

VESICO-VAGINAL FISTULAE

illustrated by the details of
14 cases operated on by the author.

T H E S I S

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by

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INTRODUCTION - HISTORICAL

The vesico-vaginal fistula is an old disease, but only in the last century has treatment been undertaken with any confidence and with a fair chance of success. The developments which I am going to write about are, therefore, comparatively recent, and well worth critical examination and careful scrutiny, especially as there are still sufficient disappointed patients to "emphasise the need of special men devoting their energies to this special surgery" (Ward 1921).

EARLY RECORDS

The first known vesico-vaginal fistula was found in the examination of the mummy of Henhenit, of the court of Mentuhotep II - a King of the 11th Dynasty, about 2050 B.C. (Derry 1935).

According to Mahfouz (1938) the earliest records are those of Avicenna, a distinguished Perso-Arabic physician.

Schuppert (1866), Deroubaix (1870), Agnew (1873), and Howard A. Kelly (1912) have left us full accounts of the early history of the vesico-vaginal fistula and the attempts to repair it, and in my historical survey I propose to quote freely from their books and papers.

Felix Plater (1597) described the injury, its diagnosis and serious complications, but shed no light at all on treatment.

Pinaeus (1650) also wrote about the condition, but without adding useful information.

The gloom of the dark ages first broke in 1663, when H. van Roonhuyse, Amsterdam, described a well-defined method of treatment; this seems to have been to freshen the edges of the fistula and then to close the opening with "pins prepared from strong swan's quills cut down fine and sharp." The observations of Van Roonhuyse have provoked much discussion and there has been considerable debate as to whether or not he actually operated on the living patient: Dr. Kelly believed that Van Roonhuyse actually practised the method successfully.

Veltham (1724) declared that a recent fistula could be cured by cicatrising agents and a retaining catheter. He appears to have considered the subject fully, except that he makes no mention of Van Roonhuyse and his work.

Johannes Fatio (1752) preferred surgery for this condition, though he described treatment as curious as carrying in a little bag over the pit of the stomach the results of pulverising a living toad in a new pot. He operated successfully, using the Roonhuyse technique; and Dr. Kelly wrote, "Thus did the brilliant suggestion of the Holland surgeon bear fruit within 13 years. Then the precious observations were afterwards lost sight of for more than a century and a half."

For the next hundred years, many attempts were made to cure the injury, and bizarre instruments were fashioned. Gradually, however, the problem became clearer; slowly and painfully different methods were tried and discarded, modified and retried, often only to be discarded again. Advances, however, were made. Lévrier (1766) operated with the patient in the knee-elbow position. His work may be compared with that of Nägele (1809), who worked most diligently at the subject, trying out different methods on the cadaver. Nägele, however, operated by touch, and so it cannot be surprising that no cures were recorded. Nevertheless, his studies greatly stimulated other surgeons, who had occasional successes.

Schreger (1817) denuded the margins of the fistula and closed the opening with silk.

Lallemand (1825) used silver nitrate without success; he also used a complicated and dangerous mechanical device of sound and hooks, which was introduced into the bladder in the hope of a cure. He appears to have succeeded occasionally, but his instrument did harm probably more often than good.

Deyber (1827) contributed a bivalve speculum to depress the posterior vaginal wall only; this appears to have been a crude forerunner of the speculum later to be introduced from America.

Roux (1829) also used the knee-elbow position.

Malagodie (1829) cured a patient by denudation of the fistulous margin and closure with braided sutures, followed by cauterisation at a later date to cure a residual opening.

Mettauer (1830) operated successfully with lead sutures.

Vidal (1832) was the first to perform colpocleisis, though it was a somewhat accidental event resulting from a cauterisation of the posterior, as well as the anterior walls of the vagina; others followed him, but considerable difficulty was experienced in closing the vagina.

Jobert de Lamballe (1834) used strips from the labia and from the buttocks to plug the opening and by this achieved some success.

Gossett (1834) was successful with gilded sutures; and his patient was operated on in the knee-chest position.

George Hayward operated successfully in 1839.

Blasius (1841) gives a good account of the methods of treatment at the time.

Leroy d'Etiolles (1842) used a flap from the posterior vaginal wall.

Wützer (1843) deserves more credit than is generally accorded him. He was a courageous and confident surgeon, and he operated on one case thirty-three times. Between 1838 and 1842 he cured 7 out of 17 cases. He operated with the patient on her stomach, denuded the margins of the fistula, and closed the opening with pins held in place by twisted

sutures. He drained the bladder suprapubically, and nursed the patient on her face.

Few cures resulted from these operations. Dieffenbach (1845) lamented, "I have filled entire wards with these wretched women gathered from all countries. I have tried all methods and have only cured a few of them."

In 1849, however, Jobert de Lamballe realised the importance of relieving tension on the wound; he modified his technique accordingly, made relief incisions and so improved his results.

Metzler (1846) operated in the knee-elbow position.

Maisonneuve (1848), following Jobert's principle of relieving tension, partially mobilised the urethra from the pubis and was able to cure a very complicated case. His success greatly encouraged other surgeons in their labours: indeed, Deroubaix describes a wave of enthusiasm spreading throughout Europe, and even to America.

The second half of the 19th century saw a change. Already Gustave Simon, a pupil of Jobert de Lamballe, had cured thirteen women. Later he was to become the leader of this branch of surgery in Germany. He made a high funnel-shaped denudation, closed the wound with silk, and occasionally relieved tension with lateral incisions. He also performed colpocleisis. He cured 35 out of 40 cases. His monograph (1862) is described by Deroubaix (1870) as one of the best written.

It was, however, J. Marion Sims (1852) who showed the world that the injury could be cured. He has also told us the story of his life (1885), of his trials and errors, of his failures and successes, and many others have repeated it to our advantage. It is a stirring tale - perhaps the most remarkable in the whole history of Gynaecology - with an epic quality.

In 1846, the event occurred in Montgomery, Alabama, which was to herald the new chapter of Surgery. Sims was called to a patient ~~whom~~, thrown from her horse, whom he judged to be suffering from an acute retroversion of the uterus; he examined her in the knee-chest position and was immediately struck by the way air entered the vagina and caused the walls to fall apart. Without delay he tried this position for the examination of a negro woman who had been referred to him in the hope that he might cure her fistula. He wrote in his autobiography:-

"Before I could get the bent spoon-handle into the vagina the air rushed in with a puffing noise dilating the vagina to its fullest extent. Introducing the bent handle of the spoon, I saw everything as no man had ever seen before."

(In this statement he was not quite accurate, as others had examined and even operated using this position before).

"The fistula was as plain as the nose on a man's face. The edges were clear and well-defined and distinct, and the opening could be measured as accurately as if it had been cut out of a piece of plain paper." He was convinced that cure should be possible, and he made the attempt; it was not

successful. Three and a half years of trial, error and failure were to follow; he was discredited and could get no medical man to assist him with his operations. Only belief in himself and the trust of his patients sustained him. However, success came. He turned to silver wire as suture material in 1849, and closed the fistula of the negro slave, Anarcha: it was the 30th operation he had performed on her. Within two weeks he had closed the fistulae of Lucy and Betsey, two other slaves on whom he had operated many times. Three years later, 1852, he described his method of repair in a paper, remarkable not only for its contents, but also because it was written at a time when Sims believed himself to be dying. (The paper describes his early operation only: for the perfected technique developed in later years we have no record from Sims himself, and depend on gleanings from other writers).

If Sims had remained in Alabama, the subsequent history of the surgery of vesico-vaginal fistulae might have been very different. He was, however, ill, and, seeking health, moved to New York (1853), having first demonstrated his operation to Dr. Bozeman, another Montgomery surgeon. In New York he met many difficulties and frustrations in his search for opportunities to practise his skill, but he overcame them, and in 1855 founded the Women's Hospital solely for curing vesico-vaginal fistulae

(Bissell 1928). This was the first hospital only for diseases peculiar to women; its foundation was the birth of modern gynaecology.

While Sims was in New York, Dr. Bozeman studied the operation independently and made various modifications in the technique, introducing a special adjuster for the silver wire, a perforated flat lead plate, through which the wires passed, and his lead buttons which were fixed over the wires.

Meanwhile, the American operation, as described by Sims in 1852, had made a great stir in Europe. In England the method was tried with enthusiasm. In France some initial scepticism, bred of many previous disappointments, was quickly overcome and surgeons were only too anxious to be convinced of the worth of this new technique. In Germany, the work was well received and it stimulated further research.

It was, therefore, a receptive audience which welcomed Dr. Bozeman when he visited Europe in 1858. He operated in both Edinburgh (1858) and Glasgow (Buchanan 1858). He demonstrated the superiority of his method so convincingly that many surgeons, among them Baker-Brown (1861), adopted his technique, even to the extent of forgetting, or overlooking, the contribution which Marion Sims had made. Baker-Brown in his book illustrates a Sims speculum and calls it Bozeman's Speculum.

Bozeman's method of fixing silver wire sutures was rather complicated and various modifications were made. J. Y. Simpson (1872) arranged a wire cage for fixing these sutures. Atlee made further modifications, trying to incorporate the advantages of the Simpson and the Bozeman techniques. Later Baker-Brown simply twisted the wire taut, his son having seen this done by Sims.

Bozeman operated in Paris, and the occasion was chosen for a large clinical conference. Following this, much was written, especially by Verneuil (1860), Follin (1860), and Andrade (1860), and the American method and Bozeman's modifications were discussed at length. Some surgeons, including Jobert de Lamballe, refused to believe in the superiority of the method. Bozeman wrote a full account of his technique in 1881.

Meanwhile, in New York, Marion Sims was operating on the women with urinary fistulae, at the rate of about two a week, and he had taken as an assistant, Dr. T. A. Emmett, who was later to make important contributions towards improving the operative technique. Indeed, Dugal Bissell (1928) believed that many of the refinements in technique were due to Emmett's influence. There was an abundance of clinical material, and much suffering was relieved. Deroubaix describes a letter which Sims sent to Monteros in 1864, recording 260 cures out of 312 cases. Figures, however, are impersonal and do not stir the imagination. The devotion

of the pioneers and the difficulties they had to contend with can better be judged from Emmett's description of his 19th case:- "To state that the day was cloudy, the patient restless, the fistula nearly out of reach and that no portion of it could be brought in view without first drawing forward the fold with a tenaculum in front of any point to be inspected, would give but an imperfect idea of the difficulties of the case." The operation occupied two hours.

Sims' skill and popularity as a surgeon led to a difference of opinion with the managers of the Women's Hospital as to the number of visitors who should be allowed to watch his operations. Neither side would give way, and so Sims resigned from the hospital he had founded. Following this, and because of the reports that were coming back to America from Europe, in connection with the technique Dr. Bozeman was advising, he sailed for Europe, and after a short stay in Britain, reached Paris in 1861. Deroubaix (1870) gives a fascinating account of the impact of the American operation on the European countries. He was particularly enthusiastic about Sims' speculum, writing, "Il est tellement simple, tellement approprié aux usages qu'il doit remplir, qu'on s'est étonné lorsqu'il a été connu que les operateurs n'y eussent par songé plut tôt." Living in Brussels, he was perfectly placed to study the English, French and German reactions to this new operation.

Sims operated on difficult cases and was successful and everywhere his skill was acclaimed.

In America and in the British Isles and Europe, there were many who profited by Sims' demonstrations, who developed his technique, who modified it where necessary, and passed on the finished operations to others, but there were other surgeons who did not have this advantage, and who, as a consequence, evolved other techniques, often widely different from the Sims technique, and not always so safe or so certain in their effects.

The most important other advance in the last hundred years or so has, without doubt, been the advocacy first by Collis (1861), Dublin, and later by Mackenrodt (1894), of free separation of the bladder from the vagina until the bladder was freely mobile and the opening could be easily closed without tension. It is, however, important to remember that both of these surgeons used the simpler American technique for repairing fistulae if conditions were suitable.

Later, transvesical and abdominal methods of repairing vesico-vaginal fistulae were tried. It is, however, very doubtful whether these methods had any advantage over repair by the vaginal route, and they are certainly a good deal more uncomfortable and more dangerous for the patient. These and other matters, however, will be considered in much greater detail in later sections.

ETIOLOGY OF VESICO-VAGINAL FISTULAE

In the United States, Britain and Europe, most of the fistulae seen in the 19th century were caused by dystocia; unrecognised disproportion with the foetal head firmly impacted in the pelvis for many hours or even days almost inevitably led to a pressure necrosis of part of the bladder or urethra. With the improvement in ante-natal and intra-partum care this cause of fistula is slowly disappearing in the English speaking world. In my series there was one such case (No. 9). In other parts of the world, however, this cause of fistula is still common.

Mahfouz (1935) has written of the "truly vexing state of Egyptian obstetrics in 1902. There were no maternity hospitals and the training of midwives was extremely difficult. It cannot therefore be wondered that in 30 years I have had to operate on more than 400 cases of urinary fistula." Das (1928), writing of fistulae in Calcutta, describes the great difficulties there and it is clear that in India most cases follow dystocia. And this appears to be true of many other countries. Pastor and Burmeister (1942) record that most cases of fistula which they saw in Chile were the sequel to dystocia. And from what my medical

friends in Africa tell me the situation there must be similar. Apajalahti (1931) reported that 80% out of 209 fistulae in Helsinki between the years 1861-1929 were obstetrical.

Closely related to the fistula caused by neglected dystocia is the fistula caused by the misuse of forceps and in particular by the careless application of the blades. In my series it is difficult to see how the injury of Mrs. M. (Case 12) for example could have been caused except by faulty technique. The application of forceps antero-posteriorly in the pelvis may be particularly likely to cause injury. In support of this there is the report by Longaker and Harriman (1927) who record 4 cases of fistula among 85 cases in which Kielland's forceps had been applied. Many other obstetric causes could be mentioned. An unusual accident described to me by Mr. Stabler, Newcastle, was the tearing during labour of a vaginal septum in such a way that part of the bladder was torn away as well.

Non-obstetrical trauma can also cause fistula. Rape, coitus in adolescence, sexual perversions have all led to this injury. Pessaries and bladder calculi (Loughlin 1936) have ulcerated through the vesico-vaginal septum. Benign diseases which cause ulceration also play a small part. Cancer is an important cause.

While bladder fistulae resulting from dystocia have been steadily declining in number, those resulting from pelvic operations have been increasing. For example, Judd (1920) reported that operation accounted for 61% of his cases. Latzko (1942) reported about 60% of cases followed operation. The Wertheim hysterectomy, abdominal and vaginal hysterectomy and operations for the repair of prolapse are those which may be followed by fistula, especially if the operation has been carelessly performed. I have seen a uretero-cervical fistula following subtotal hysterectomy, and a ureteric fistula following hysterectomy for ruptured uterus (the fistula being on the opposite side to the tear!). In each case faulty technique must surely be blamed.

Radiation for carcinoma of the cervix is a new but fortunately rare factor in urinary fistulae. I have seen 5 cases and have operated on 3 cases myself. In this connection it will be interesting to see if the modern treatment of carcinoma of the cervix with radiation and operation will increase the numbers of fistulae caused by devitalisation of the vesico-vaginal septum - a risk Herbert Spencer (1925) warned us against twenty-five years ago.

PROBLEMS OF DIAGNOSIS AND EXAMINATION

The medical rule that accurate diagnosis is necessary for successful treatment is nowhere better exemplified than in the bladder fistula. For there is no gynaecological disease in which failure is so easy if the surgeon is hurried or if he has not taken time to study the individual problem. The saying, "a miss is as good as a mile," might have been written for the repair of the vesicovaginal fistula. It is true that the injury is never fatal per se but, as Sims wrote (1852), "it may well be imagined that a lady of keen sensibilities so afflicted and excluded from all social enjoyment would prefer death." (And from personal experience I can vouch for the depression and despair of these women which is sometimes associated with ideas of suicide). We should aim at nothing less than cure, and that preferably in one operation. But this will only be possible if great care is taken. Hobbs (1942) has made a little rhyme about this to finish his paper, "attention to minutiae to-day may close the fistulae for aye." Mahfouz has written, "it would be no exaggeration to say that of all plastic operations performed on the pelvic organs of women repair of the urinary fistula stands out as the most delicate and the most difficult. It demands long experience,

dexterity, precision and careful attention to a multitude of details." It is worth noting at this stage that splendid results are possible: fifty cases all closed by the vaginal route is a magnificent record (Moir 1949).

In considering diagnosis, I do not mean just the diagnosis of a fistula, but rather the recognition of the many and varied aspects of each case. To understand fully the nature and extent of the lesion needs time and patience and a knowledge of the important things to look for.

DIFFICULTIES IN DIAGNOSIS

The hole may be tiny with a sinuous tract, allowing urine to escape only intermittently and in small quantities. Both H. R. Spencer (1925) and Taussig (1925) describe the minute elusive fistula. Spencer overlooked his in spite of several examinations and did not succeed until he had used an expanding speculum. Stadiem (1941) found an elusive fistula after injecting air into the bladder and fluid into the vagina.

The fistula may be high in the vagina or even opening into the cervix or uterus, in which case urine may only escape when the woman is in certain positions or when the bladder is full or contracting. One of my patients (Case No. 10) could remain dry for journeys up to 2 miles. I have also known a patient able to contain urine in her bladder by the voluntary contraction of the levator ani

muscle - a few fibres of which could be felt encircling the fistula (Case 12).

The type of fistula is not always apparent. Abroad I have seen a uretero-cervical fistula misdiagnosed (though fortunately only temporarily) as a vesico-cervical fistula. Furthermore there may be more than one fistula and more than one variety of fistula. Another difficulty is that urethral incontinence without fistula can be so severe that the patient is continually wet. In one recent case a small fistula at the vesico-urethral junction had three separate vaginal openings (Case 13).

EXAMINATION OF THE URINE

This is essential in all cases and is performed to exclude infection of the bladder or the upper urinary tract; if operation were to be performed in the presence of such infection serious complications might well ensue, (Thompson 1945). Phosphatic incrustations have to be removed and the urine kept acid to prevent their reforming. Compounds such as sodium acid phosphate and ammonium chloride will now be used to make the urine acid. Dr. Emmett's (1868) prescription to acidify the urine was:-

R	Benzoic acid	-	One drachm
	Sodium borate	-	Two drachms
	Water	-	to eight ounces

Sig. One ounce to be taken thrice daily for 4 days, then reduced to one drachm.

The acidifying of the urine and sulphonamide therapy, for which an alkaline urine is desirable, can be reconciled by choosing a sulphonamide which is highly soluble, e.g. Sulphamezathine, and using it in the smallest effective dosage.

THE VAGINAL SWAB EXAMINATION

This simple procedure is often of great value in confirming the presence of a suspected fistula and in showing its origin. The technique is to insert pledglets of cotton wool in the vagina, to run in 10 ccs. of methylene blue or other dye into the bladder, to apply a sanitary pad to the vulva, to allow the patient to move about for an hour or so, and then to re-examine her. If the vaginal swabs are stained with dye then there is a vesical fistula; if they are stained with clear urine then there is a ureteric fistula. Two warnings must be made. The vaginal swabs must be inserted loosely lest a single sinuous tract be closed by compression; and the bladder must be allowed to distend before the swabs are examined. By this simple procedure information of the greatest value can readily be obtained: it is the best method of distinguishing ureteric and vesical fistulae. Another method of differentiating between vesical and ureteric fistulae (Schenck, Woronov 1939) is to drain the bladder by catheter and observe if there is still constant dribbling of urine.

CYSTOSCOPY AND UROGRAPHY

Cystoscopic examination should be performed in most cases, as it is the only way of relating the position of the fistula to the openings of the ureters; furthermore it will show the state of the bladder, its capacity, the condition of the mucous membrane, the presence of infection or calculi and ureteric activity on each side. It is not always easy to find a small vesical fistula by cystoscopy so this examination should rarely be used for diagnosis. The examination is often difficult because of the constant escape of urine, but this may be overcome in one of two ways. Either a small rubber bag or balloon is placed in the vagina and inflated to block the escape of fluid through the fistula (Ahlstrom 1932, Hoffman 1939), or the cystoscopy is performed after the patient is placed in the knee-elbow position and air is allowed to enter the bladder. I have found the former method more satisfactory than the latter. Cystoscopy is of value in other ways. The vesico-vaginal septum can be transilluminated and examined for any unusual thinness such as might prejudice a repair. This is particularly important in post-radium fistulae or in cases where previous operation has failed. The fragility of the vesico-vaginal septum after radium treatment is well illustrated by Case 14 in which the vesical fistula followed an attempt to repair a rectal fistula.

Catheterisation of the ureters in the difficult case is often advised and it should certainly be considered if the technique to be employed and the proximity of the ureteric openings makes their damage a possibility. I will have more to say about this when comparing the classical Sims-Emmett operation with the more popular flap-splitting technique. Another use for the ureteric catheter is to pass it through the fistula into the vagina. Then with one end of the catheter out through the urethra and one end out through the vagina, the fistula can be "strung up" to assist the repair (Reich and Wilkey 1943, 1947).

Intravenous urography should be the rule in most cases, not so much because a fault is likely to be found as to have a picture of pre-operative renal function against which post-operative function may be compared, should there be unexpected complications. Urography, however, has few if any advantages over other methods in showing the location of a fistula.

PRE-OPERATIVE RE-EXAMINATION

Even though the diagnosis seems clear and the nature and extent of the injury obvious, it is wise in all cases to make one or more further examinations with the patient in a good light. The repair of even a small fistula can present unexpected difficulties and may turn out to be much more troublesome than anticipated. The examinations

may be made with the patient anaesthetised or unanaesthetised. Attention should be paid to the points already mentioned, i.e. the size and extent of the fistula and its relationship to the ureters. Other features which should be noted are the extent of scar tissue and the amount which will have to be removed, and possible methods of relieving tension on the suture line. It is also important to examine the urethra and the bladder-neck to try and assess how much urethral control the patient is likely to have when the fistula is closed. If there has been great loss of tissue, the source of spare tissue must be sought. It is often of value to examine the patient in the lithotomy and in the knee-chest position to find which gives the best exposure. Martius (1939) quotes Fritsch as saying, "The more fistulae one operates on the more one gains the conviction that one method does not suit for all cases so that individualisation here too is the greatest medical art."

Careful pre-operative examination is of value in another way. More than one operation may be required to close a fistula and the patient may only give consent if she has confidence in the surgeon. His attention and detailed examination may help her to acquire that confidence. The greatest difficulty is met when there have been many previous unsuccessful attempts to cure her injury.

CHOICE OF APPROACH

The abdominal approach to a high, inaccessible fistula has been advised for some cases by many surgeons, (Lequeu 1929, Walters 1939, Young 1927), and many cures have been reported by both the transvesical and the transperitoneal route. Sharp and Green (1946) have even given the indications for the supra-pubic approach. Nevertheless, I should say that the vaginal approach is that of choice because it is much the safest, (post-operative death is almost unknown after the vaginal operation), because the post-operative period is pleasanter for the patient, and because by this route cure should be easier than by the abdominal route. In my own series the vaginal route was chosen for every case. Moir (1949) has closed all his 50 cases by the vaginal route. Mahfouz in 1938 reported that during the previous 8 years he had never operated abdominally, and he wrote, "if I failed to close the fistula by the vaginal route I seldom succeeded to do so by the abdominal route." Hoffman (1939) never had to operate abdominally. B. W. Turner (1947) condemned the supra-pubic approach as unsound in that it is impossible by that route to divide fibrous bands which fix the fistula. Professor N. F. Miller (1942) also stressed the advantage of the vaginal approach and added the argument of early ambulation to those given above. Counsellor (1942) also operated vaginally. And there are many others who have

taken a stand against the suprapubic approach. This is what the late Dugal Bissell (1928) of Sims' own hospital had to say about the abdominal approach, "I am unable to conceive of a vesico-vaginal fistula so situated as to make the abdominal route preferable to the vaginal." The evidence therefore overwhelmingly supports the vaginal approach and from the many fistulae which I have seen repaired by Professor Chassar Moir, or have repaired myself, I cannot imagine a case in which the suprapubic route would be indicated. The failures of vaginal surgery have been the result of faulty technique rather than faulty approach.

NON-OPERATIVE TREATMENT

It is not necessary to operate on every case of fistula. Some will close spontaneously, others if the bladder is kept at rest. In almost every case, with perhaps the exception of the post-radium fistula, delay will lead to a surprising shrinkage in the size of the fistulous opening; indeed spontaneous closure has occurred as long as 7 months after the vaginal injury (Pemberton, Smith, Graves 1936). The process of healing and closure of the opening may be greatly assisted by continuous bladder drainage. Miss Gladys Dodds (1941) has reported the spontaneous closure of a fistula after only 13 days of

bladder drainage started $4\frac{1}{2}$ months after the injury. Deutschman (1932) reported 4 cases after childbirth which closed spontaneously. Apajalahti (1931) reported that 45 of his 209 cases had been treated by bladder drainage, with spontaneous healing in 10. His figures suggest that one out of every 20 fistulae will close spontaneously. Success is, however, exceptional and generally operation is required. Three to six months after the original injury seems a reasonable date on which to operate, and the same interval is required if a repeat operation is necessary. Hayes (1945) with experience of 85 cases advised 6 months' delay if a second operation was required.

Fistulae which close spontaneously or with bladder drainage are small, and for such cases various additional procedures short of operation have been tried. Mein (1936) and O'Connor (1940) report success with cauterisation of the fistulous margin followed by bladder drainage, though it must be noted that in O'Connor's cases some weeks passed before the fistula eventually closed. R. T. Frank (1938) describes the closure of several tiny fistulae: his method was successful provided the openings were no larger than 3 mm. across, and provided the vesico-vaginal septum was not thin. The technique was to touch the vesical opening of the fistula with the active electrode until there was some superficial whitening. Several

fulgurations were sometimes required. ~ Herbert Spencer (1925) cured the patient with a tiny fistula by touching it with the cautery.

It must be doubted, however, if these methods should be encouraged. For if the surrounding tissue is mobile and healthy simple denudation of the fistulous margin and suture in one layer is more certain, and if the surrounding tissue is rigid and avascular cure cannot follow a technique which causes further destruction of tissue. Emmett's (1868) 32nd case is of interest in showing the effect of the cautery which he describes as "an uncertain procedure and one which generally converts a simple case into a complicated one."

One other method described by Heaney (Am. J. O. G. 44, 1942) was the insertion of 12.5 mgms. of radium into the fistula for 18-20 hours. Though he seems to have cured his patient, I cannot condemn too strongly such a technique. Radium burns and devitalises tissue, and the last state of the patient could easily have been worse than the first.

THE MINUTIAE OF THE REPAIR

Most vesical fistulae require operation and the remaining part of my thesis will be concerned with the minutiae of the repair, for only by attending to innumerable details will success be certain. As Schmitz (1935) has said "the time to close a fistula is at the first sitting," and this is not an unreasonable ambition. Most of Professor Chassar Moir's cases were closed in one operation. Of my series all but two were closed at the first operation, and the failure in one case was entirely due to faulty technique. Pettit (1943) cured 14 out of his 15 cases in one operation.

EXPOSURE OF THE FISTULA

The first matter to be considered is the position of the patient during the operation. The choice is between the lithotomy position and the knee-elbow or some similar position. The former is the more popular and is particularly suitable for the fistula with lax or even prolapsed surrounding tissues which can be drawn downwards to the vaginal introitus, and for the partial colpocleisis operation. The lithotomy position also has the advantage of being the most convenient for the anaesthetist, and the most accustomed for the surgeon. It has its drawbacks, however; if the opening in the bladder is very large, the mucosa may prolapse

through it and get in the way during the repair; urine tends to flow over the operation wound; and access to the fistula may be most difficult. The alternative is the knee-chest position, or some modification of this such as Moir describes (1947), or Bozeman's position, or the Sims' position, and there is no doubt that for some fistulae these positions allow a far better exposure and ease the difficulties of the repair. The vagina balloons out with air and the fistulous margins are clearly and distinctly seen; urine and blood keep out of the way, the surgeon works downwards and the ordinary theatre lighting is quite adequate. The operation has to be carried out inside the vagina and the fistula is further away from the vaginal introitus, but this is not such a disadvantage as some surgeons would have us believe. Among other surgeons who advise the face down position with buttocks elevated are Sunde (1941), Miller (1935), Counseller (1943). This position is particularly suitable when there is a prolapse of the bladder through the fistula, and it is much preferable to replacement of the bladder by packing as advised by Kirvin and Lowsley (1935).

To make a fistula more accessible, bladder tamponage followed by suprapubic pressure has been used, Pastor and Burmeister (1941). Metallic balls drawn into the bladder up against the fistula have been used for the same purpose, Sjövall (1945). Traction sutures of wire

placed 1-2 cms. from the margin of the fistula have been used with advantage, (Kloman 1941).

The exposure of a fistula may be improved by episiotomy, or more rarely by Schuchardt's paravaginal incision as advised by Ward (1917). When the vagina is greatly contracted the preliminary division of bands and the use of graduated vaginal dilators (Emmett 1868) has to be considered. There has been little written these days about preliminary vaginal dilatation largely, I suspect, because of the paravaginal incision and because the dilatation probably was of little benefit. Miss Satur (1946) discusses this difficulty. I have seen a fistula with complete destruction of the urethra and with complete obliteration of the vagina above the level of the fistula, so that the vaginal introitus opened directly into the bladder. It was treated successfully by a colleague by ureteric transplantation: if vaginal methods had been seriously considered an essential preliminary to any repair would have been the re-opening of the upper part of the vagina. The use of skin grafts on a mould as in the formation of an artificial vagina, or some other form of graft, might then have been helpful.

INSTRUMENTS AND SUTURE MATERIAL

I have found certain instruments most helpful in this type of operating. Particularly the pointed No. 11 knife, scissors curved on the flat, hooks such as are used



Fig. 0.5. Case No. 11.

Photograph taken on the 20th post-operative day. The anterior vaginal wall has been depressed by a pair of fine scissors to show a silver wire suture in position. The absence of any inflammatory reaction is clearly seen.

in cleft palate surgery, dissecting forceps with a locking device, a piece of glass tubing somewhat narrowed at the point to be used attached to the sucker, a Dakin syringe for washing away blood clot and a plain catheter for post-operative bladder drainage.

I use silver wire No. 32 for the vaginal closure for two main reasons. Firstly, it can be twisted to a tension much more precise than is possible with a knot. Some surgeons maintain that the main disadvantage of wire is that it has to be twisted: I say that this is one of its advantages. Secondly, the wound closed with silver wire is remarkably clean. It is almost as if the silver wire was liberating part of itself as an antiseptic. It is not easy to illustrate the cleanness of the sutures, but Fig. 0.5 is an attempt to show this feature. The wire should not penetrate the bladder, otherwise calculi may form round it, as happened to one of Cattell's cases (1940). The wire must be fine, otherwise it does not twist satisfactorily, (see Case 14).

Throughout the literature there is steady support for the silver wire suture. Sims, of course, was enthusiastic about it, believing it to be - as it was - one of the great discoveries in surgery. Kelly (1912) describes how Sims (1858) said, "after nearly four years of fruitless labour silver wire was fortunately substituted for silk as a suture and lo! a new era dawned on surgery." As Moir (1940) has

told us, Sims wrote of the sutures in a facial operation - "their removal was like that of a delicate ear-ring from the ear long used to wearing it." Sims' claims were, perhaps, somewhat overdone; certainly they stimulated Schuppert (1866) to write of a patient he had cured - "the patient did not long enjoy her happiness. About three months later she died of yellow fever, a disease in which silver wire sutures are unavailing." Emmett and his pupil, the late Dugal Bissell, both used silver wire. Bissell (1928) gives us a fine account of the more recent modifications of the Sims-Emmett operation, and particularly the change from the clamp or quill suture to simple twisting. One of the most remarkable features of the history of the operations for repair of fistulae was the time taken to learn that simple twisting of the silver wire was adequate. One has only to look at the illustration of the complicated wire cage Professor J. Y. Simpson used for fixing his sutures - which were of iron - to appreciate the growing pains of this technique. Agnew (1873) used silver wire, as did Sampson (1904). Herbert Spencer (1925) used silver wire exclusively for 37 years, and on a visit to America is reported as having hoped "to receive from Americans a better reception for its advocacy than I did from my countrymen." George Grey Ward, discussing his paper, said, "I am frank to say that in the cases where I have failed in the use of

catgut or silkworm gut I have ultimately succeeded with silver wire." De Lee also said in this discussion that silver wire was the best material, and Rawls agreed, having been let down by catgut. Aldridge (1928) used silver wire, as did Hertzler (1929). Phaneuf (1935) supported the use of silver wire, saying that it was responsible for absence of "inflammation and tumefaction" as in May 1849. Pemberton, Smith, Graves (1936) consider silver wire "one of the most important factors in achieving a cure." Furniss (1938) advised rustless steel wire.

In formulating a plan of repair in any particular case a number of widely differing methods have to be considered. I propose, therefore, to examine the standard operative procedures in some detail.

THE SIMS-EMMETT OPERATION
SOMETIMES CALLED THE CLASSICAL OPERATION

This consists (a) in exposing the fistula vaginally; (b) in denuding the fibrous margin obliquely down to but not including the bladder, (Moir describes this as "saucerisation"), so that a $\frac{1}{4}$ " or wider raw surface is made around the fistula; (c) in drawing these raw surfaces together with silver wire sutures placed down to but not through the bladder and twisted taut; (d) in relieving tension where necessary by remote incisions; (e) and in draining the bladder post-operatively.

It is an excellent operation, as those who have tried it, or seen it performed properly, know well; it has

the virtue of simplicity; it reduces trauma to a minimum, is often easily performed and, most important, it succeeds. Most of Moir's 50 cases were repaired by this method and a number of them were complicated cases that had been previously operated on elsewhere many times. In my series 10 out of the 14 cases were operated on by this technique and, in all but one case, closure followed the first operation. Bissell (1928) was very critical of the lack of attention paid to this operation: he wrote, "the principle and technique first formulated by Sims is more nearly uniformly applicable to the varied forms of vesico-vaginal fistula than any technique used before or since his day," and Ward (1943) wrote, "if the fistula is embedded in scar tissue the result of radiation or cautery, it is most important to dissect out this tissue even if the fistula is enlarged thereby, as the lack of vascularity will be a cause of failure. When multiple attempts have resulted in failure with the flap-splitting technique I have found the Sims operation with silver wire sutures often successful." Among those who still support the method are Aldridge (1928), Pemberton, Smith, Graves (1936), Phaneuf (1936), Frank, R. T. (1938), Schenk and Woronow (1939), Roton (1939) except that he sutures with "crins de Florence," and Turner (1947). Nevertheless, even this support has not yet brought the operation completely back into favour. Much of the

reluctance on the part of Gynaecologists to adopt it must be attributed to a misunderstanding about the details of the operation. It is still thought of as an operation in which only the edges of the fistula are pared. Halban (1937) describes "freshening edges" and goes on to say the method has been given up. A. Laphorn Smith (1906) condemns the method as it leaves a raw surface for union of only 1/32nd of an inch in thickness. No wonder the method failed. One of my colleagues seeing the operation for the first time commented favourably on the thickness of tissue brought together, and I myself have been able to perform a fascial sling repair following this operation (Case 7), though I have to admit there was not much tissue between vaginal skin and bladder neck.

Another feature of this operation which may account for its lack of popularity is the apparent enlargement of the fistula by the saucerisation of the margin. This enlargement only affects the vaginal aspect of the fistula and is mostly limited to the removal of the scarred margin - which is useless for healing anyway - to expose vascular tissue likely to heal soundly. The size of the opening in the bladder is unchanged.

THE COLLIS OPERATION - CLOSURE IN LAYERS

Though Collis, Dublin (1861) first advised the wide separation of vagina and bladder and closure in layers, Mackenrodt (1894) usually gets the credit for this method.

It has been acclaimed by many as one of the most important advances in the surgery of the vesico-vaginal fistula. Grey Turner (1948) said that Rutherford Morison (1895) also stressed the point. The method is undoubtedly the most popular yet it is quite wrong to say, as is all too often said, that only by this technique will success be likely. It has its dangers. Duncan (1938) describes a fatal case in which both ureters were occluded. Miller (1935), on a similar theme, is not satisfied that the present cry for mobilisation is not over-loud. "Slough, resulting from excessive trauma incident to mobilisation of badly scarred tissues, with unsuccessful union frequently occurs." He believes in the relief of tension - which we are all agreed is essential - by remote incisions, and this is my opinion too. The widely divergent views probably result from the comparison of two different types of case. On the one hand there is the fistula in the upper third of the vagina and surrounded by healthy even prolapsed tissues. In such a case, free mobilisation and closure in layers would seem admirable treatment: such cases are usually easily cured. On the other hand there is the fistula perhaps at the bladder neck, or adherent to bone, or in some inaccessible place, or adjacent to ureters and surrounded by hard, avascular, immobile tissue: in such a case extensive undercutting of the vagina may so devitalise the vesico-vaginal septum that

healing is unlikely. In a bladder neck fistula it must be excessively difficult to find enough tissue for closure in layers. Apajalahti (1931) has unwittingly illustrated this point. He made a comparison of the different methods of treating 209 fistulae in Helsinki over 68 years and found the best results followed closure in four layers of catgut, and the second best results followed the "American method." Such a comparison is not, however, really fair, because no one could possibly put in four layers of catgut except in a highly favourable case, and the cases operated on by the American method may well have included many complicated cases. In my own series I used a flap-splitting technique in Cases 10 and 12, because in each case there was excess of tissue. In my three cases of bladder neck fistulae, a flap-splitting operation would have been much more difficult and, I believe, more uncertain in its results than the simpler operation.

Lower and Schlumberger (1939) describe a method of closure of the small fistula with mobile surrounding tissue. Two flaps are raised one above and one below the fistula, and one is turned over the opening and tucked under the other: the method is unnecessarily complicated and could only be used for a very favourable case.

If the flap-splitting operation is chosen for one reason or another, there are certain technical details that are important. Firstly, the separation of the bladder and

vagina is often greatly simplified if it is begun at some distance from the fistulous margin, (Loughlin 1936). Secondly, separation of bladder and vagina in the region of the fistula should begin $\frac{1}{8}$ " to $\frac{1}{4}$ " on the vaginal aspect of the margin, (André 1937, Hobbs 1942, Martius 1939, Hertzler 1929); this is usually described as the circumcision of the fistula and is designed to prevent the troublesome haemorrhage which is likely to follow if the bladder mucosa is incised. Thirdly, the bladder should be mobilised until it can be freely moved in all directions (Halban 1937, Stone 1906, Koster 1938, Hayes 1945). Fourthly, suturing should not be too tight if devitalisation of the tissues is to be avoided, (Mahfouz 1929); in this connection Miller (1942) thinks that purse-string sutures are best avoided. Fifthly, the suture line of the bladder and that of the vagina should, if possible, be in different planes, (Mayo and Walters 1924). Lastly, a small gap in the suture line of the vagina should be left for the drainage of any blood which may collect, (Keller 1932). An unusual opinion is that of Quinby (1936) who wrote, "closure of the bladder should be as perfect as possible and closure of the vagina is an entirely secondary consideration: it need not be perfect, for it will heal by granulation."

COLPOCLEISIS

It is important at the outset that the meaning of this word be defined, because, as a procedure, it has been so

vigorously condemned, (Mahfouz 1938). I believe the word can properly be used to describe any closure of the vagina, however incomplete it may be.

The main criticism of this operation, as originally performed by Simon, has been that it created a bladder diverticulum in which calculi formed; and furthermore that it was much inferior to direct closure of the fistula and was seldom, if ever, necessary. "A bas le colpocteleisis" was Santy's (1929) translation of Bandle's view of the operation in 1881. Miller (1929) regarded the operation as obsolete.

Latzko (1942) has pointed out that for the post-operative fistula the Sims operation or Mackenrodt's mobilisation operation may be very difficult, because the posterior margin of the fistula coincides with the scar in the vaginal vault and is very close to the peritoneum of the pouch of Douglas. He described how, faced with these difficulties, many surgeons abandoned the vaginal approach for the suprapubic approach with its much greater risk. His alternative is the obliteration of the vaginal vault by denudation of the vagina up to the margin of the fistula, and closure of the upper part of the vagina in such a way that there is no diverticulum of the bladder, a fact which he has confirmed by cystoscopy; he seems to have made out a good case for his operation when the fistula has followed

hysterectomy and is high in the vaginal vault. My experience of the post-hysterectomy fistula is limited to one case, (No. 5). The opening was high in the vagina and I closed it in one layer. At the time I looked on this as a classical Sims-Emmett operation, but it is clearly very little different from the operation Latzko described. One might almost say that the Sims-Emmett technique applied to a post-hysterectomy fistula situated at the vaginal vault is indistinguishable from the partial colpocleisis or the "obliteration of the vaginal vault" operation of Latzko.

An alternative method of repair of the post-hysterectomy fistula is deliberately to open widely the peritoneum of the pouch of Douglas, which is always very close, until the bladder can be drawn down into the vagina and the opening closed without difficulty, (Frank 1938).

POST-RADIUM FISTULAE

At this juncture it is appropriate to consider the treatment of post-radium fistulae, because partial colpocleisis is often the operation of choice in such cases; indeed Taussig (1943) wrote that colpocleisis is the "only hope" for some cases.

These fistulae differ from all others in that they are always surrounded by inelastic, hard, avascular, immobile tissue; indeed it is the avascularity and subsequent necrosis which causes the fistulae (see Cases 4 and 6).

They are situated high in the vagina and extend down to near the ureters. Neither the Sims operation nor Collis' flap-splitting operation is likely to be successful, though a very occasional cure is reported (Scrivner 1947). Bubis (1942) performed colpectomy for such a case, but this may be needlessly drastic. The best hope seems to be to use the posterior vaginal wall as a patch for the fistula, and to denude a circular cuff of the vagina below the fistula for a width of about one inch, or until vascular tissue is reached, and to close the vagina. I have performed this operation three times on two patients. My first attempt was unsuccessful because I did not close the vagina over a wide enough area, but in the other two the result was entirely satisfactory. In each case I performed cystoscopy about one year after the operation and there was no bladder diverticulum - only a shallow depression to mark the site of the fistula. Santy (1929) described two cases successfully treated this way. Twombly and Marshall (1946) have described a transvesical and vaginal approach aimed at filling the hole of a post-radium fistula with a patch from the posterior vaginal wall. In my view their success may be attributed to the closure of the vagina below the fistula at a level where the blood supply is good: if this is correct, the suprapubic part of their operation was unnecessary. Macalpine (1940) has used the posterior vaginal wall to patch the opening of a fistula which did not, however, follow radium.

When there is a post-radium fistula of any variety it is important to remember that the vagina over quite an area may be devitalised. Great care, therefore, must be taken during attempts at repair not to injure adjacent organs. Case No. 14 illustrates this. In an attempt to repair the rectal fistula the bladder was damaged and a vesical fistula developed. To a lesser extent Case No. 4 also shows this danger, because a tiny rectal fistula followed the two operations necessary to cure the vesical fistula.

Sometimes the radium creates both a rectal and a vesical fistula, and this double lesion presents a more difficult problem. Colostomy will generally be required as a first step in such cases; but even this must only be taken after thought. Subsequent to the colostomy, further operation to close at least the vesical fistula would be required.

SUBSTITUTION OF ANAL FOR VESICAL SPHINCTER

An alternative to the above treatment would be closure of the vagina so that the bladder and rectum were continuous. Meave Kenny (1950) has described the successful treatment of a patient with a colostomy and a post-radium rectal and vesical fistula by closure of the urogenital orifice with "flaps from the nymphae" so as to use the anal sphincter for urinary control.

At this juncture it is appropriate to consider the deliberate substitution of the anal for the vesical sphincter in inoperable fistulae. Reuben Petersen (1917) has given us details of 41 cases from the literature in which a deliberate communication was made between the rectum and the bladder and the vagina closed, and he has added two cases of his own. His first case was a patient with a fistula following removal of the urethra for cancer: he performed a two-stage operation, firstly closing the urethra and making a high vesico-vaginal fistula, and secondly, making a recto-vaginal fistula and performing colpocleisis. This patient remained well for 6-7 years until she died of caecal cancer. His paper is carefully reasoned and some of the results described are impressive. The chief criticism must be the risk of urinary infection, but this is probably no greater, if not actually less, than after ureteric transplantation. Petersen's view was that there was little likelihood of faeces flowing into the bladder, and this opinion is supported by the events in my 4th Case. Following partial colpocleisis for a radium vesical fistula, a tiny recto-vesical opening formed and for a while she passed half the urine per rectum without at any time passing faeces or flatus per urethram. Though I have never seen Petersen's operation performed, or heard of anyone in this country who has even considered it, it would seem to be a reasonable alternative to ureteric transplantation

in some cases. I wrote to Professor N. F. Miller to enquire about this operation and he replied as follows:-

"..... You also inquire about the so-called Bird or cloaca operation performed by Professor Reuben Petersen many years ago. A few of these patients still report back to us for check up examination. One such individual has been coming back periodically for a period of 25 years. While she does show some changes in her kidneys these changes are not pronounced. I have not used this operation but suspect that in carefully selected elderly individuals there might be an occasion when it should be considered." If the operation is to be performed the artificial fistulae should be made large enough (2 fingers) to allow for shrinkage during healing.

RELIEF OF TENSION

In some fistulae there has been great loss of tissue or there is greatly reduced mobility of the margins of the fistula; their repair presents a special problem as the wound must be closed without tension if healing is to occur with any certainty. Three possibilities must be considered. There must either be free mobilisation of the bladder, closure of the opening with spare tissue sought elsewhere, or relief incisions must be made. The first method has already been fully discussed, and I have described how the posterior vaginal wall may be used as a

patch for the opening. Other methods may be more suitable in individual cases to enable the surgeon to close the fistula without tension. One special device is to open the abdomen and mobilise the uterus until it can be delivered forwards through the utero-vesical pouch of peritoneum until its posterior wall can be used to patch the opening (Schroeder 1908, Dowman 1920, Latzko 1933). Skin flaps from some other part of the vagina, from the labia or vulva may occasionally be used profitably, (Roeder 1927, Emmett's 35th case 1869, Satur, D. M. 1946, Keller 1932). Corscaden (1920) reinforced the bladder repair with the rectal wall.

As important, if not more important, than these devices is the use of relief incisions placed at some distance from the fistula. Watkins (1924) describes the advantages in exceptional cases of mobilising the bladder from the cervix, even to the extent of freely dividing the pillars attaching it to the cervix. A further step practised by Fahmy (1947) is preliminary vaginal hysterectomy to enable the fistula to be drawn readily into view. Dr. Hunner speaks of this method in the discussion of Dr. Watkin's paper. On the other hand, Dugal Bissell insisted he had never seen a case in which mobilisation of the bladder was necessary, and pleaded for a return to the simpler Sims-Emmett operation. In my case of vesico-cervical fistula following rupture of the lower uterine

segment, the freeing of the bladder from the cervix was clearly necessary to expose the fistula, but I have never seen a case in which mobilisation of the bladder from the cervix was necessary to relieve tension.

Another important method of relieving tension is by relief incisions at the sides: this method is particularly useful when the fistula is at or below the level of the ureteric openings in the bladder. I have twice used it with great profit, in each case cutting the bladder and bladder neck free from the subpubic ramus (Cases 8 and 14); indeed, I cannot see how else tension in the wound margin could have been so well and so effectively relieved. Halban (1937) describes the mobilisation advised by Schauta by incision external to the labia; he himself mobilises the bladder medially working upwards from a Schuchardt's incision.

Another method, for use in cases presenting great difficulty, has been described by Roton (1939): this consists of a partial mobilisation of the urethra by an S-shaped incision curving between the urethra and clitoris: this tends to interfere with normal bladder control, so it should only be used if lesser procedures were insufficient to relieve tension.

(Recovery of control after damage of urethral supports can be remarkable. I have seen the urethra completely detached from the symphysis pubis, following

a subcutaneous symphyseotomy during labour, without causing any appreciable urethral incontinence).

Quite a number of cases have been reported in which the cervix, having been severely damaged, has been drawn forwards until it is pointing into the bladder and even partially closing the fistula. If, in such cases, it is impossible to restore the cervix to a normal position, it appears to be a safe procedure to suture it - or half of it (Stevenson 1909) - into the bladder to assist in closing the hole (Agnew 1873). Emmett (1868) who records that he was several times obliged to use the cervix to fill up an opening, wrote, "Menstruation, as a rule, takes place without pain or any indication beyond a discolouration of the urine." Bissell (1928), Aldridge (1928) describe cases of this sort though they performed preliminary subtotal hysterectomy. On the other hand, Vineberg (1909) describes a calculus after this operation, though it is not clear why it formed. My opinion is that free separation of the bladder from the cervix should be possible in most cases, and that it should seldom, if ever, be necessary to suture the cervix into the bladder.

FISTULAE WITH SEVERE URETHRAL DAMAGE

A special type of fistula is the one with partial or complete destruction of the urethra. The repair is a very special problem because of the likelihood of urethral

incontinence even though a new urethra has been well fashioned and the fistula closed. The Ward-Farrar (1934) operation would appear to be the best for complete urethral reconstruction. In it a rectangular strip of vaginal skin one inch in width is taken from above the fistula, folded on itself and then placed in a groove at the site of the destroyed urethra; the vagina is then closed over this new urethra. In order to improve subsequent urinary control, Ward places a deep stitch or stitches at the bladder neck.

When there is only partial destruction of the urethra some lesser procedure will be required, though great difficulty may still be expected. G. B. Thomas (1945), writing of the closure in layers of this type of case, says, "it is hard to exaggerate how difficult this part of the operation may be." In a later paper (1947) he describes in some detail his method of treating the cases where the urethra and the bladder open into the vagina somewhat apart. In two of my cases the urethra was severely damaged (No. 7 and 12). In the one, the urethra had been laid open up to the bladder neck by a forceps delivery: it was closed in layers and the patient is better, but has not complete urinary control. In the other, the fistula was large and involved the upper half of the urethra. She was given fair urinary control by a fascial sling operation performed 10 months after the original repair.

The question that must be faced in each case is whether or not the woman after operation is going to be continent. Hayes (1945) says, that provided 1/3" of urethra is available satisfactory reconstruction can be effected, though he does not state the degree of urinary control to be expected in such a case. My opinion is that with half the urethra still present the attempt should certainly be made: with less than half the urethra remaining the attempt should generally be made, though good control will be unlikely unless the urine is diverted into the bowel.

If the vaginal operation is to be attempted, every effort should be made to get as deep a thickness of tissue between the bladder neck and the vagina in case a subsequent fascial sling operation is required. Closure in several layers may be possible (Case No. 12). In other cases the suture line may be reinforced, by mobilising the bulbo-cavernosus muscle and its adjacent tissue, by swinging it beneath the labia and by suturing it in position (Martius operation - 1939). Mr. Wilfred Shaw (1949) has also recently described this operation. Garlock (1928) has used the gracilis muscle to fill space between bladder and vagina.

Many other methods have been tried to give control in such cases. Taussig (1932) has said that it is easy enough to make a urethra, but difficult to give control; he has had 6 cases with complete urethral absence

and has even transplanted levator ani fibres, but he is pessimistic about the end results of vaginal operations. Douglass (1936) has also used the levator ani muscles, but prefers the Ward-Farrar operation.

McGlenn (1932) reported that Baker-Brown in 1863 made a new urethra by a puncture below the clitoris, and this procedure has been revised by Marion (1934). André (1937) advises the method of Marion as being simpler than the more complicated procedures. Drawbacks are that the new track tends to contract and that the bladder is likely to empty incompletely, with a consequent risk of infection and of calculus formation. Couvelaire (1947) has modified this operation. At the time of closure of the bladder fistula he forms a new urethra, joining the two later. Though he reports success, he considers it is still too early to recommend it. I have never seen any of these operations performed.

POST-OPERATIVE CARE

Before the end of any fistula operation, blood clot must be washed out of the bladder. If the patient has been operated on in the lithotomy position it is better to do this before the stitches are inserted: if the patient has been operated on in the knee-chest or some similar

position, she should be turned into the lithotomy position after the suturing has been completed and the bladder then washed out. In my experience it is not very satisfactory to wash out clot except with the patient on her back (see Case 7). A further advantage of completing the operation with the patient on her back is that the drainage is better adjusted in this position.

BLADDER DRAINAGE

Continuous bladder drainage is an important part of the care of these patients; it keeps the bladder at rest and empty, and it relieves the patient of the discomfort of passing clots per urethram. A proviso is, of course, that the drainage is efficient and that any failure is quickly and expertly put right. Sturmdorf (1925) after some difficulty took the other extreme view, and wrote that he was convinced "that the traditional indwelling catheter in the case of the vesico-vaginal fistula is a sanctified relic from the thralldom of antiquated dogma that should be consigned to the limbo of the obsolete." With this I disagree.

The method of draining the bladder must be suited to the individual case. When the fistula is in the upper part of the vagina, transurethral drainage is quite adequate. Most surgeons use a self-retaining catheter: a few prefer a plain catheter (Ward 1943) with an extra eye tied to a silver wire loop placed in the vestibule (Moir 1947).

When, however, the fistula involves the bladder neck it seems reasonable to place the catheter at some distance from the suture line. For such cases suprapubic drainage is recommended by Sunde (1941). I have found the small separate vaginal cystotomy high in the anterior wall to be a satisfactory alternative, (Geist 1940, Moir 1947, Everett 1947), provided the vesico-vaginal septum is healthy; the extra opening will close spontaneously, though this should be assisted by a few days of urethral drainage, (see Cases 8 and 11). The adjustment of the catheter through a separate cystotomy is more awkward than for urethral drainage. I use a plain catheter and tie it to the vagina with some plain catgut, which will dissolve or work loose in 6-7 days when urethral drainage is substituted. Vaginal cystotomy is absolutely contraindicated if the vesico-vaginal septum is scarred or avascular following radium, because closure under these circumstances is very uncertain. Elant (1934) drained by a catheter through the anterior lip of the cervix. Stoeckel (1936) drained the bladder through an opening anterior to the urethra.

Most of the difficulties with bladder suction occur in the first 12-72 hours, though a few present later. A common one is that drainage ceases and the patient feels she wishes to pass urine. The most likely fault is that the eyes of the catheter are blocked with blood clot, though other possibilities are, that the catheter has

partially slipped out, that the mucosa of the bladder has been sucked into the eyes of the catheter, or that the catheter is too far in and is irritating the fundus. When faced with these complications, I turn the patient first on one side and then on the other, making sure that the tubing is not kinked and that she is not lying on it; this is sometimes sufficient. If not, the suction and the position of the catheter are checked, and if all is well but the urine is still not draining, the bladder is washed out with normal saline. If there are many clots, as in Case No. 11, the washing should be continued until they have all been removed.

Difficulty with drainage is quite common, and I prefer to correct any fault myself. My practice is to review the situation 6-8 hours after operation, at which time a little heavily blood-stained urine should have drained away. At this time I disconnect the suction and empty and clean the bottle which receives the urine, and connect up the suction again. This early emptying of the bottle enables me to tell precisely what has drained away when I review the situation in another 6 hours, (this is usually about 11.0 p.m.). By this time it is usually possible to tell whether the suction drainage is working satisfactorily or not. If the urine is very thickly blood-stained, it is probably wise to wash out the bladder, as

there are sure to be clots in it which may well block the catheter during the night. With this regime I have only once - as far as I can remember - had to get up in the night to attend to a case in which the drainage had ceased. Subsequently I review the situation at least twice a day. The acidity of the urine is conveniently tested at these times; the clip between the two bottles is temporarily closed and the drop of urine on the end of the inlet tube is touched with litmus paper.

During the first few days after operation, the patient may have some intermittent bladder colic. This may be caused by clot in the bladder, or by the catheter being in poor position, especially too far into the bladder, or it may be unassociated with any obvious fault. The symptom tends to pass off after a day or so, and is usually relieved by tincture of opium, minims 20 four-hourly.

A later complication of continuous suction, which I have observed twice, is rather puzzling. Towards the end of the first week the patient has a return of the urgent desire to micturate, even though the drainage is working well, and she may pass a small amount of urine around the catheter. I judge the desire to micturate to mean that the bladder has healed, and the passage of urine around the catheter to mean that post-operative oedema has subsided and that continuous suction may safely be

discontinued. The passage of urine around the catheter within a few days of the operation (see Case No. 7) is a sign that urethral control will probably be incomplete when the post-operative oedema subsides. The parallel case is the patient who passes her urine easily within a few hours of a urethroplasty operation for stress incontinence: she is unlikely to be cured.

POSITION OF THE PATIENT AFTER OPERATION

If the patient is nursed on her face after operation, the wound is kept relatively dry and the chance of quick healing should thereby be improved. This is the view held by many gynaecologists who have special experience of the repair of these injuries (Schmitz 1944, Marion Douglass 1937). Counsellor (1942) put his patients into a Bradford frame for two weeks and there are others who have followed his example. On the other hand, Moir (1947) was of the opinion that "the maintaining of a special position during convalescence was necessary in only a small proportion of cases;" he favoured the three-quarter prone position when necessary. My patients have been nursed on their backs or on their sides, and so far I have not seen any harm come to the repairs on this account. The theoretical advantages of the face down position may be considerable, but there are disadvantages. It cannot be so pleasant or comfortable for the patient, it makes nursing difficult, and

it will probably prevent the complete emptying of the bladder unless of course there is suprapubic drainage. For these reasons it may be argued that the prone position during convalescence is unnecessary and undesirable in most cases. I am supported in my opinion by Pettit (1943) who points out that in the absence of gas or air in the bladder the intact viscus is always full, that the mucosa is everywhere equally wet and that pooling of urine therefore cannot occur. He considers that the position of the patient can have no influence on the distribution of the urine away from the repair site. His results are as good as any; all his patients have been cured, and only once in 15 cases did he have to operate twice.

I usually allow my patients up about the 6th or 7th day, so that when the catheter comes out a day or so later they are moving about freely and can go at once to pass urine without waiting for a nurse to accompany them. The stitches are removed with great care not earlier than the 20th day, unless the fistula has been a highly favourable one and easily closed, in which case I take them out earlier. The patient is allowed home as soon as the stitches have been removed. Coitus is forbidden until it is clear that healing is complete.

CONCLUSIONS

The woman with a vesico-vaginal fistula leads a miserable existence. She deserves the best that modern surgery can offer her.

The repair of a vesico-vaginal fistula, though often easy, can be extremely difficult and laborious. The degree of difficulty is well illustrated in the extensive literature on the subject.

Unless there has been severe damage to the urethra, she should be cured of her incontinence by vaginal surgery.

The most favourable occasion to cure the patient is the first operation.

Cure is most likely if attention is paid to the smallest details of the case. In particular, there should be most careful pre-operative examination and re-examination, until the nature of the injury is clearly and completely understood.

Because of the great variety of injuries seen, there is no such thing as a routine method of closure. The operation must be fitted to each case. Three principles, however, learnt painfully and slowly, have stood the test of time. Firstly, a depth of healthy,

vascular tissue must be exposed around the fistula. Secondly, the closure of the opening must be without tension. Thirdly, so far as possible the wound should be kept at rest during the process of healing by continuous bladder drainage.

Before operation, the patient's general health should be restored by appropriate remedies; the urinary tract and the local condition should also be treated when necessary.

The vaginal approach is best for the patient.

The position of the patient during the operation should be chosen to give the best possible access to the fistula.

The classical Sims-Emmett operation should be chosen, unless there is good reason for the use of some other technique. The operation consists of:- saucerisation of the fistulous margin down to, but not including the bladder, until one-quarter to one-third of an inch of raw, bleeding surface is exposed; closure with silver wire sutures down to, but not through the bladder, in one layer; relieving tension where necessary by remote incision; and continuous bladder drainage. A flap-splitting technique should be used for cases with associated prolapse, for cases that require reinforcing sutures at the bladder neck, for vesico-cervical fistulae, and for some fistulae adherent to the pubic bone.

Redundant tissue must not be trimmed until it is certain that it cannot profitably be used.

Partial colpocleisis or obliteration of the vaginal vault (Latzko's operation) is a useful operation for the vesical fistula which has followed hysterectomy; its principles are very similar to those of the Sims-Emmett operation; it must be performed in such a way that no diverticulum of the bladder is formed.

When there has been considerable loss of tissue and the surrounds of the fistula are scarred, the opening may be closed with a patch from the posterior vaginal wall, or skin flaps from adjacent tissue, or the rectum, or even the uterus after it has been delivered forward through the utero-vesical pouch.

When the urethra has been severely damaged, it can often be reformed, but it is unlikely that operation will restore complete urinary control.

Silver wire gauge No. 32 should be used for the vagina in all difficult cases; it should be twisted taut and as a rule not removed for 20 days.

Continuous bladder drainage should be arranged, but in such a way that the suture line is not irritated by the catheter. The drainage should be maintained for 6-10 days in favourable cases, and for longer in unfavourable cases.

The patient should be seen by the surgeon every 6-8 hours for the first 24-36 hours, and between these times the closest watch should be kept for any breakdown of the bladder suction drainage.

The urine post-operatively should be kept, as far as possible, sterile and acid, by sulphonamides in small dosage and capsules of ammonium chloride.

CASE RECORDS

Summary

- Case No. 1. Vesico-vaginal fistula following dystocia.
Nine previous unsuccessful attempts at cure.
Closure in one operation using Sims-Emmett
technique.
- " No. 2. Post-partum vesico-vaginal fistula. Closure
in one operation by Sims-Emmett technique.
- " No. 3. Tiny post-partum vesico-vaginal fistula.
Closed in one operation by Sims-Emmett
technique.
- " No. 4. Post-radium vesico-vaginal fistula. Cured at
the second operation by partial colpocleisis.
- " No. 5. Post-operative vesico-vaginal and uretero-
abdominal fistula. One previous unsuccessful
attempt to close the vesical fistula. Closure
of the vesical fistula by the Sims-Emmett
operation. The ureteric fistula later treated
by nephrectomy.

- Case No. 6. Post-radium vesico-vaginal fistula. Cure at the first attempt by partial colpocleisis.
- " No. 7. Large post-partum vesico-vaginal fistula with destruction of the upper half of the urethra. Closure of the fistula by the Sims-Emmett operation. Partial relief of residual urethral incontinence by a fascial sling repair.
- " No. 8. Post-partum fistula at the bladder neck. Closure at the first attempt by the Sims-Emmett technique with ~~remote~~ relief incisions.
- " No. 9. Post-partum fistula. Closed by the Sims-Emmett technique at the first attempt.
- " No. 10. Vesico-vaginal fistula following incomplete uterine rupture during labour. Closure at the first attempt by free mobilisation of the bladder and suture in layers.
- " No. 11. Fistula at the bladder neck following fascial sling operation (performed wholly from above). Closure at the first attempt by the Sims-Emmett technique. No residual urethral incontinence.

Case No. 12. Vesico-vaginal fistula with severe urethral damage following a forceps delivery. Closure by free mobilisation and suture in layers. Some slight residual urethral incontinence. Uncompleted case.

" No. 13. Vesico-vaginal fistula with three separate vaginal openings. Two previous unsuccessful attempts at repair. Closure by the Sims-Emmett technique at the first attempt.

" No. 14. Vesico-vaginal fistula following a surgical attempt to close a post-radium recto-vaginal fistula. Closure by the Sims-Emmett technique with relief incisions. Failure of healing. Uncompleted case.

CASE NO. 1. MRS. E. R.

This patient, aged 63, was seen in the Nuffield Department, Obstetrics and Gynaecology, Oxford, in April 1946. She gave a history of complete urinary incontinence since a destructive operation during labour 32 years previously. There had been nine unsuccessful attempts at repair of the fistula.

We suspected pelvic contraction as forceps had been applied in all of her labours, and this was confirmed by radiological pelvimetry. The true conjugate measured 3 inches.

On examination a small vesical fistula was found opening to the right side of the vaginal vault. There was no cervix, the uterus having previously been removed. Operation was advised.

10.4.46. Operation:-

The patient was placed in the lithotomy position. The previous findings were confirmed. The edge of the fistula was excised and "saucerised." The opening was closed with interrupted silver wire sutures, with one deeply placed mattress wire suture to relieve tension. A plain catheter with two eyes was inserted in the bladder and tied to a wire loop in the vestibule. Blood clot was washed out and the patient returned to the ward, where continuous gravity suction drainage was started.

20.4.46. So far her convalescence had been uneventful.

She was dry. The suction drainage, which had worked well, was discontinued and the catheter was removed. She passed urine normally.

27.4.46. Five silver wire sutures were removed.

3.5.46. The remaining sutures were removed.

4.5.46. She was allowed to go home.

24.6.46. She attended for a routine follow-up and reported complete urinary control.

Comment:-

As there had been nine previous unsuccessful attempts to close the opening, and as this was the first urinary fistula that I had ever repaired, the excellence of the result is testimony to the value of the classical Sims-Emmett operation with silver wire sutures.

CASE NO. 2. MRS. X.

While on a visit to Copenhagen in September 1946, I was asked to operate on a patient with a vesico-vaginal fistula. Unfortunately I have not succeeded in obtaining all the details of her case.

She was a young woman whose general health was good; she had complete urinary incontinence. The fistula was small, in the middle third of the vagina, and it was surrounded by healthy mobile tissue. There was some cystocele.

Operation:-

The patient was placed in the lithotomy position. The fistula was easily exposed. The edges were excised, saucerised and sutured with silver wire. Blood clot was washed out of the bladder and a plain catheter was inserted and tied to a silver wire loop in the vestibule. Continuous suction drainage was started on her return to the ward.

I was unable to supervise her convalescence, but on enquiry some months later I was told that it had been uneventful.

Comment:-

In retrospect, repair by the free mobilisation of vagina from bladder, closure in layers and removal of redundant vagina might have been preferable. At the time, however, I was inexperienced and I judged it safer to use the simpler Sims-Emmett technique.

CASE NO. 3. MRS. P. Gynaecological Case No. 39565,
St. Mary's Hospitals, Manchester.

Since the birth of a child by forceps in the second half of 1946, this patient was incontinent of urine. She was an obese woman, but otherwise her general health was good. Dr. Bride, whose patient she was, transferred her to my care.

Accurate diagnosis in this case was not easy. Dye injected into the bladder was, however, seen to escape from a tiny opening about one inch from the cervix. The surrounding tissues were healthy. On cystoscopy the fistula was found just lateral to the opening of the left ureter. Operation was advised.

March 1947. Operation:-

The patient was placed in the modified knee-chest position as this improved the exposure. The fistula was found, and repaired by the Sims-Emmett technique with silver wire. A catheter was inserted and tied to a wire loop in the vestibule. Continuous gravity suction drainage was started on her return to the ward.

Her convalescence was uneventful, the catheter being removed in 10 days, and the sutures a week later. She was discharged with full urinary control.

Comment:-

The fistula in this case was so tiny that it might have been cured by cauterisation and bladder drainage. There was never any real doubt about the successful outcome in this case.

CASE NO. 4. MRS. Mc. Gynaecological Case No. 17227,
St. Mary's Hospitals, Manchester.

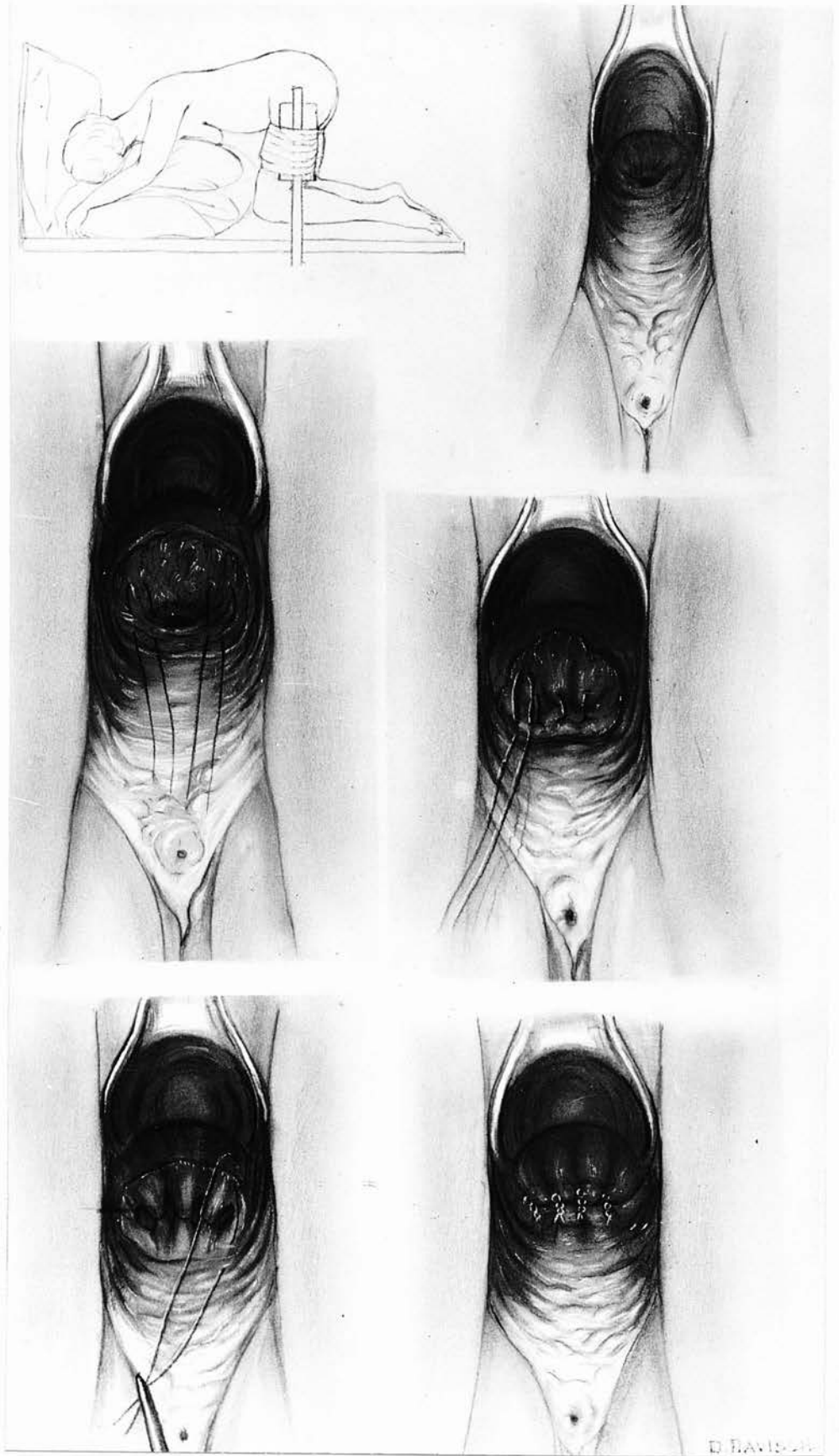
This patient, at the age of 36, was treated by radium for carcinoma of the cervix. The following year, 1943, the growth was reported to be "advancing very rapidly" and the treatment was judged to have failed to cure her cancer. However, three years later she appeared again, free of obvious cancer, but with complete urinary incontinence. Dr. Newton, whose patient she was, asked me to look after her.

Her general health seemed good; there was no sign of recurrence of cancer. There was a vesical fistula in the upper part of the vagina which had the typical appearances of the post-radium lesion: it was surrounded by hard, indurated, immobile, avascular tissue. The cervix had disappeared. Operation was advised.

13.9.47. Operation:-

The patient was placed in the modified knee-chest position. A cuff of vagina about half an inch in width was removed from just below the fistula, and the vagina was closed with one layer of silver wire sutures. A catheter was inserted, and continuous suction drainage started on her return to the ward.

4.10.47. She had remained dry since her operation and she had been without the catheter for some days and was passing urine normally. Unfortunately, during



- Fig. 1. Case No. 4.

Partial colpocleisis for the closure of the post-radium fistula.

the removal of the sutures some rather firm retracting was required, and the repair gave way. Continuous bladder drainage was continued for a further 10 days.

14.10.47. She was passing urine normally and was dry, so she was allowed to go home. Shortly after, the incontinence re-appeared.

2.1.48. She was re-admitted for further operation.

3.1.48. Second Operation:-

With the patient in the knee-chest position, a thin bridge of tissue was found partially closing the vagina. This broke down completely at the touch of a finger, exposing the fistula as before. A much wider cuff of vagina was removed and three layers of sutures were placed, the highest being fine catgut and the lowest silver wire. A catheter was inserted and continuous bladder drainage started on her return to the ward.

17.1.48. Bladder drainage was discontinued.

24.1.48. Sutures were removed. She was dry and was passing urine normally.

7.4.48. She was still quite dry and content, though she insisted that she passed half the urine per urethram and half per rectum. On rectal examination a tiny dimple could be felt, which presumably was the site of the opening into the bladder.



Fig. 2. Case No. 4.

Photograph of a painting of the cystoscopic appearance one year after operation. The white area marks the site of the fistula now closed by the posterior vaginal wall. The two black spots mark the site of the tiny vesico-rectal fistulae.

7.7.48. She only occasionally passed urine rectally.

She had full urinary control.

16.3.49. She passed urine infrequently by the rectum.

The vagina was firmly closed in the upper half.

The dimple could still be felt rectally. On cystoscopy the site of the fistula was a shallow depression; in its centre there were two minute black spots which presumably marked the rectovesical openings. It was not possible to distinguish bladder wall from the vaginal wall.

The patient was very content. Sexual relations had not been re-established, at her own wish.

Comment:-

Because of the avascularity in the region of the fistula, closure in layers or closure by the Sims-Emmett operation would certainly have failed. The chief disadvantage of the operation is the shortening of the vagina. The re-establishment of sexual relations has been described after similar operations (Twombly and Marshall).

CASE NO. 5. MRS. A. E. B. Gynaecological Case No. 46056,
St. Mary's Hospitals, Manchester.

In 1946, at the age of 64, this patient had a total hysterectomy for uterine fibroids.

In 1947, a papilloma of the bladder was diagnosed and fulgurated. Later, the same year, the papilloma recurred and operation was performed. The right ureter was transplanted into the bladder fundus and the growth widely excised. Following this a vesico-vaginal fistula developed. An unsuccessful attempt was made to close this. She then came north to Manchester, where she was seen by the late Professor Dougal, who transferred her to my care in October 1947.

Examination showed a small vesico-vaginal fistula at the vaginal vault. The cervix had previously been removed. She also had a right uretero-abdominal fistula. Her general health was fairly good. Cystoscopy showed no recurrence of the papilloma. Operation to close the vesical fistula was advised.

31.10.47. Operation:-

The patient was placed in the modified knee-chest position. The edges of the fistula were excised. The peritoneum was so close that it was opened early in the operation. Air rushing in and out of the peritoneal cavity

and over the operation site during the patient's respiration caused some difficulty, so the peritoneum had to be closed. The fistula was then repaired with interrupted silver wire sutures. A catheter was inserted and continuous bladder drainage started on her return to the ward.

10.11.47. The catheter was removed.

22.11.47. The silver wire sutures were removed. The vaginal incontinence was cured.

During her convalescence from this operation, the uretero-abdominal fistula closed spontaneously, only to re-open nine days later, following some right-sided pain.

Later the ureteric fistula was treated by a colleague by nephrectomy.

18.2.48. The patient reported for a final follow-up examination. Her incontinence had been cured and she was convalescing well.

Comment:-

There are many points of interest in this case, but two deserve emphasis. Firstly, the presence of a double fistula. Secondly, the close relationship of the peritoneum to the fistula. It might have made the operation easier if the pouch of Douglas had been widely opened until the fistula could be drawn towards the vaginal introitus and so made more accessible.

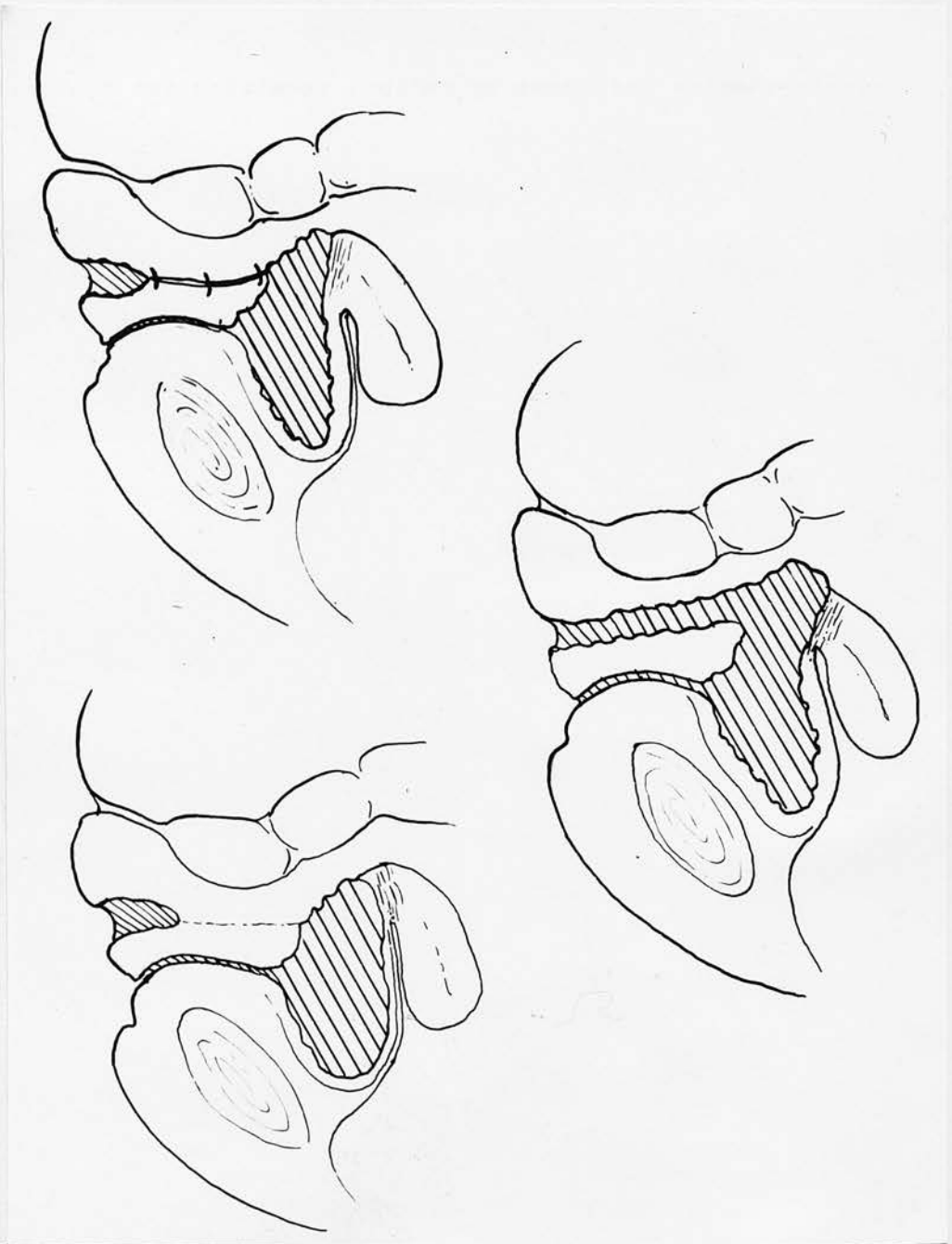


Fig. 3.

Diagram showing the principles of partial colpocleisis for a post-radium fistula.

CASE NO. 6. MRS. L. H. Gynaecological Case No. 47826,
St. Mary's Hospitals, Manchester.

In April 1945, this patient, aged 54, was treated for a uterine carcinoma by radium, receiving two treatments at weekly intervals. Thereafter, she reported regularly and remained well until September 1946, when she developed a small recto-vaginal fistula; this, however, closed without treatment. In December 1947, she reported to St. Mary's Hospital, Manchester, with complete urinary incontinence.

On examination she was found to have a vesico-vaginal fistula about half an inch in diameter, and with all the features of the post-radium case. It was a late sequel to therapy, it was situated high in the vagina and close to the ureters, and it was surrounded by thickened, almost cartilaginous immobile avascular tissue. The cervix had disappeared. Operation was advised.

January 1948. Operation:-

The patient was placed in the lithotomy position. The previous findings were confirmed. A cuff of vagina was excised, extending from the lower margin of the fistula downwards for $1\frac{1}{2}$ inches. The vagina was then closed in three layers, the highest being fine catgut and the lowest silver wire. A catheter was inserted and tied to a wire

loop. Blood clot, which was very scanty, was washed away. On her return to the ward continuous drainage was started.

Her convalescence was uneventful. The catheter was removed on the 10th day and the sutures on the 18th day, when the vagina was well healed.

April 1948. She attended for follow-up. She had full urinary control. The vagina was healed.

March 1949. She attended by request. She had full urinary control. The vagina was healed. On cystoscopy there was old-standing scarring of the bladder base. There was no diverticulum, only a shallow depression; there was no calculus formation. It was not possible to see where the bladder finished and the posterior vaginal wall began.

Comment:-

Without any shadow of doubt, partial colpocleisis was the correct operation for this fistula. The repair was easy, safe and effective.

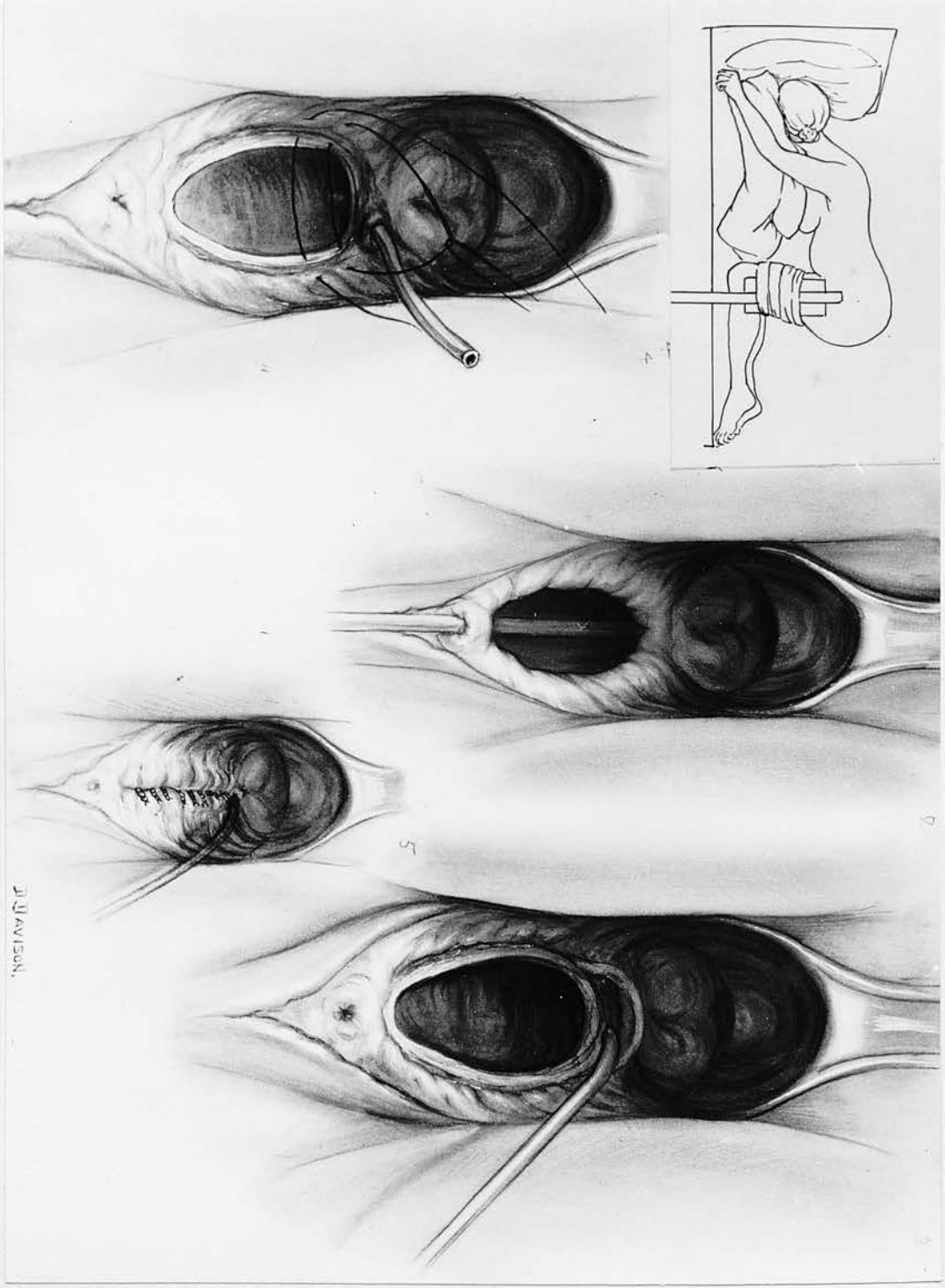


Fig. 4. Case No. 7.

Large post-partum fistula.

CASE NO. 7. MRS. H. Gynaecological Case No. 47895,
St. Mary's Hospitals, Manchester.

In 1947, at the age of 24, this patient was delivered with difficulty by forceps. Ever since she had complete urinary incontinence. In 1948, she was referred to Dr. Addis, who asked me to undertake her treatment.

On examination a very large vesico-vaginal fistula was found extending from the cervix down to and including the upper half of the urethra. The surrounding tissue was mobile and healthy.

The question was not so much whether this fistula could be closed as whether after closure she would have urethral control. Operation was advised.

14.2.48. Operation:-

The patient was placed in the modified knee-chest position. The edges of the fistula were saucerised and the opening closed with interrupted silver wire sutures. Because the urethral end of the fistula was considered the more important the catheter was inserted into the bladder near the cervix. Blood clot was washed away, and continuous bladder drainage was started on her return to the ward. The bladder drainage, which had not been tested post-operatively with the patient on her back, was inefficient and had to be abandoned in 12 hours. Urethral drainage was then substituted.

- 20.2.48. The urethral catheter ceased to be efficient for no clear reason, and as urine was escaping around it, it was removed.
- 3.3.48. The sutures were removed. The patient had been passing urine normally.
- 4.5.48. She attended for follow-up and reported some urethral stress incontinence. The fistula was healed.
- 2.6.48. She still had some urethral incontinence.
- 30.9.48. She had definite marked urethral incontinence, which distressed her greatly. Further operation was advised.

1.12.48. Operation:-

A vertical strip of the anterior sheath of the rectus muscle was mobilised except for its attachment at the lower end. The abdominal wound was then partially closed. A longitudinal incision was made in the vagina over the bladder-urethral junction and the vagina was dissected off the bladder. Great care was necessary as the whole of this part of the operation was over the site of the now-healed fistula. The space of Retzius was opened up with the finger pushed from below upwards behind the symphysis pubis. The fascial sling was pulled down one side and pushed up to the other, pulled tight over a urethral catheter and anchored to the rectus sheath. The abdominal and vaginal openings were then closed. When the

patient returned to the ward continuous bladder drainage was started.

13.12.48. The catheter was removed.

19.12.48. She was allowed to go home.

26.1.49. The patient was pleased with the result of her operation. She had much better control, though she still had to wear a pad during the day.

20.7.49. She reported that she had perhaps still more control. One pad only was slightly soiled by the evening: she was quite dry by night. The bladder-urethral junction was well hitched up by the sling.

Comment:-

The excellence of the result in this case encourages me to advise vaginal repair even for those cases with severe urethral damage.

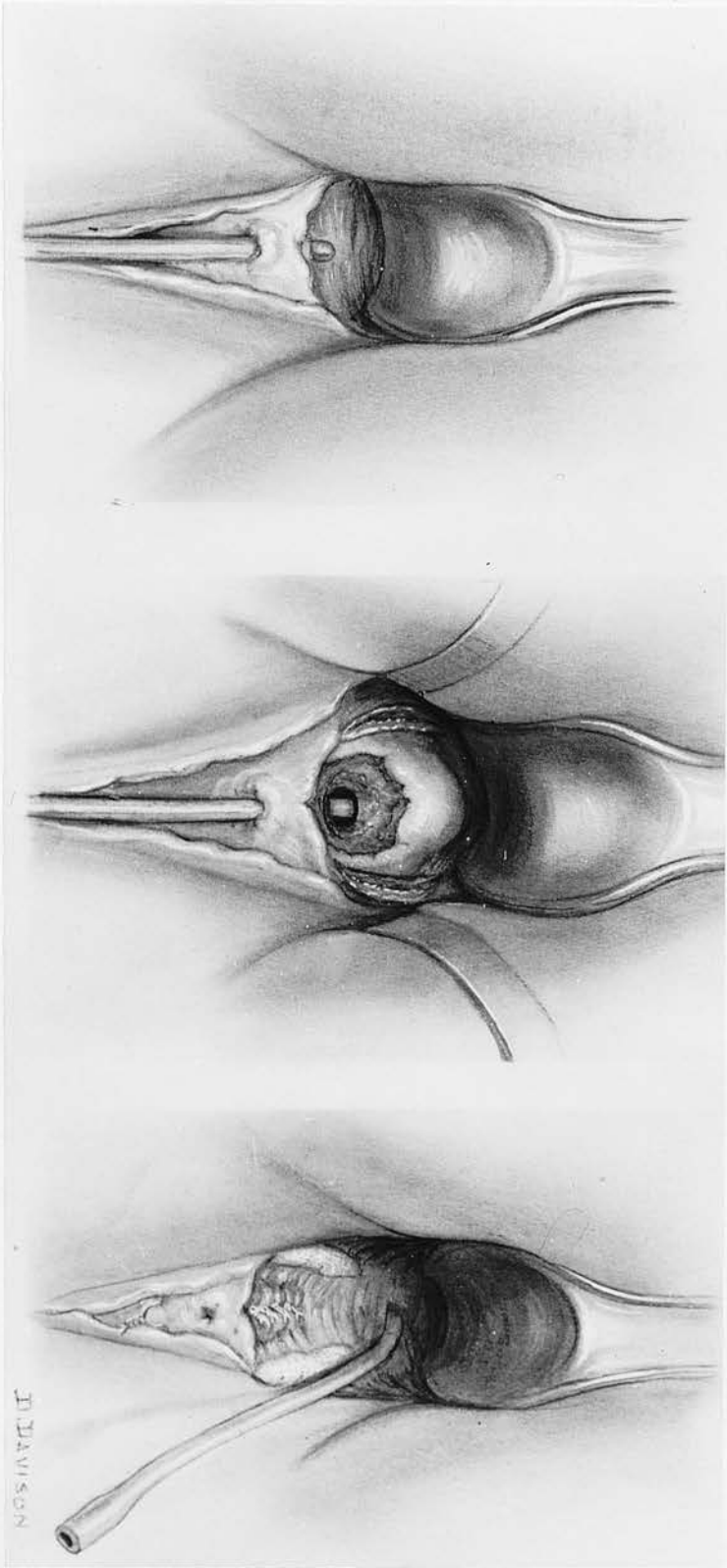


Fig. 5. Case No. 8.

Small fistula at the bladder neck. Repaired
by Sims-Emmett technique with relief incisions. Separate
cystotomy for bladder drainage.

CASE NO. 8. MRS. E. W. Gynaecological Case No. 48776,
St. Mary's Hospitals, Manchester.

In 1947, this woman, aged 35, was delivered of twins by forceps. Following this she had complete urinary incontinence. In 1948, she reported to St. Mary's Hospitals, Manchester.

On examination a small vesico-vaginal fistula was found; this was situated at the bladder-urethral junction and was surrounded by scarred, relatively avascular immobile tissue. Operation was advised.

14.4.48. Operation:-

The patient was placed in the modified knee-chest position because this greatly improved the exposure. The previous findings were confirmed.

The scar tissue around the fistula was freely excised until a broad shelf of healthy tissue was exposed. When this stage of the operation had been completed, it was apparent that the edges of the wound could not be brought together without tension. Deep relief incisions were therefore made at a little distance from the sides of the fistula to free the upper part of the urethra and bladder from their attachments to the sub-pubic ramus. Free bleeding occurred from these relief incisions and packing was required. The fistula was then easily closed without tension using interrupted silver wire sutures.

A small midline cystotomy opening was made high in the anterior vaginal wall and a plain catheter with an extra eye was pulled into the bladder and fixed by a catgut stitch around it and through the anterior vaginal wall. Blood clot was washed out of the bladder. A silver wire loop was placed in the vestibule for the urethral catheter later to be inserted.

On her return to the ward continuous bladder drainage was started. Her convalescence for the first week was uneventful.

21.4.48. Under pentothal anaesthesia the catheter was removed from the cystotomy puncture, and a urethral catheter was inserted and tied to the wire loop. On her return to the ward continuous bladder drainage was restarted. For a day or so afterwards there was a little escape of urine, presumably from the cystotomy puncture, but this quickly ceased.

28.4.48. The catheter was removed. After this there was again occasionally a little escape of urine.

5.5.48. The sutures were removed.

6.5.48. The patient was dry and was allowed to go home.

4.8.48. She attended for follow-up examination and reported that she had occasional urethral

incontinence. On questioning she said she could sit through a cinema show and remain dry.

23.3.49. She attended again by request and reported that she very occasionally damped a pad, but that generally she could hold her urine for 5-6 hours and throughout the night. She was very content.

Comment:-

Though this fistula was small, it was in an unfavourable position and it was surrounded by unhealthy tissue. Without the wide excision of scar tissue and the free mobilisation by relief incisions, cure would have been improbable. I am very doubtful if any technique other than the one chosen would have resulted in cure in only one operation. This repair was one of the most difficult I have undertaken.

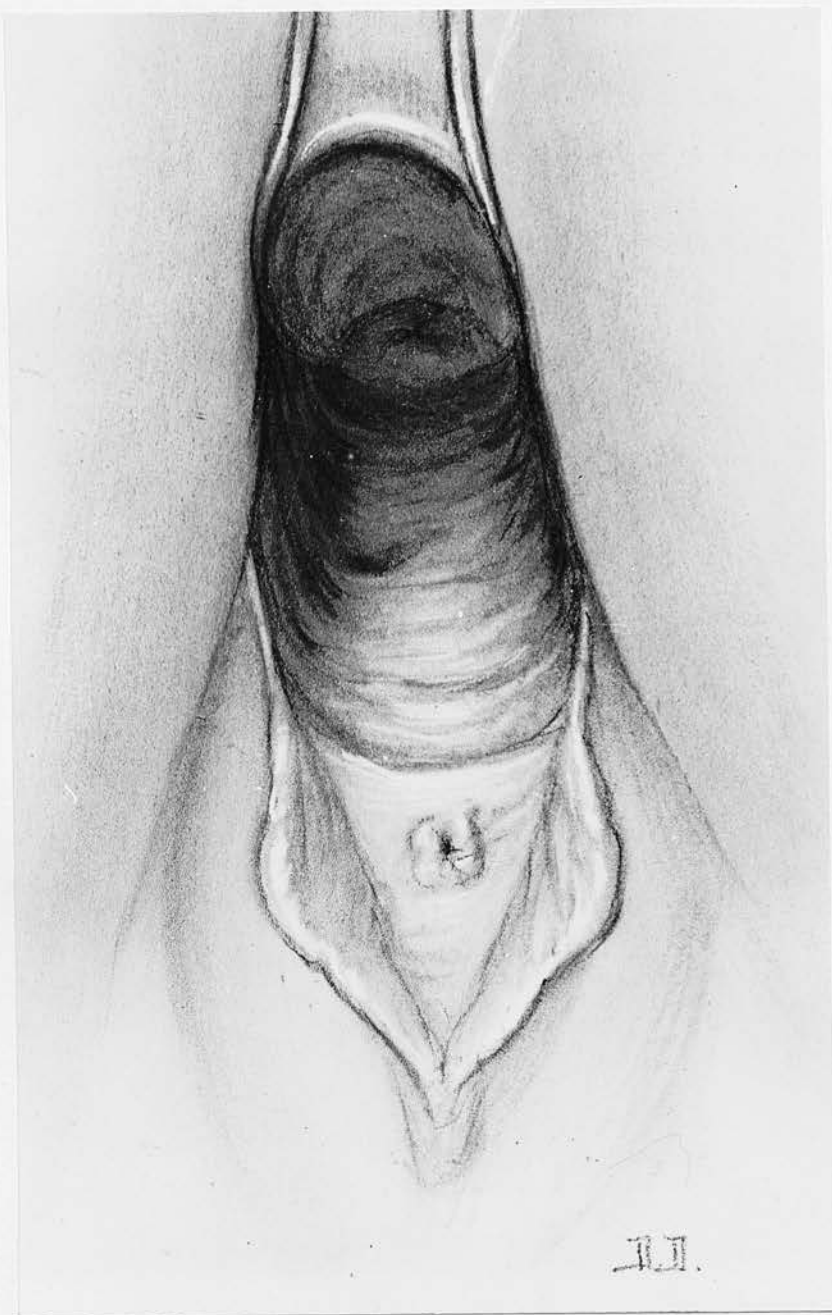


Fig. 6. Case No. 9.

Small favourable vesico-vaginal fistula.

CASE NO. 9. MRS. N. Gynaecological Case No. 49005,
St. Mary's Hospitals, Manchester.

During this patient's first labour there was unrecognised disproportion. A forceps delivery was attempted and persisted in until the patient collapsed, still undelivered. For many hours she was desperately ill, and during the whole time the foetal head was jammed in the pelvis. Eventually she rallied and was delivered with difficulty. After a stormy convalescence a small vesico-vaginal fistula was found.

Within a few weeks of delivery I was asked to see her and I immediately started continuous bladder drainage in the hope of obtaining a cure without operation. This was maintained for nearly three weeks, but without success.

The fistula was clean and small; it was in the middle third of the vagina and was surrounded by mobile tissue. Operation was advised.

19.5.48. Operation:-

The patient was placed in the modified knee-chest position. The previous findings were confirmed. The edges were "saucerised" without difficulty and the wound closed with silver wire sutures. Blood clot was washed out and a catheter was inserted in the urethra and tied to a silver wire loop. On her return to the ward continuous bladder drainage was started.

26.5.48. The catheter was removed.

9.6.48. The sutures were removed and the patient was allowed to go home, dry.

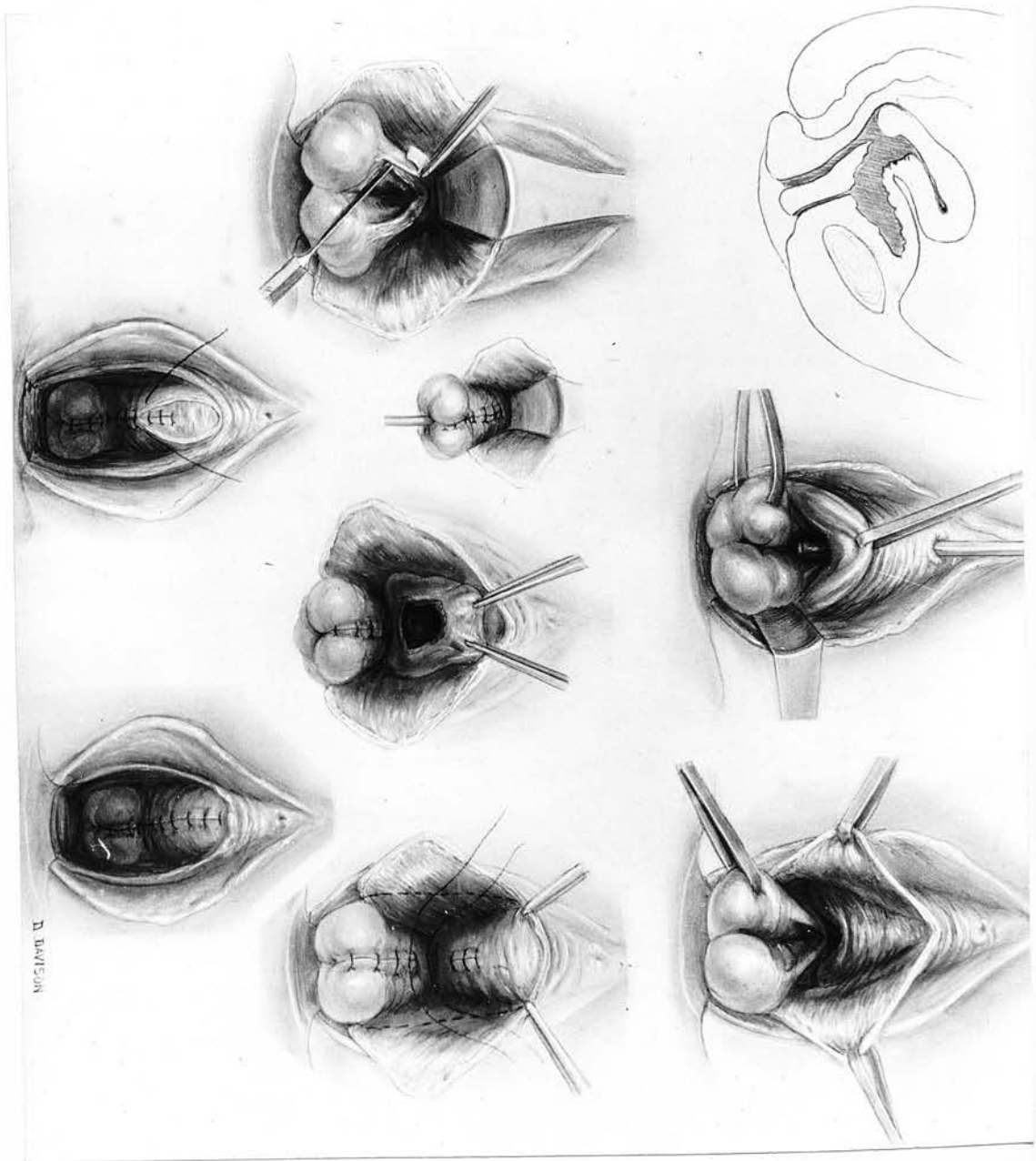
13.3.49. She attended for follow-up examination. She was well and had good urinary control. The fistula was well healed.

Comment:-

Early operation was favoured in this case as the prospects of cure were so good.

Vesico-cervical fistula following incomplete uterine rupture during labour.

Fig. 7. Case No. 10.



D. BAIVSON

CASE NO. 10. MRS. E. T. Antenatal Case No. 26737.
Gynaecological Case No. 54882.
St. Mary's Hospitals, Manchester.

In June 1948, this patient, aged 42, gravida 2, was admitted to St. Mary's Hospitals, Manchester, having uncontrollable bearing down pains, a shoulder presentation, a dead baby, and a visible retraction ring.

She was anaesthetised immediately, and the foetus decapitated and extracted. Immediate exploration of the uterus showed that there was an incomplete uterine rupture, in the form of a vertical tear in the middle line of the lower uterine segment, and that the bladder had been torn. I was called to see her and confirmed the findings. As there was no bleeding, as the bladder was damaged, and as the tear was not involving the peritoneal cavity, operation was not undertaken. A catheter was tied into the bladder and continuous suction drainage started.

Her recovery was steady and apyrexial. It was, however, unusual in that all the lochia escaped via the bladder. Indeed, on many occasions the catheter blocked with the lochia and had to be changed. Not once in the first ten days after delivery did she soil a sanitary pad. On the 10th July the patient was allowed to go home, apparently dry.

Six weeks later she was seen again and there was a little urinary incontinence, though she did not complain of this.

In October 1948, the patient said that she could hold urine for about two hours. On examination at this time there was complete healing of the vagina, but there was a small vesico-cervical fistula. Operation was advised.

February 1949. Operation:-

The patient was placed in the lithotomy position. The cervix was drawn down and the fistula exposed. The anterior vaginal wall was incised in the midline and dissected laterally off the bladder. The bladder with its fistula was then mobilised from the front of the torn cervix, (the uterine tear, which had been about 6" in length, had shrunk down to a tear of the cervix about $1\frac{1}{2}$ " in length). When separation was complete, the edges of the cervical tear were pared and repaired, and the opening in the bladder was closed in two layers. Redundant vaginal wall was removed and the vagina then closed with interrupted nylon sutures. A catheter was tied into the bladder and blood clot washed out. When she returned to the ward, continuous bladder drainage was started.

Her convalescence was uneventful. The catheter was removed in the second week and the sutures in the third week.

23.3.49. She attended for follow-up examination. She had good urinary control and the fistula was healed.

Comment:-

The successful conservative management of an extraperitoneal rupture of the uterus with involvement of the bladder is an interesting feature of this case. The fistula very nearly closed spontaneously, and it never gave her very much trouble because it was situated so high in the vagina. The only reasonable method of repair was the one employed, namely, free mobilisation of the bladder from the cervix and the repair of these two organs separately. There was never any real doubt about the outcome.

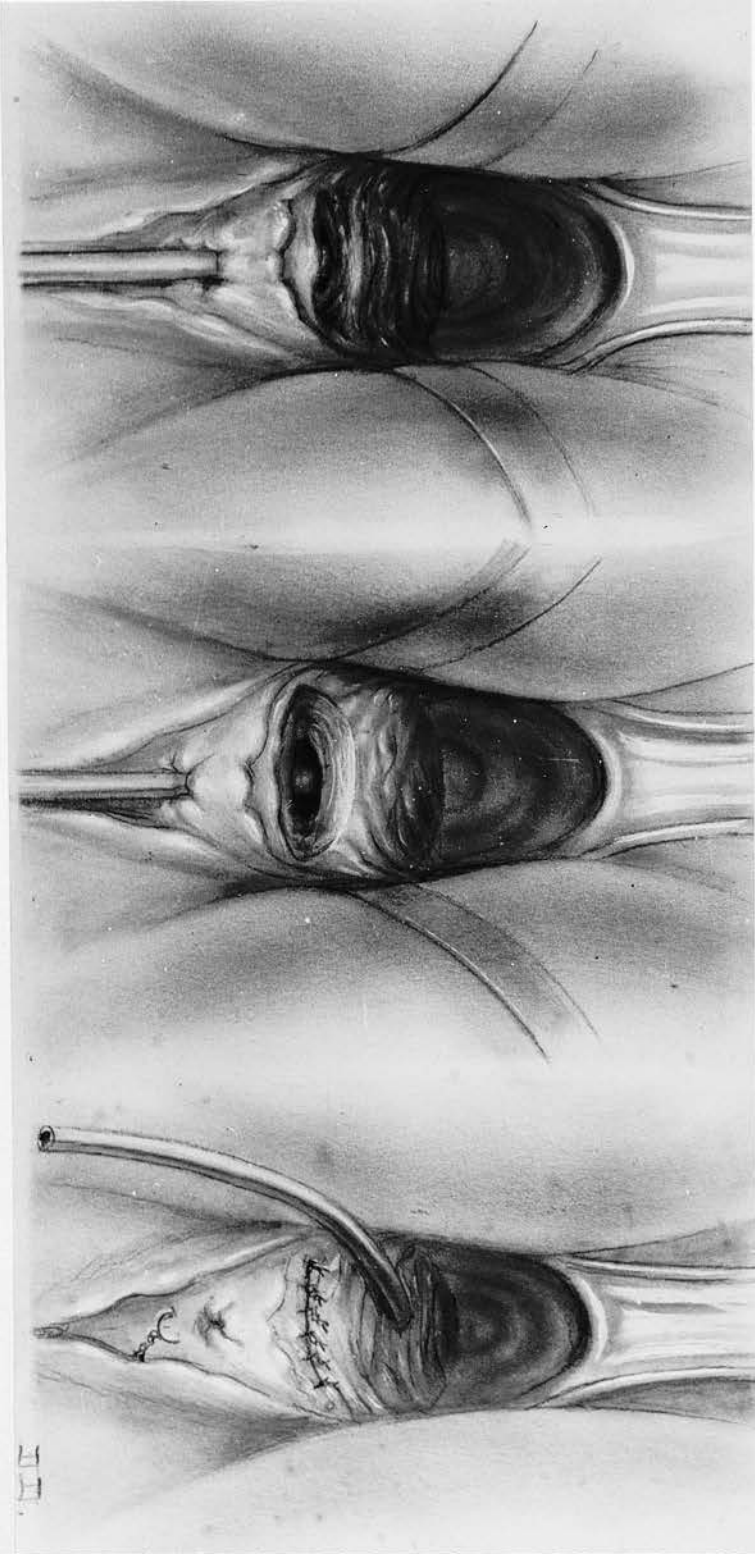


Fig. 8. Case No. 11.

Fistula following fascial sling operation for stress incontinence. Closed by Sims-Emmett technique. Separate cystostomy for bladder drainage.

CASE NO. 11. MRS. J. Gynaecological Case No. 49104,
St. Mary's Hospitals, Manchester.

In August 1949, a fascial sling operation for urinary stress incontinence was performed on this patient. The operation was wholly carried out from above, and during it the bladder may have been injured: much bleeding was reported.

She had a stormy convalescence on account of her chest, but there was no record of her bladder condition except that when she was discharged on the 18th day she was incontinent. When she was seen in the follow-up clinic a month later she was found to have a vesico-vaginal fistula. Dr. Bailey, whose case she was, asked me to see her and undertake treatment.

On examination there was a transverse fistula, about half an inch across, at the bladder neck and surrounded by some scar tissue; the edges of the fistula were pulled upwards and were somewhat inaccessible, especially at the sides. Operation was advised.

October 1949. Operation:-

The patient was placed in the modified knee-chest position as this facilitated access to the fistula. The edges were saucerised and scar tissue was removed. The wound could not be closed from side to side, but was easily closed

to leave a transverse suture line. Silver wire was used. A separate midline cystotomy puncture was made high in the anterior vaginal wall and a catheter was tied into the bladder through this opening. A wire loop was inserted in the vestibule. Blood clot was washed away. On her return to the ward continuous bladder drainage was started.

Six hours after the operation, blood clot was removed from the rubber tube and the bladder washed out; this had to be repeated five hours later, as the urine was not draining satisfactorily.

On the 5th day, the catheter fell out, so urethral drainage was substituted and this was continued for a further six days.

She remained dry throughout her recovery, except for a day or so after the first catheter fell out. On the 21st day the sutures were removed and the wound was seen to be well healed.

December 1949. She attended for a follow-up examination. She was quite dry and had good urinary control.

Comment:-

This case also illustrates the particular value of the Sims-Emmett operation.

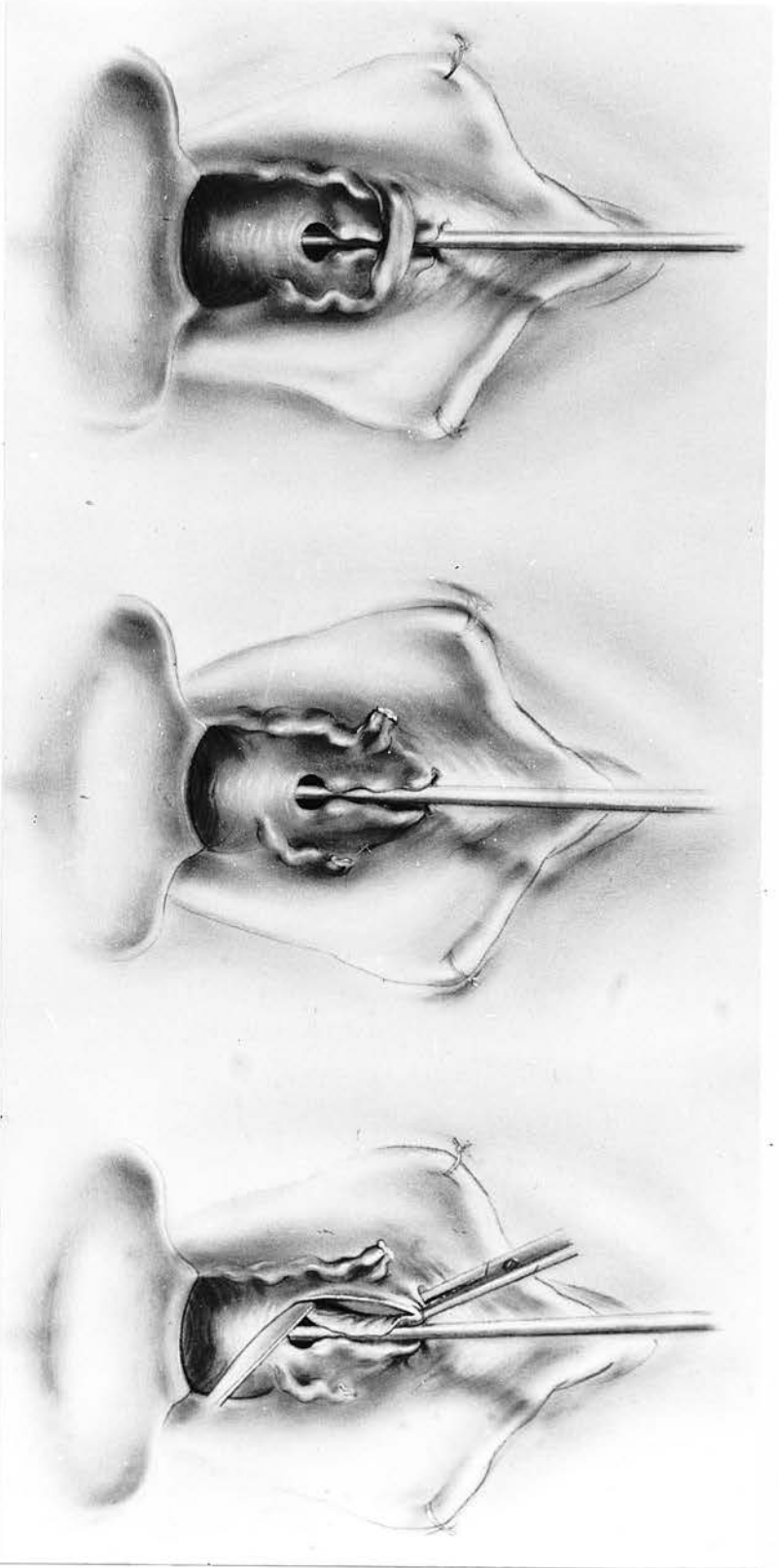


Fig. 9. Case No. 12.

Vesico-vaginal fistula with severe urethral damage.
(See also Fig. 10).

CASE NO. 12. MRS. M. Gynaecological Case No. 59081,
St. Mary's Hospitals, Manchester.

In 1947, this patient was delivered by forceps of her first child. Two months later she noticed partial urinary incontinence. Provided she was sitting or lying down she could keep herself dry for about one hour, but if she moved about or fell asleep she was wet. Shortly after the natural birth of a second child, she attended the University Unit of St. Mary's Hospitals, where she was seen by Professor Morris. He asked me to undertake her treatment.

The diagnosis in this case was not at all easy: indeed, I had made three pre-operative examinations before I was satisfied about the nature and extent of the injury and the way it should be repaired.

The urethra must have been split open by the forceps and then partially healed. There was a vesicovaginal fistula at the bladder urethral junction, and this fistula could be kept closed for a short time by the voluntary contraction of the levator ani muscle, a few fibres of which surrounded the opening; the contraction of these fibres could be felt when a finger was inserted into the bladder and the patient asked to "tighten up." Below the fistula the urethra was split open along its whole length, except in one place where a bridge of tissue crossed loosely from one side to the other. The surrounding tissues were healthy and abundant.

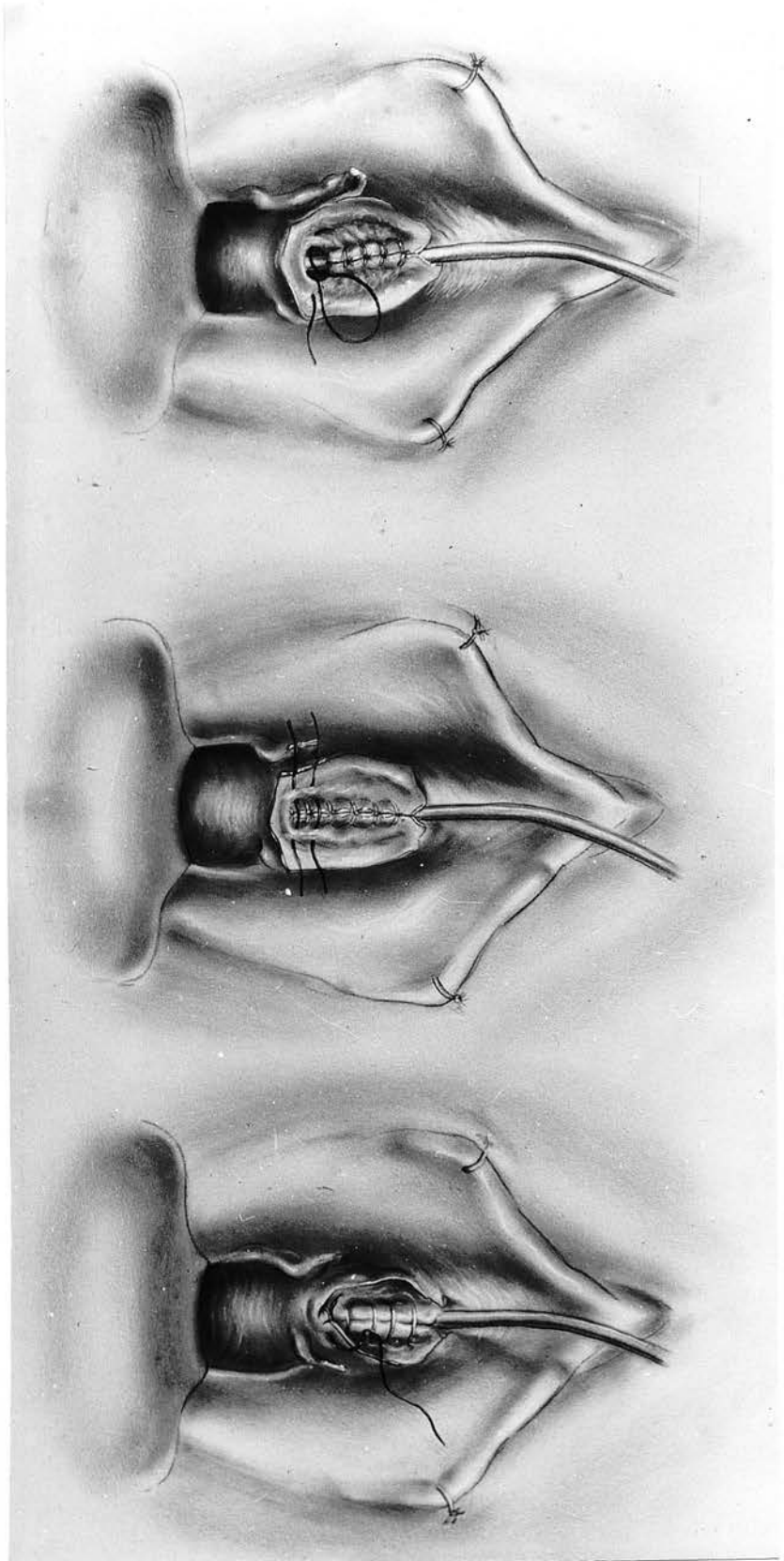


Fig. 10. Case No. 12.

Vesico-vaginal fistula with severe urethral damage.
(See also Fig. 9).

The surgical problem was fourfold. Firstly, the urethra had to be refashioned. Secondly, the vesicovaginal fistula had to be closed and joined to the urethra. Thirdly, the repair had to be designed so that the slight control she had over the bladder neck would, if possible, be improved. And fourthly, as much tissue as possible had to be built up between the bladder neck and the vagina in case further operation to relieve urethral incontinence was required. Operation was advised.

27.1.50. Operation:-

The patient was placed in the lithotomy position. The bridge of tissue over the urethra was divided. An incision was made at the junction of urethra and vagina, and this was carried round the fistula about $\frac{1}{8}$ " away from the margin. The vagina was then undercut until the bladder neck was freely mobilised. The urethra was then reconstituted with fine catgut over a small catheter. A second invaginating layer of catgut was placed on top of the first layer, to tighten up the bladder neck. Redundant vaginal wall was removed and the edges brought together with silver wire sutures. The catheter was left in position and clot was washed out. On her return to the ward continuous drainage was started.

2.2.50. There had been practically no blood-staining of the urine and her recovery so far had been uneventful. Because I did not want the urethra to be irritated any more than was absolutely necessary, I examined the catheter and, as it was quite loose in the urethra and could easily have been replaced, I removed it.

The remainder of her convalescence was uneventful.

15.2.50. The sutures were removed. The wound was well healed.

16.2.50. She was allowed to go home.

When she attended a month later, she insisted she was better, though urinary control was not perfect. While on her feet she could, with an effort, keep herself dry, but if she relaxed she would damp one sanitary pad a day, except just before and after her periods, when several pads would be wet. She did not waken up in a soaking bed, though she was wet. She was asked to report again in three months' time.

Comment:-

This was a most unusual injury, which could only have resulted from the careless application of the forceps. The main difficulties were to obtain a clear picture of the injury and its nature, and to devise an operation plan likely to restore normal function.

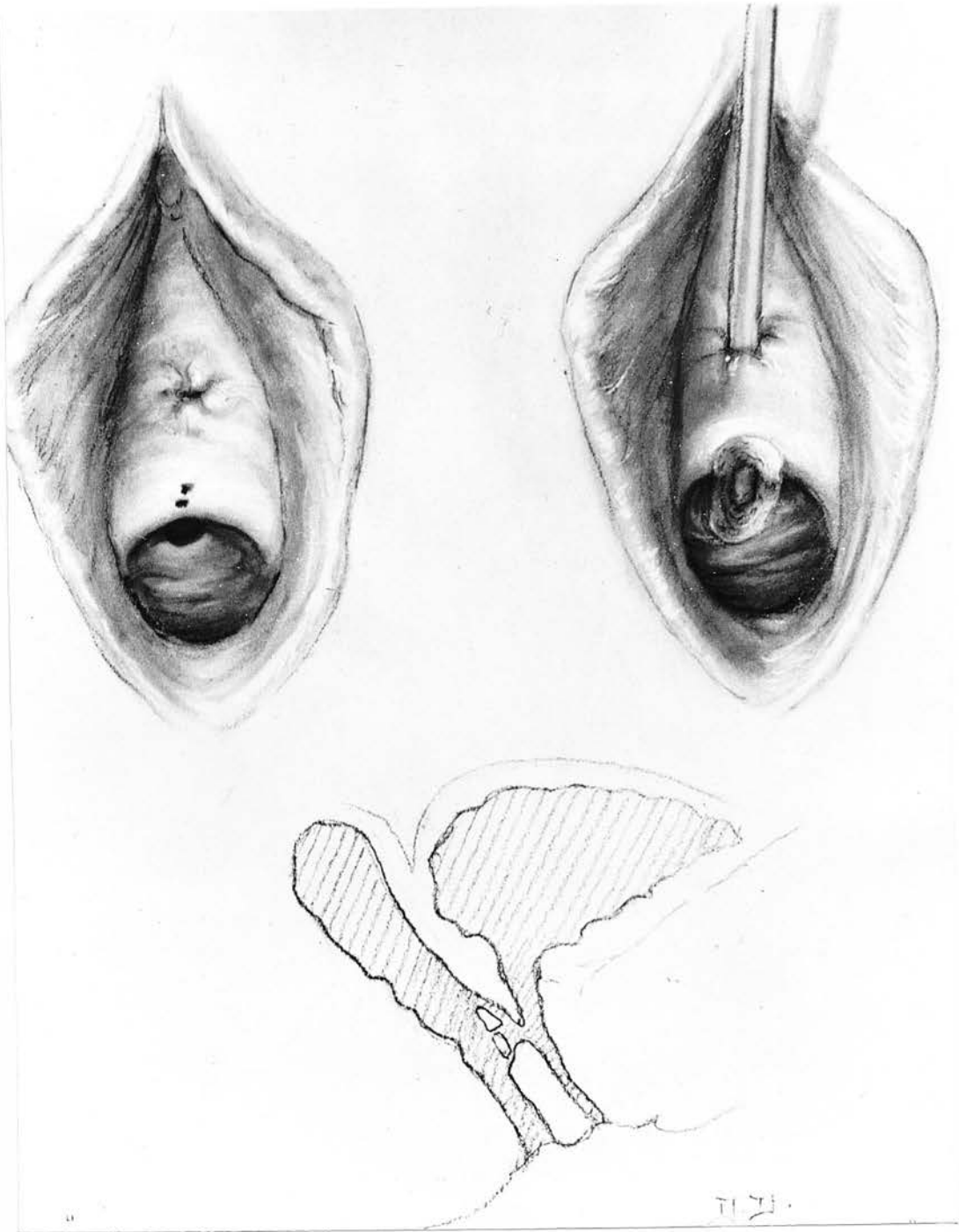


Fig. 11. Case No. 13.

Fistula with 3 separate vaginal openings.

CASE NO. 13. MRS. V. Gynaecological Case No. 40424,
St. Mary's Hospitals, Manchester.

In 1947, this patient, aged 48, was operated on for prolapse. After this operation she complained of urinary incontinence and in October 1948 a small vesico-vaginal fistula was repaired. A few months later she was still wet by day, though dry by night. She was examined by a urologist, who was unable to find any evidence of fistula, and who suggested she must be suffering from urethral incontinence.

In May 1949, a fascial strip from the anterior rectus sheath was taken prior to performing a fascial sling operation for stress incontinence. When the vaginal part of the operation was commenced, a vesico-vaginal fistula was found. This was repaired and the sling operation abandoned.

In September 1949, she still reported some incontinence, and in December 1949 this was severe. Examination by the vaginal swab technique showed that there was a vesico-vaginal fistula. Further operation was advised.

February 1950. Operation:-

I was asked to operate on this patient when she was already anaesthetised. Fortunately, the diagnosis was not unduly difficult, though it was complicated. There was a stricture in the lower third of the vagina. Just above

this there was a fistula opening into the bladder at the vesico-urethral junction. A complication was that there were two other vaginal openings of the fistula. The surrounding tissues were fairly mobile. Cystoscopy was difficult, but no other openings were detected and the ureters seemed to be well above the fistula.

The three vaginal openings were run together by incision and this exposed the underlying opening in the bladder. The edges of the fistula were saucerised down to the bladder and the opening was easily closed without tension using silver wire sutures. A catheter with an extra eye was inserted in the urethra and was tied to a silver wire loop placed in the vestibule. Blood clot was washed away. On her return to the ward continuous bladder drainage was started.

For the first 5 days after operation her recovery was uneventful, and she remained dry. On the 6th day she passed some urine around the catheter, even though the suction drainage seemed to be efficient. The catheter was fairly loose in the urethra, so it was removed. The rest of her post-operative recovery was uneventful, and the sutures were removed on the 21st day, at which time the wound was well healed. She was discharged home dry and with good urinary control.

20.4.50. She attended for a follow-up examination. The incontinence of the fistula was cured and the operation site was soundly healed. She said that she had some frequency and occasional stress incontinence, but that this did not seriously inconvenience her.

Comment:-

Apart from the melancholy history of unsuccessful and wrong operations, the main feature of this case was the difficulty in defining the nature of the injury. Once the three openings were run together the picture was clarified. Repair by the Sims-Emmett technique was simple as the surrounding tissues were vascular and mobile. The patient was cured.

CASE NO. 14. MRS. E. P. Gynaecological Case No. 57844,
St. Mary's Hospitals, Manchester.

In 1935, this patient had an operation for stress incontinence.

In April 1948, an "ulcer" on the cervix was treated by radium. Three months later she was given injections for severe rectal pain.

In May 1949, faeces began to be discharged through a recto-vaginal fistula.

In July 1949, a temporary colostomy was performed. At this time it was noted that there was a ring constriction in the middle third of the vagina well below the fistula.

Early in November 1949, operation was performed with the intention of closing the rectal fistula. In dissecting past the vaginal stricture the bladder was inadvertently opened. Partial colpocleisis was attempted, a catheter was tied into the bladder, and continuous drainage started on her return to the ward. Three weeks after operation she was discharged incontinent of urine.

In February 1950, I was asked by Dr. Hunter, whose case she was, to undertake her treatment.

Because of the vaginal stricture, examination was unsatisfactory.

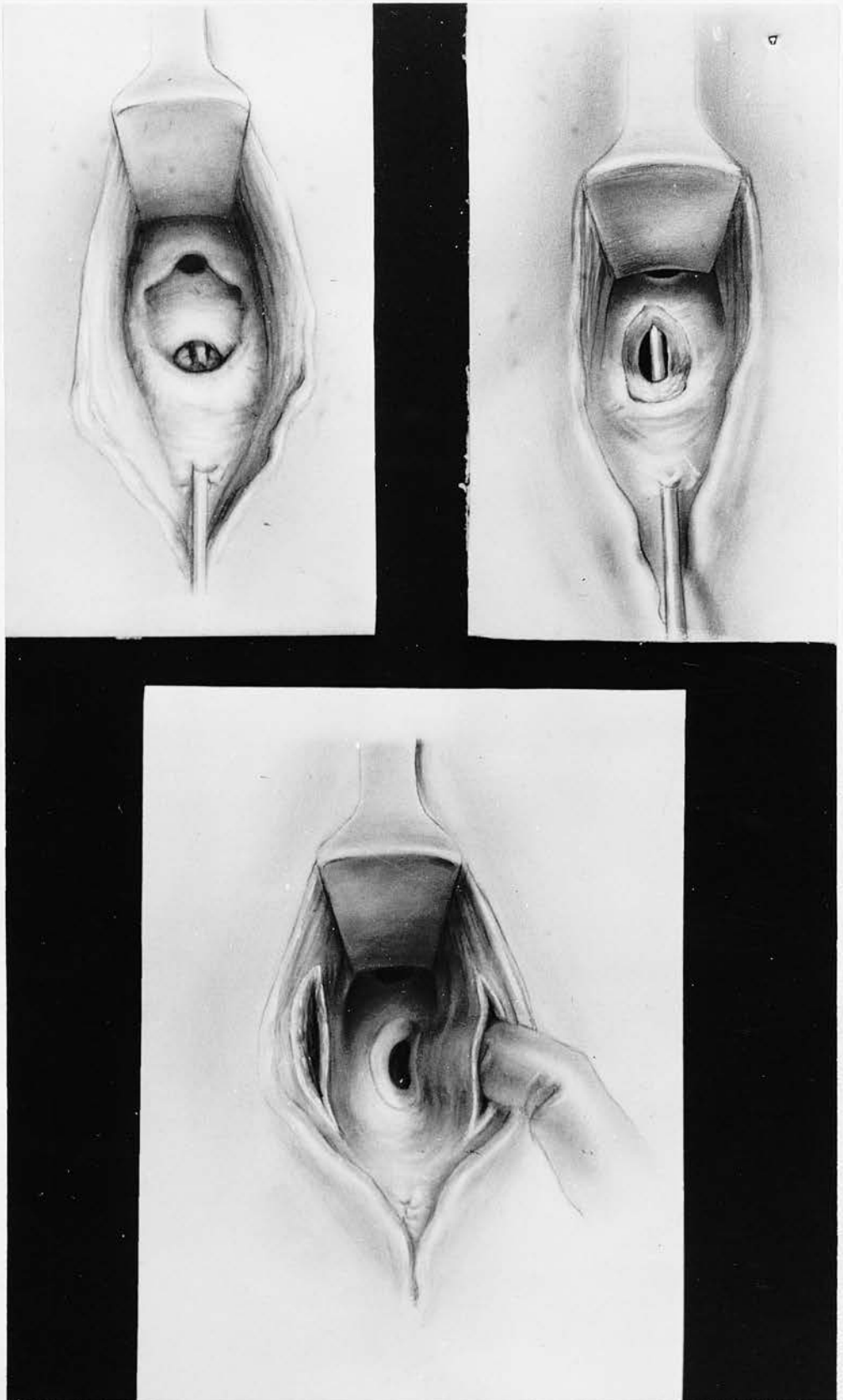


Fig. 12. - Case No. 14.

Vesico-vaginal fistula following an unsuccessful attempt to close a post-radium recto-vaginal fistula, (the rectal fistula can also be seen). The third drawing illustrates the method of relieving tension on the wound. No healing occurred in this case.

27.2.50. Examination Under Anaesthesia:-

In the middle of the vagina there was a fibrous ring preventing more than a finger tip from reaching the vaginal vault. Just above this ring the vesico-vaginal fistula could be seen. The ring was easily broken down with the finger, when it was possible to see that the recto-vaginal fistula was at a higher level. Dense scar tissue surrounded both fistulae and was particularly marked below the vesical fistula. A rubber bag (Taylor's) was placed in the vagina and inflated. Cystoscopy then revealed the bladder capacity to be about 4 ounces. Though the ureters could not clearly be seen, I thought they were adjacent to the fistula. Subsequent excretion urography showed normal kidney function on each side.

The surgical problem was where to find tissue healthy enough for healing. The scarring below the fistula seemed to contra-indicate partial colpocleisis: besides, the vesical and rectal fistulae were at different levels. As there was some more healthy tissue at the sides of the fistula, the Sims-Emmett technique was preferred. Operation was advised.

3.3.50. Operation:-

The patient was placed in the knee-chest position. With considerable difficulty the margin of the fistula was excised to give a $\frac{1}{4}$ " width of tissue. Deep relief incisions were then made to free the bladder neck from the subpubic

ramus, and the wound was then closed with interrupted silver wire sutures. In error, two of the sutures were of rather coarse wire, which did not twist easily. Even though the wound had been closed without tension, the avascularity of the tissues was such that I was very doubtful if healing could occur.

The patient was then turned into the lithotomy position and a catheter was inserted into the bladder. Clot was washed out and the repair appeared water-tight. On her return to the ward continuous suction drainage was started.

Six hours after operation the bladder drainage ceased and clot had to be washed out of the bladder and the catheter cleared. Thereafter, the suction worked satisfactorily. The patient complained of some bladder colic for a few days, which responded to tincture of opium, minims 20, four-hourly. In addition, she was given sulphamezathine, 0.5 G. six-hourly, and ammonium chloride, $7\frac{1}{2}$ grains thrice daily, which kept the urine just acid to litmus paper.

Her immediate convalescence was uneventful and I allowed her up in a few days, and removed the catheter in about a week. Thereafter, all went well until she developed some violent coughing, probably the result of smoking, (she was caught doing this in the lavatory!):

soon after, there was a little involuntary escape of urine. I reinserted a catheter, put her back to bed and restarted the suction drainage; for a while there was an improvement, though from time to time there was still some escape of urine.

30.3.50. Under general anaesthesia, I removed the sutures with great difficulty. The wound was not perfectly healed, and on her return to the ward she was incontinent. She was allowed to go home, having been told to report back in one month.

27.4.50. She reported for a follow-up examination. The repair had given way completely, so she was admitted for further operation.

Comment:-

This case was much the most difficult I have so far undertaken. Not only were the tissues rigid, but they were largely devoid of a blood supply: in fact, no healing occurred. Colpocleisis, with or without closure of the urethra, seems to offer the best prospect of relieving her incontinence.

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