolated a segment of ileum, closed the upper (oral) end, and dragged the other (cæcal) end down to the vulva, re-establishing, of course, the intestinal canal by anastomosis. It is difficult to understand how, without dangerous cutting or tearing of the mesentery, this dragging down of one end of the isolated segment could be accomplished, unless the site of anastomosis also was dragged down into the pelvis and kinked. In order to avoid this traction on the site of anastomosis, without compromising the nutrition of the bowel, and desiring to construct a single vagina, instead of a double vagina as in the Baldwin operation, we removed a portion of the bowel, as described above. If the uterus had been present we should have sutured the upper end of the transplanted bowel around the cervix.

Of the ten patients thus far operated upon all recovered and secured an excellent result. Stoeckel found that in his case the mucous membrane of the transplant continued to elaborate intestinal juices, and that the amount varied with the character of the food taken into the stomach; thus on an albuminous diet the total quantity of secretions in 24 hours was 6.2 c.c., on carbohydrates 3.7 c.c., and on fats 2.1 c.c. Stoeckel calls attention also to the increased danger of absorption and poisoning if corrosive sublimate, carbolic acid, lysol, or other strong antiseptic is employed as a vaginal douche.

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STATED MEETING HELD DECEMBER 2, 1912

DR. GWILYM G. DAVIS, President, in the Chair.

INFECTIONS OF THE HAND.

A REVIEW OF 90 CASES.

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THIS study is based upon all the cases of infection of the hand treated in the German Hospital Surgical Dispensary from April 1, 1912, to October 1, 1912. Ninety cases in all were treated during these six months, and it is of incidental interest to note that during this period only five cases of infection of the foot presented themselves for treatment.

In the main we followed closely the anatomy, diagnosis, and treatment as urged by Allen B. Kanavel, of Chicago, in his most excellent book, "Infections of the Hand." This line of treatment was a radical departure in several respects from our former treatment, but as the first few cases so treated gave such splendid results, we have been using Kanavel's method or a modification ever since.

The less severe cases will be taken up first, as we wish to reserve the deep infections for more emphatic discussion. Under the less severe infections come felons, paronychiæ, carbuncles, furuncles, infected blisters and cuts, and other superficial infections.

Felons (*Nine Cases*).—By "felon" we mean an infection occurring within the closed connective-tissue space which exists in the pad over the palmar surface of the distal phalanx of the thumb and fingers. Seven of these cases were seen before pressure had shut off the vessels supplying the diaphysis of the distal phalanx and thereby caused osteoperiostitis. These cases were at once arrested, and made rapid and complete recovery by making a deep lateral incision, opening the perios-