days after the operation, but was discharged well with her child on the twenty-second day. At the end of her following pregnancy, she entered the hospital to be delivered by section. Labor pains began soon after her entrance and became vigorous. While the patient was in transit from the ward to the operating-room, uterine rupture took place. Section was quickly performed. The child and placenta were found in the abdominal cavity; the child was living and was immediately delivered. The uterus had ruptured in the previous scar. Hysterectomy was performed, leaving the ovaries. Mother and child left the hospital well on the twentieth day. On examination of the uterus, it was found that the scar had separated through half its extent; the remaining half was firm and could be detected only by the white line in the overlying serosa.

One can readily understand how a uterus containing a scar, the result of improper healing, could rupture if it were overdistended as in excessive liquor amnii, twin-pregnancy, or as the result of intra-uterine manipulation. Another factor that may weaken a scar that has healed by granulation is the implantation of the placenta on it. A study of sections taken from the edges of the uterine wound demonstrated the fact that in my case the implantation of the placenta on the scar certainly weakened it so that with the first contractions the increased tension caused the uterus to rupture.

How does the implantation of the placenta on the scar weaken it? Starting in with an infected uterine wound, the scar that results contains granulation tissue, no matter how slight. This soft connective tissue soon becomes covered with endometrium and the uterine glands penetrate it. As pregnancy ensues the endometrium is converted into decidua which forms a looser and softer tissue. Trophoblastic tissue and chorionic villi, with their burrowing and penetrating properties, invade the loosened and softened scar and weaken it so that it is a question whether or not it can stand the strain and stress of labor.

A peculiar feature about my case was the comparative absence of symptoms and the mildness of those present. As a rule, one can generally obtain a history of a sharp, shooting pain in the abdomen followed by a sensation as if something had given way. In some instances the patient may collapse as a result of shock, but this was not true in my case. Hemorrhage was also absent. The only symptoms of which the patient complained were (1) slight bearing-down pain, irregular and indefinite in character; (2), a feeling of weight in the lower abdomen, more marked on standing. The signs that I secured on examination were: a slightly distended abdomen with a history of constipation, absence of nausea and vomiting; no fever. Abdominal palpation gave very few data. I mapped out the fetus as if it occupied the left occipito-anterior position, and when we opened the abdomen, there it was, wedged in in that position. I am repeating these symptoms to show how insignificant they were, while the patient was going about with the child and secundines in her abdominal cavity. Williams⁸ of Johns Hopkins, says that "in some cases the patient merely complains of malaise, grave symptoms only occurring later as the result of infection or putrefaction of the fetus. Thus, in one of my cases, two weeks elapsed before the appearance of alarming symptoms." Hartman⁹ has drawn similar conclusions; he says: "These cases seem peculiar in that the

patients complain of very little pain at time of rupture and seem much less disturbed than in cases in which rupture had occurred without section." The fact that vaginally I could not feel the presenting part was conclusive evidence to me that the uterus had ruptured and that the fetus had escaped into the abdominal cavity.

Just a word as to the operative treatment. Each case is a case *per se*. If the rent is a partial one, or one the margins of which are not jagged, the operator can resect the scar tissue, freshen the edges and sew up the wound; on the other hand, if the tear is extensive and irregular, it is far better to do a supravaginal amputation. In case the mother has two children or more, and the uterus is left behind, I would certainly sterilize her unless the parties concerned object.

CONCLUSIONS

1. A cesareanized woman who gives a history of an infection with a purulent vaginal discharge in the puerperium is a good candidate for rupture of uterus in one of her subsequent pregnancies.

2. The mere fact that a cesareanized woman has delivered herself spontaneously is no reason for believing that she is free from the danger of rupture of the uterus with her future pregnancies.

3. Rupture of a cesarean-section scar generally takes place in a scar resulting from improper wound-healing in the presence of infection.

4. The implantation of the placenta on the site of the scar may so weaken the uterine tissue that it may rupture under the strain and stress of labor.

5. I firmly believe that cesarean section should be limited to those cases in which it is strictly necessary. If there is any possible chance for the uterine wound to become infected, some operative measure for sterilizing the patient should be employed.

6. A cesareanized woman should be in a maternity hospital during the last month of her subsequent pregnancies so as to be under constant medical supervision.

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THE CONSERVATIVE TREATMENT OF UNDESCENDED TESTICLE *

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Although more than thirty years have passed since Schüller¹ described his operation for bringing the undescended testicle into the scrotum, and although in this time many other observers have reported series of cases and personal experiences, many surgeons still doubt the practicability of the operation and in dealing with this condition advise excision of the undescended testicle as the operation of choice.

Rawling² is the most prominent advocate of excision as the operation of choice, his conclusions being based on a study of the results of 120 cases.

Opposed to Rawling we have on the other hand numerous reports, including those of Brocha, Bevan and Coley.

The important questions to be decided regarding this operation are, first: Is the non-descended testicle worth

8. Williams: Obstetrics, New York, D. Appleton & Co., p. 861.
9. Hartman: Ztschr. f. Geburtsh. u. Gynäk., 1908, No. 62.

* Read before the Southern Surgical and Gynecological Association, Atlanta, Ga.

1. Schüller: Ann. Anat. and Surg., 1881, iv, 89.

2. Rawling: Practitioner, London, August, 1908, p. 250.

saving? Second, Is it technically possible to bring such a testicle into the scrotum in a manner that will preserve its vitality? With these points in mind I have studied the histology of undescended testicles removed at operation, the literature on the subject and the end-results of sixteen operations in which I have placed the testicle in the scrotum.³

This study is limited to cases of undescended testicle as distinguished from those of malposition of the organ.

The undescended testicle may occupy any position in the normal route of descent of the gland. Three general divisions are made, (1) abdominal, (2) inguinal and (3) puboscrotal, these divisions being made by the relation of the testicle to the internal and external abdominal rings. One form may pass into the other according to various circumstances. For instance, a testicle arrested in the inguinal canal may gradually pass down outside the external ring and even into the normal position in the scrotum. The last-mentioned result is rarely observed except in childhood. Or, an inguinal testicle may be forced back into the abdomen by external violence or muscular contraction.

In the older literature practically all the attention is concentrated on the occurrence of malignant change in an undescended testicle, and consequently excision was the only treatment considered. Later study shows the frequency of malignant disease in undescended testicle to be less than was supposed and nearly always to occur in cases of inguinal retention, in which the greater exposure to trauma explains susceptibility to malignant change. As will be shown later, it is in this inguinal form of non-descent that the operative treatment is most successful in securing both normal position and good nutrition for the testicle.

The histology of the undescended testicle varies in wide limits. A very complete study of the pathology of the undescended testicle has been published by Uffreduzzi.⁴ He distinguishes four types of undescended testicle: (1) those with few signs of disturbed development; (2) those with marked disturbance; (3) those showing distinct senile retrogression, and (4) those consisting largely of edematous fibrous interstitial tissue.

The changes occurring at puberty in the normal testicle seem delayed in the undescended gland. This is indicated for the most part by the persistence of the interstitial cells in large numbers. In the specimens which I have examined, spermatogenesis was observed in three of the seven cases in which the testicle was removed from young adults. This proportion of spermatogenic activity is about the same as that reported by Odiorne and Simmons,⁵ who found adult spermatozoa in four of nine testicles examined, and a few tubules containing spermatogonia in one of the remaining five cases. In the remaining cases the histologic picture resembled the infantile type of testicle four times, and the senile testicle twice.

3. These patients came under my care in St. Agnes' and the Mercy hospitals, Baltimore, between the years 1906 and 1913. During this time there were also admitted to St. Agnes' Hospital four patients with undescended testicles, in whom the organ was not transplanted into the scrotum. In three cases the testicles were excised. All of these were unilateral retentions, occurring in young adults, and were complicated by hernia. One of these excised glands contained several tubules showing active spermatogenesis. The others were atrophic. The fourth patient was a child of 10 with a left-sided retention. There was no hernia and at operation a most diligent search failed to reveal the presence of a testicle or vas deferens on the affected side. The cremaster muscle was well developed, but the internal ring was entirely closed. We have had no case of malignant tumor in an undescended testicle.

4. Uffreduzzi: Arch. f. klin. Chir., 1913, c. 1151 and cl. 150.

5. Odiorne and Simmons: Ann. Surg., December, 1904.

Imperfect development of a portion of the genital organs in embryonic life gives an abnormal testicle, which does not descend but is retained in the abdomen. With such a testicle the inguinal canal on the same side is usually closed tight, the scrotum atrophied, and the vas and seminal vesicle insignificant. This form of undescended testicle cannot be improved by surgery and seldom requires any treatment. The glandular epithelium, if formed at all, soon degenerates and is absorbed, leaving a fibrous mass to represent the testicle.

On the other hand, there are undescended testicles which have the normal structure of the infantile testicle, but which fail to develop into the adult type when allowed to remain in the abnormal position.

Finally, there are undescended testicles in which spermatogenesis and the other changes characteristic of the adult form develop at puberty, but in which senile changes resulting in atrophy occur very early, unless the testicle is brought into its normal position.

In the two varieties last named the testicle is almost always associated with a congenital inguinal hernia and has a normally developed vas and seminal vesicle. They are usually situated in the groin, or in the abdomen close to the internal abdominal ring. The spermatic vessels and the vas with its blood-supply may be contained in a mesentery-like fold of the peritoneum, a persistence of the fetal mesorchium; but there is no regular relation of position of testicle with histologic structure or development, and the abdominal or inguinal gland may be fibrous and entirely undeveloped.

These three varieties are examples of the views of Hunter, of Curling and of Monod and Arthaud, respectively, on the cause of the imperfect function of the undescended testicle.

Whether or not a gland of the infantile type will develop all of the adult characteristics after transplantation into the scrotum is not certain. The transplantation undoubtedly is a factor in the production of those changes which are associated with the development of secondary sexual characteristics.

It is difficult to arrive at a conclusion regarding the subsequent development of the spermatogenic function in these infantile glands. Experimentally, with dogs, Griffiths⁶ has proved the converse to be true, namely, that when the fully descended testicle is replaced in the abdomen the gland becomes soft and small and never shows active spermatogenesis. Schmidt⁷ shows that when the immature testicle is transplanted into the abdomen, it develops to the extent of forming spermatocytes, but then gradually degenerates. In man it is probable that spermatogenesis when developed persists for only a short time, and that the testicle rapidly passes into the senile form.

It is generally agreed that the testicular changes incident to puberty are delayed or prevented by the faulty position of the undescended testicle. It is, therefore, important to transplant such testicles into the scrotum before puberty. Spontaneous descent may occur in young children, but is rare after ten years. It is at this age, therefore, that operation becomes necessary, and for double non-descent imperatively so, because unless transplanted, both glands are very likely to remain infantile or become functionless.

For single non-descent I think that the operation is almost equally important. Disease or injury of the other

6. Griffiths: Jour. Anat. and Phys., 1893, xxvii.

7. Schmidt: Beitr. z. klin. Chir., 1912, lxxxii, 36.

testicle may occur at any time and so render it useless, or even require its removal.

After puberty the undescended testicle is unlikely to develop adult characteristics. In most cases even after transplantation into the scrotum it does not develop further, and often atrophies. There are cases, however, in which the opposite result occurs. This is proved by the occurrence of active and potent spermatozoa in the semen of persons in whom both testicles have been transplanted after puberty. In one of my cases the patient was 30 years of age at the time of operation. Both testicles were in the abdomen and were complicated by hernias. Both were brought into the scrotum, after division of the spermatic vessels. Eighteen months after the operation the patient became the father of a child. Whether this case is one of those in which the undescended testicle had taken on the changes of puberty and possessed spermatogenic function at the time of operation, or whether the testicle has developed in its present position, cannot be decided. This much at least is proved: the operation did not destroy the vitality of the testicles, and a recent report from the patient states that their form has been preserved.

In operating for the relief of undescended testicle we find that the obstacles to our placing the gland in the scrotum consist of adhesions between the structures of the cord and the vaginal process of peritoneum, with more or less tortuosity and adherence of the spermatic vessels. These barriers must be removed, if the gland is to be properly placed in the scrotum.

Unless the structural shortening of the cord is overcome by division of these contracted tissues, no fixation will retain the testicle in the scrotum. The Bevan⁸ operation furnishes a method by means of which we are able to accomplish this end. The ultimate success of the Bevan operation depends on the great factor of safety provided in the blood-supply of the testicle. Either the spermatic or the deferential artery alone seems able to supply sufficient nourishment for the vitality of the testicle. Therefore, in cases in which short spermatic vessels make a persistent barrier to the transplantation of the testicle into the scrotum, these vessels may be divided without necessarily destroying the function of the organ.

Following is a description of the operation done in the present series:

After the usual skin disinfection, the inguinal canal is opened as in the hernia operation. The testicle, if situated in the groin, is lifted up and by gentle traction the cord is put on the stretch. The peritoneal covering is incised around the cord as high up as is possible and the spermatic vessels separated by blunt dissection from their peritoneal covering inside the abdomen. The vessels are now straightened out by dividing all adhesions.

In many cases this loosening gives sufficient mobility to the cord to bring the testicle into the scrotum. Should this prove true the tunica vaginalis is turned back over the testicle and the gland is placed in the scrotum. Usually it is necessary to make a pocket for its reception, by pushing the finger or a clamp into the scrotum.

When the testicle is retained inside the abdomen, the peritoneal cavity is opened through the hernial sac, which is usually present, or the wall is incised in the region of the internal ring. The testicle may be found in the abdomen, with the structures of the cord in the canal; or all the vessels and the vas may be retained in the abdomen. In the former event the testicle is drawn out and an attempt is made to

lengthen the cord by division of adhesions, etc., as just described. With the latter condition it is usual to find a mesorchium, the vessels showing plainly through the peritoneal covering. This mesentery-like structure fixes the testicle to the abdominal wall and must be divided in order to gain sufficient mobility for the transplantation. The testicle with its mesentery is brought out through the wound and the vas with its vessels separated from the spermatic group. The two sets of vessels are easily distinguished coming from different directions inside the peritoneal fold.

The spermatic vessels are doubly ligatured and divided. The peritoneum is split so as to bring the vas and its vessels with the testicle into the inguinal canal and the scrotum. Enough peritoneum is retained to form a coat for the testicle.

The division of the spermatic vessels removes the greatest factor in the shortening of the cord and should be done whenever the separation of adhesions, etc., do not give sufficient length to permit the testicle to rest easy in the scrotum. A slight gain may be obtained by shortening the distance from the abdomen to the scrotum. This is accomplished by dividing the floor of the canal down to the deep epigastric vessels. This was done in one case and thereby the spermatic vessels were preserved. I have never been required to ligate the epigastrics and carry the opening of the floor beyond them, as recommended by Davisson,⁹ although this maneuver should be considered before resorting to excision of the testicle.

In closing the canal a stitch is taken through the pillars of the external ring and the cord, fixing the latter structure. In other respects the closure is the usual one made for inguinal hernia without transplantation of the cord.

In my experience the immediate result has been good in all cases and the ultimate result, for periods ranging from three months to seven years, in all cases has been satisfactory. There has been no gangrene of the testicle even in the cases in which the spermatic vessels were divided. All the hernias are cured. No testicle has retracted out of the scrotum, and there has been no gross atrophy of the transplanted organ.

All sixteen cases were associated with hernia. One hernia was strangulated. The spermatic vessels were divided four times. There were four bilateral cases, three left-sided and nine right-sided single retentions. Of this number ten patients have been examined or heard from during the past two months. The bilateral cases have been watched very carefully and three of the four have reported. One of them is the adult mentioned above. The two boys were 12 years old at the time of operation. Both were quite undeveloped and showed absence of pubic hair and other secondary sexual characteristics. Both have since developed these characteristics. In one the change occurred very promptly and was marked four months after the operation. The other boy required nearly a year for the change to be noticeable. These boys were operated on fifteen and twenty-four months ago, respectively. In the earlier operation the spermatic vessels on one side were divided.

In the remaining seven cases the patients were operated on from three months to seven years ago.

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9. Davisson: Surg. Gynec. and Obst., 1911, xii, 283.

8. Bevan, Arthur Dean: The Surgical Treatment of Undescended Testicle, THE JOURNAL A.M.A., Sept. 19, 1903, p. 718.

Politics and Health Administration.—Politics has been a curse of health administration in this country. Politics and sanitation do not mix. One of the important things is to divorce the two. Only those should be appointed to the position of health officer whose training adequately prepares them for the work. Such persons should be given compensation commensurate with their great responsibility, and the tenure of office and other conditions should be attractive so as to induce competent men to enter and build up the profession.—M. J. Rosenau in *Vermont Med. Month.*