CASE V.—Mr. A. W.—Suffering from well-marked hard sore, resulting from infection five weeks previously. Given first intra-muscular injection March 17th, min. v. Dose repeated 24th, 31st, and April 7th. Sore began to heal after second injection; was healing rapidly on April 7th, and no constitutional symptoms have yet appeared beyond the local induration, which is retrograding.

I could multiply cases, but the foregoing are sufficient to illustrate the effect which may be expected from this method of treatment, both in chronic syphilis and in recently infected patients.

ART. XVI.—*Suprapubic Cystotomy in Children.* By CHARLES GREENE CUMSTON, M.D.; Surgeon to the Boston Floating Hospital for Children; Honorary Member of the Surgical Society of Belgium; Member of the American Urological Association; Corresponding Member of the Urological Association of France, &c., &c., Boston, Mass.

IN considering the subject of suprapubic cystotomy in children it may be well to briefly outline a few considerations relative to the anatomy of the bladder in young subjects, but I have no intention of studying this organ in any detail. All authorities seem to consider that in children the bladder is, so to speak, an abdominal organ; this disposition is merely the result of its development, as we know that it is the pedicle of the allantoid. The small dimensions of the pelvis, all diameters of which are only slightly developed, and the slight elevation of the symphysis pubis only exaggerate this situation. Consequently the greater part of the anterior aspect of the bladder and nearly its entire body are to be found above the pubis. Barkow is most categorical regarding this subject, and according to him the bladder is situated in the abdomen up to the time of puberty. Although less affirmative, Delbet has published a drawing in which the preceding opinion is well demonstrated, and Takahasi, followed by Testut, only confirm Barkow's opinion. This abdominal situation of the viscus is to be remembered. Compressed and applied against the wall by the intestinal coils, the bladder becomes flattened. The urachus pulls upon its upper pole, and it is to these

different causes that its oval and very elongated aspect is due, and later on its great oblique diameter extending downward and backward. It consequently possesses a very distinct anterior and posterior surface, and it is not oval, with four surfaces, as it is later in the abdomen. Delbet insists upon this point, which he says he has distinctly met with in frozen bodies, and states that the cavity of these oval bladders continues almost without transition directly with the urethral cavity. The prostate is only slightly developed at this age, and the slanting of the bladder surface is quite sufficient to explain this anatomical disposition. This situation occupied by the bladder changes its relationships; those of the anterior aspect alone are of interest as far as the subject of this paper is concerned. It has a larger surface of contact with the anterior abdominal wall, and this renders the relationship of the bladder and the rectum less intimate. The peritoneum becomes normally reflected on the anterior wall of the bladder, and the exact knowledge of the point at which the serosa of the bladder forms the cul-de-sac is of capital importance. Various means have been employed by anatomists to give reliable data upon this subject, and in the adult it usually is about 4 centimetres back, and in the latter this should be remembered, but wounding it in the child is more or less exceptional. Since the bladder normally extends above the os pubis it is easy to understand that the point where the peritoneum becomes reflected will naturally be higher up, and in children it has been my experience that whether the bladder is filled or emptied the peritoneum never goes down towards the pubic bone. When the bladder is distended the peritoneum stops at least three centimeters from the upper border of the os pubis, and Pitha believed that this point of reflexion was still higher up; according to him the peritoneal cul-de-sac is situated from $1\frac{1}{2}$ to 2 centimeters above the umbilicus up to the age of eight years. Ballantyne seems to partially adopt Pitha's conclusions, but he believes that from the age of twelve years on, when the organ becomes completely pelvic, the pre-vesical cul-de-sac takes on the same conditions as in adults. If it is rarely wounded during suprapubic cystotomy it is because the peritoneum is not very adherent to the urinary reservoir, and it is easily detached and pushed back

by the operator's finger. We may, consequently, conclude that in children the surgeon will hardly be able to wound the peritoneum during the operation of suprapubic cystotomy, and this fact explains the great success which the older surgeons met with when they undertook this operation.

On the posterior aspect of the bladder the peritoneum extends lower than in the adult, and it even covers the lower part of the prostate. The serous membrane is easily opened during recto-vesical or perineal cystotomy, and this is one of the great inconveniences of these methods and the principal cause of post-operative peritonitis observed after these operations. Another important point is the slight extent of the pre-vesical space. This space, whose importance in the adult is well known, both surgically and pathologically, is not so in children. The bladder, in direct contact with the abdominal wall and against the posterior aspect of the os pubis, partially fills it, and for this reason very little fat is to be found, but nevertheless it should always be carefully drained as in adults.

Then, again, the vascular supply differs in children; the arteries are smaller, but follow the same course as in adults; the veins are still less developed, and it is well known that the plexus of Santorini is extremely reduced in children. The periprostatic plexus is rudimentary, and the entire venous system takes on its development only at the commencement of puberty, to acquire later on that considerable importance which it possesses in old age. We may consequently conclude that in children the anatomical situation of the bladder singularly facilitates its access by the suprapubic route, that on account of its shape it does not possess a fundus in which calculi can collect, and that, because of the poor vascular supply of its walls, hæmorrhage need never be feared as a complication.

The frequency of vesical calculi in children is well known, and it is hardly necessary to say that the two extremes of life are the times when one is most subject to the development of stone. Poor children, the aged rich—such is the classical formula.

In young children it would seem well demonstrated that the uric acid diathesis has no very great influence on the pro-

duction of calculi, and out of 144 cases of stone in the bladder in children, Guersant was unable to find a single instance in which the father had been the subject of calculi. All things taken into consideration, it would appear that vesical calculi are due to bad hygiene and an alimentation too exclusively vegetable to suit the needs of children. However this may be, nothing is more variable than the symptoms which indicate the presence of calculi in them. Beside those cases where the presence of stone is badly supported and is indicated by intense functional phenomena, there are other instances where the affection undergoes its evolution in a most insidious way, and frequently patients are operated on as late as the 20th year who have carried their calculus about with them ever since infancy. The infrequency of hæmaturia, in spite of the violent exercises indulged in by children, is quite remarkable, although the reason for this is not known, but perhaps the poor vascular supply of the bladder at this time of life may account for it. The symptoms observed are frequently attributed to reflex phenomena supposed to be due to a marked degree of phimosis with incontinence of urine, which is frequently noted in these cases, and is considered as a primary incontinence. In a word, all absolute symptomatic indications are wanting in most cases, but I would particularly point out that incontinence of urine is of capital importance, and if, after proper medical treatment, it continues the bladder should be explored with a sound.

When once a calculus has been discovered the question arises whether or not the case should be treated medically, because some few observers have upheld that occasionally it will give brilliant results, but I hardly think that the common sense of the average medical man will allow his patient to receive anything but a proper curative treatment, the only rational one of which is surgical.

The indications for surgical treatment leave little in the way of discussion, because the early advent of functional troubles, and especially more serious lesions, will render all hesitation impossible. Some authorities have considered that a very young age is a contra-indication, but statistics show that this is not the case, and every calculus when once diagnosed should be operated as early as possible.

Relative to the choice of the technique, we would in the first place group those operations which allow the removal of the stone by an artificial opening, namely, the cystotomies; in the second group we would place operations by the natural passages, namely, lithotomy; and we will now rapidly compare these two methods in order to consider more in detail the question of suprapubic cystotomy.

The characteristic of the various forms of cystotomy is the artificial route followed in order to extract the stone, and many are the techniques that have been advocated in the last few hundred years. They may be classified, according to the route followed, into perineal, recto-vesical and suprapubic cystotomy. Of the second nothing need be said because of the frightful mortality to which it gave rise.

Perineal cystotomy still finds a little favour among a few surgeons, and we owe in the past a great many successful results to it, and, in truth, not so very long ago it was the method of choice. The simplicity of the interference, the ease which one could reach the bladder by this route, the slight hæmorrhage and the resulting natural drainage were the reasons why this operation was in vogue. It certainly is resorted to at the present time by numerous surgeons practising in the Orient, namely, at Bombay by Bainbridge, Harris in Bengal, and many others. These operators, following the example of the ancient surgeons, perform a lateral cystotomy. The convalescence is more simple, and the young Oriental subjects on which these operations are done are said to get up on the same day that the operation has been performed. In order to render this manner of operating legitimate in the eyes of the profession these surgeons have published their statistics, which are the most recent and most complete relative to this question. Mayet united them in his thesis published a few years ago, and they certainly are favourable for the operation of perineal cystotomy before antisepsis rendered the suprapubic route without danger. Summing up the statistics of fourteen surgeons, who have operated by this route, we find that out of 1,634 cases in subjects varying in age from 1 to 17 years old, there were 75 deaths, in other words, a mortality of 4.58 per cent. If to this figure we add that of median cystotomy, we

come to the following result as regards the various forms of perineal cystotomy, namely, 1,649 cases with 87 deaths, in other words, 4.7 per cent. Such are the figures with which statistics furnish us.

Although the mortality of perineal cystotomy is small, this operation has a very serious disadvantage, namely, section of the ejaculatory canals, and this accident alone, which is almost inevitable, is quite enough to throw the operation into disrepute. In 1894, St. Germain recommended lateral cystotomy, which would at least allow the vas deferens to escape injury ; bi-lateral cystotomy, which cuts through both, is very good for large sized calculi, but is not as practical, and, consequently, should be given up.

There is an occurrence which arises, namely, that the genital gland becomes atrophied when the vas deferens is cut, and, consequently, impotence and atrophy of the testicle are two factors, practically inseparable, of the bi-lateral operation. Guersant affirms that in eight cases of death that occurred from the perineal operation in his practice he found at autopsy that he had wounded the ejaculatory canals. Other surgeons are so affirmative that they even go so far as to say that these canals become choked up by the cicatricial tissue, which brings about the same result as if they had been cut. Beside this argument, which in itself is quite sufficient to cause the operation to be given up, others may be mentioned. In order to reach the calculus by this route one is working in the dark, and although hæmorrhage is not to be greatly feared in children on account of the poor development of erectile tissue, the immediate neighbourhood of the rectum is extremely dangerous. Guersant, out of 100 operations, had three recto-vesical fistulæ, and several other surgeons have had to deplore similar results. The bladder, which one endeavours to avoid, will be sometimes opened to a considerable extent and tearing of the retro-vesical peritoneal cul-de-sac was also frequent. The above-mentioned authority lost for this reason 8 per cent. of his patients, "all having an inflammation of the cellular tissue of the pelvis, starting from the neck of the bladder and extending to the abdominal peritoneum, the pathologic changes in which were found at autopsy." Then, again, it may happen that the perineal

wound will not close, and the result is a stubborn urinary fistula. And, lastly, let me mention an absolute contra-indication for the perineal route, namely, a very large calculus which would cause serious injury to the soft structures during its extraction. One may consequently conclude that, at the present time, perineal cystotomy has been given up with good reason, although some few surgeons still resort to it.

A word now as to lithotrity. Suggested for the first time by Civiale for calculi in children, it was considered a very dangerous proceeding. The defects in the instruments at that time, and the ease with which the perineal operation could be done, caused the former operation to be abandoned. In 1838, after much progress had been made in the construction of instruments for this operation, a number of surgeons again resorted to it with success, but, in spite of all this, the perineal operation still remained for some time the method of choice. For the older operators lithotrity presented a serious inconvenience, because if the calculus was of any size three or four séances became necessary in order to completely break it up. The duration of these interventions was only from four to five minutes, but during the interval a permanent catheter had to be inserted, which was tolerated with difficulty by the little patients. Frequently, also, the size of the fragments prevented their exit and the permanent catheter, which was impossible to keep in place, did not prevent the pieces becoming lodged in the urethra. The strong contractions of the bladder and the absence of a fundus facilitated this forced expulsion; the fragments would go through the neck, which became dilated with ease, but lodged in the membranous portion of the urethra. When this occurred the fragment could not be pushed back into the bladder, and one was obliged to either crush it in the urethra or proceed to its extraction with appropriate instruments, while occasionally it had to be removed by external urethrotomy.

In spite of the real progress made in the new method the insufficiency of the instrumentation rendered lithotrity delicate and possible for only a few operators. The roughened surface and small projections of the fragments played the part of foreign bodies and produced traumatism and serious inflammatory lesions of the vesical mucosa. And still more,

the perineal operation, like lithotripsy, performed without any antiseptic care, also became complicated by serious infections, while cystitis and nephritis were well known and feared by all surgeons.

Bigelow, in 1878, by a plucky innovation, made lithotripsy diverge from the path in which it was progressing in a slow and quiet gait. Removing the calculus from the bladder at a single sitting, he at the same time did away with the many disadvantages due to the presence of the fragments. His method was received with enthusiasm, and it was applied in all parts of the world. Its application for the removal of stone in children was soon undertaken by Bigelow himself, followed shortly afterwards in France by Guyon. The proceeding became generalised to such an extent that from 1881 to 1896, 1,062 cases in subjects varying from 1 to 16 years of age were done, with a mortality of 2.7 per cent. In spite of such reassuring figures surgeons did not become convinced, and it appears that at the present time litholapaxy in children is practically forgotten. Its contra-indications are about the same as those we formulated for lithotripsy by Civiale's method, the principle one being the size of the stone.

The various ways of estimating the exact size of a calculus are extremely elastic. The metallic searcher may give some indications as to its size but not its shape, and rectal examination, combined with abdominal palpation, is extremely useful. The bladder thus becomes pushed forward, and the abdominal hand may obtain very useful indications as to the existence of the calculus, but of very little precision relative to its size. The lithotrite is the only instrument giving any exact appreciation, and it is with this instrument, with the child fully under the influence of an anæsthetic, that an exact exploration of the bladder should be undertaken. By this means, better than in any other way, one can ascertain whether or not the stone can be crushed, but in the case of children the instrument used is usually of such small dimensions that it can be employed for crushing only small calculi. Sir Henry Thompson has pointed out that a child's urethra, between the ages of three to eight years, is extremely small, and that it is precisely during this period of life that 50 per cent. of the cases of calculi in children will occur. In order

to crush a stone at this age it is consequently necessary to use a very small lithotrite, and therefore only small calculi can be attacked, for the very simple reason that the jaws of the instrument are very short, and can seize only a very small stone. He also goes on to say that, if this operation is resorted to, the urethra should, in the first place, be dilated, and with the pelvis elevated a calculus not larger than a good sized pea may be crushed and evacuated in a single sitting, care being taken to completely crush it. When more than two sittings appear necessary, the advantage of lithotrity becomes doubtful.

Harrison, who studied the question of the indications of lithotrity in children, comes to the same conclusions as Thompson, and, according to his way of thinking, calculi which are not larger than $\frac{3}{8}$ " in their greatest diameter are the only ones that can be attacked by this method, and, consequently, when they are too hard or too large they cannot be crushed. This operation is contra-indicated when there are several small calculi, and in this point of view the conclusions arrived at by Kirrison in his excellent thesis appear quite correct :—" Chez les enfants, la lithotritie moderne ne donnera de bons résultats que si elle est appliquée dans toute sa rigueur. Si l'on ne pense pas pouvoir faire l'évacuation complète de la vessie en une seule séance, ou du moins pousser le broiement assez loin pour que la poussière calculeuse ne donne lieu, pendant son passage à travers l'uretre, à aucun accident, il vaut mieux employer la taille, qui fournit, à cet âge de la vie, de très beaux succès."

Such, at the present time, are the reasons why both the perineal operation and lithotrity have been abandoned, at least as far as children are concerned ; but since 1884 supra-pubic cystotomy has become more and more an honour. It is far surer, and one is not working in the dark ; the technique is extremely simple, and it can and should be practised by surgeons even of little experience in bladder work. We will now briefly set forth the principal rules of the classical technique of the operation in children, as well as the preliminary and post-operative care.

Excepting in those instances where the condition requires immediate operation, the general health, as well as the local

condition of the organs, should be carefully gone over. Weakness, or extreme anæmia, are in children contra-indications, or at least sufficient reasons for deferring the operation, and one should wait until the organic resistance of the patient will permit a favourable operative outcome. Although calculous cystitis is not frequent in children, a careful examination of the kidneys and urine should never be neglected. If the urine is purulent or simply alkaline at the time it is voided, irrigation of the bladder should be done for several days prior to the operation, but Petersen's advice to use irrigation in order to progressively distend the viscus is absolutely useless. The liquid should have the temperature of the body in order to prevent any reflex contractions, and I think the best solution for this purpose is a one in two thousand nitrate of silver. A milk diet, combined with the administration of salol or urotropin, will realise an indirect antiseptis, which occasionally is useful. The bowels should be carefully emptied for several days before the operation.

The lower half of the abdomen, including the umbilicus and genital organs, should receive the ordinary treatment as in any laparotomy, and general narcosis with ether is necessary, the primary anæsthesia being obtained by ethyl chloride. Trendelenburg's position will facilitate both the operation and the distension of the bladder, which should always be done before the operation is commenced. The use of air, as I have pointed out elsewhere, appears to me to be far preferable to an antiseptic solution, and the amount to be injected is about 90 to 100 cc. in children from five to six years of age. While the air is being injected the operator should percuss the abdomen in order to ascertain the amount of distension; the dulness and resistance offered by the suprapubic region are excellent guides. The use of Petersen's rectal bag is of no more use here than it is in adults, and its dangers are just the same, but the introduction of the finger of an assistant in the rectum may occasionally be of much use; by pushing the bladder forward with this finger it is made to come in contact with the anterior abdominal wall. In little girls this method is particularly useful, because the uterus is easily raised by the finger in the rectum, and consequently allows the urinary reservoir to be brought forward.

These precautions having been taken, the abdominal wall is then incised, but great care should be exercised to carry the incision directly in the median line, on account of the great mobility of the distended bladder in children. The incision need only be about four or five centimetres, at least, in the beginning, as it is preferable to increase it during the operation if, on account of the size of the calculus, it is necessary to have a larger opening. One should remember that the elastic fibrous tissue, which, in the adult, forms the suspensory ligament of the penis, is only in a rudimentary state in little boys, and the linea alba is extremely narrow, so that frequently it is quite impossible to recognise it, and, for this reason, the sheath of the rectus muscle is usually opened, which offers no great hindrance, provided that the knife does not diverge too greatly from the median line. The incision of the thin aponeurosis forming the posterior layer of the sheath of the recti opens up the preperitoneal space of Retzius. This is usually absent up to the age of eight or ten years, so that, when the wall has been incised, the bladder is at once exposed, covered by the umbilico-prevesical aponeurosis on its anterior aspect. It is at this time that it is necessary to determine whether one is really in presence of the urinary reservoir, and introducing the index finger through the lower part of the wound, the surgeon will come upon the distended convex vesical globe behind the pubis ; but here again the use of the rectal finger renders the greatest service, and in itself is enough to assure the operator that he has exposed the bladder.

Nothing now remains but to incise the urinary reservoir. Before doing this, however, the fibrous tracts and masses of fat covering the anterior aspect of the organ should be pushed out of the way, and it is also necessary to peel from below upwards the peritoneal cul-de-sac in order to keep it from the knife. This is easily accomplished with the finger at the upper part of the wound, and one may also feel the insertion of the urachus on the apex of the bladder. The bladder should be opened in the median line, but it is unnecessary to pass any sutures to hold it, because in children it projects into the abdominal wound, and it may be retained outside the pelvis when once emptied. After incision the borders of the wound should be held by sutures passed through them, as in operating

on the adult, and the calculi are carefully removed, care being taken to leave none behind when they are numerous and small. In children, urinary concretions will sometimes be found at the apex of the organ, and they should be looked for here. It is much better to extract the stones with the finger than with instruments, and when they are all removed it is not a bad plan to wash the bladder out with a little sterile salt solution, which will remove any minute stones or sand. After this all that is necessary to do to close the bladder and the abdomen.

In order to obtain cicatrisation of the suprapubic wound and the return of the urine by way of the urethra, many proceedings have been proposed, but from the very fact of their number it will be impossible to consider them all, so that we will simply class them according to their essential characters and rapidly indicate the principles upon which they are based :—(1) Partial suture of the bladder wound and abdominal incision; (2) total suture of the bladder, and incomplete suture of the abdominal wall; (3) total suture of the bladder and abdominal wall with or without a permanent catheter.

A fourth technique should also be mentioned, which consists in suturing neither the bladder nor the abdominal wall, allowing the closure of the wound to take place by second intention. The great advantage of draining the bladder is that it does away with the permanent catheter, and the drainage tube in the suprapubic wound can be changed for a smaller one within a few days after the operation, and cicatrisation rapidly takes place when the bladder is not infected, which is usually the case in children. The permanent catheter is tolerated with difficulty in young children, and it rapidly becomes incrustated with salts. Then again, it is with difficulty held in place. Even when it can be retained its advantages are doubtful, pus, mucus, or a small clot may obliterate its lumen, and thus compromise its function, under which circumstances the urine will accumulate in the bladder and pass through the points of suture. Then again, the danger of infection is ever present, for one can rarely obtain a complete asepsis of the lower end of the catheter. By doing away with the permanent catheter, the post-operative

treatment after complete closure of the bladder and abdomen is greatly facilitated.

Complete suture of the bladder and incomplete closure of the abdominal wall appears to be an intermediary between suprapubic drainage and complete suture of the bladder and abdomen. It has been more especially employed in adults, because of the fear of urinary infiltration, an accident less to be feared in children. Many excellent results have been reported, and eighteen cases of stone in the bladder in children, reported by Alexandrow, were all discharged from the hospital within from 10 to 20 days after the operation. Such results as these would appear favourable to the method, but the use of the permanent catheter must be resorted to, and its inconveniences have already been pointed out. It is not very comprehensible why a pre-vesical drainage should be necessary if the bladder has been carefully sutured, so that all urinary infiltration is impossible. But if the bladder is infected the method is decidedly bad. The permanent catheter, which keeps up the inflammation, allows one to make only small irrigations, which can in no way be compared with the free irrigation and drainage offered by suprapubic drainage tubes. On the other hand, we know that the space of Retzius is rudimentary in children, the bladder is situated high up, and there is no place for decortication and for the drain, while a tube introduced into the bladder makes no very great delay in the closing of the latter. Vesical drainage, as a proceeding of security, is to be recommended when a perfect suture of the bladder has not been possible; but of late years one knows how to hermetically suture the bladder and the abdomen, so that a permanent catheter is not required.

Complete suture of the bladder and abdominal wall is still a question under study, but it would seem to me from my own experience that, if it is properly done, on the condition that the bladder is not infected, it is the technique to be preferred. Silk or celluloid thread should always be used for sutures, a continued one, including only the muscular layer, and over this a second row of Lembert's suture is inserted. The abdominal walls are closed in the usual way. The patient should be catheterised every three hours, and no permanent catheter is necessary. There are few contra-indications to total suture, the only ones being marked changes

in the bladder, a thickening of its walls, or pericystitis with adhesions, and naturally vesical infection. Hæmorrhage is rarely to be feared, because calculi in children are usually primary and the bladder healthy. The sutures at the borders of the bladder incision should always commence somewhat beyond the limits of the incision, and, after this has been completed, the bladder should be distended with sterile salt solution in order to ascertain whether or not the viscus is hermetically closed.

When one is assured of this, and the abdominal wall is closed, it is absolutely necessary during the after treatment to prevent any distension of the bladder. The passage of the catheter every three hours is extremely difficult in young children, and it also requires more experience than in adults. Personally I think that, after the first 24 or 48 hours, most children will be able to urinate spontaneously, and, provided that they can be made to do so at regular intervals, the use of the catheter will no longer be necessary. Let us now consider the actual value of total suture, with reference only to suprapubic cystotomy for calculus. There are already a large number of cases reported, and the statistics given are too important to be neglected; it may be said that the number of successful outcomes from total suture increases each year. In 1886, Schmitz, out of 17 cases attained 13 instances of union by first intention, and Irschick, who operated on 20 cases, obtained 7 primary unions—in other words, 35 per cent. In 1887, Couvée published Iterson's results in 18 cases, total suture having been successful in 13. Bassini obtained 14 successful results out of 21 operations—in other words, 66.6 per cent. The statistics due to Alexandrow of 26 children operated on by suprapubic cystotomy, varying in age from 2 to $7\frac{1}{2}$ years, are so complete that they are worthy of being given in detail; and as he employed various techniques, it is possible to establish a comparison. Twice he employed vesical drainage, and a cure was only obtained in 47 days in one, and in the other in 21 days, but it should be pointed out that these periods of recovery were rather longer than is usually the case. In 24 children he made a total suture of the bladder, in 16 of which he employed pre-vesical drainage, and 8 times he closed the abdominal wound with the following results. The 16 cases of suture of the bladder with pre-vesical drainage

gave 15 primary unions, one unsuccessful result by an opening up of the bladder wound. The majority took 18 days for closure of the drainage opening in the pre-vesical space. In 8 total sutures of the bladder and abdominal wall there were seven primary unions; the eighth case was opened up on account of a hæmorrhage which occurred several days after the operation, but vesical union was found to be nicely advanced. In all these cases a permanent catheter was used, which was removed at the latest within three days. In all the foregoing cases the permanent catheter had been used for a varying length of time, usually from 24 to 48 hours. We now come to the question of total suture without the use of the permanent catheter, but the small number of cases which have been reported, in spite of their brilliant success, prevents me from stating any affirmative conclusion. It may, however, be said that, if these cases continue to be as favourable, it will not be long before this method will be the one of choice.

In going over the statistics comparing partial suture with total suture of the bladder and abdominal wall it would seem that there is no very great difference between the two operations as far as the mortality is concerned. It remains for us to consider the indications for the two methods. In the former, combined with proper drainage, its use, as we have already pointed out, is indicated in all cases where the surgeon has any doubt as to the completeness of his suture, or when the latter may be compromised by the condition of the bladder walls. A contracted bladder, adherent on account of a pericystitis, or on the contrary isolated from the surrounding tissues by operative detachment, a bladder with rigid walls, or where the latter have been injured by the extraction of the calculus, will present an excellent soil for the development of infection, and consequently are capital indications for the first method. Then, again, after the sutures have been applied and distending the bladder with fluid shows leakage, drainage must be resorted to. As to total suture with or without the use of a permanent catheter, its indications are to be found in what has just been said. The operation is certainly the ideal one, and should be followed by success in the large majority of cases on condition that the bladder is not allowed to become distended.