THE OPERATIVE TREATMENT OF VESICOVAGINAL FISTULÆ[1]

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FISTULÆ between the bladder and the vagina are the result of difficult parturition, or some operative procedure, most often the extirpation of the uterus for cancer. In the early days most of the cases of fistula that were under observation were the result of trauma at the time of childbirth. It was in the treatment of such cases that Sims developed the first accurate operative technique for their repair. In later years, however, several factors have arisen to change conditions materially. In the first place, better obstetric management has greatly reduced the number of fistulæ which occur as the result of difficult labor, but there has been a great general wave for the radical extirpation of cancer both by operative procedure and by cautery and large doses of radium. While the ultimate results of these operations and treatment warrant the procedure, they very greatly increase the number of cases of vesicovaginal fistula. Sampson, in 1904, reported 19 cases following 158 hysterectomies for carcinoma of the cervix, while a review of the cases in which we have operated since 1908 shows that 61 per cent have resulted from some operative procedure for the removal of tumors of the uterus, and only 39 per cent followed childbirth. These percentages undoubtedly would be different in a strictly obstetric and gynecologic clinic, but they indicate the cause of the fistulæ generally seen.

The occasional satisfactory result of the treatment of a carcinoma of the cervix which is extensive and involves the vaginal mucosa, undoubtedly warrants the continuance of treatment in such cases. The apparent complete disappearance of a large cauliflower cancer of the cervix after a few treatments with radium is most striking, but these treatments should not be undertaken without considering the fact that a fistula from the bladder may result from the use of radium alone as well as from operation or cautery. If the malignancy is eradicated so that the fistula may be repaired satisfactorily the operation is certainly justified, but if the patient is left without control of the urine and with malignancy persisting in the edges of the fistula or evident in other places, the treatment cannot be justified. For this reason the extent of involvement must be studied carefully to make sure that the patient has some chance of relief before the additional risk is taken. Radium has been a great help in the treatment of cancer of the cervix and ordinarily it can be used without the danger of injury to the bladder, although there are 5 cases in our series in which the fistulæ followed the use of radium alone.

The scar resulting from the cautery or radium renders the technique of the operation much more difficult than in the cases which follow childbirth. The scar from the

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TABLE I. — TYPE OF URINARY FISTULÆ OPERATED ON FROM JANUARY, 1908, TO SEPTEMBER, 1919

Vesicovaginal	67
Vesico-ureterovaginal	6
Vesico-uretero-uterine	1
Vesico-uterovaginal	5
Vesico-urethrovaginal	3
Total	82
Age of youngest patient	19 years
Age of oldest patient	64 years

TABLE II.— CAUSES OF FISTULÆ

	Cases
Childbirth	32 (39 per cent)
Operation	50 (61 per cent)
Hysterectomy	31 (13 in our clinic)
Percy cautery (no hysterectomy)	4 (2 in our clinic)
Excision of cervical stump	3 (0 in our clinic)
Percy cautery and radium for recurring cancer (previous hysterectomy)	3 (2 in our clinic)
Amputation of cervix	2 (0 in our clinic)
Litholapaxy through urethra	2 (0 in our clinic)
Puncture drainage of bladder for cystitis	3 (0 in our clinic)
Abscess drained through vagina	2 (0 in our clinic)
Total	50 17
Shortest time between occurrence and repair	3 weeks
Longest time between occurrence and repair	24 years

use of the cautery is thick and firm, and it is very troublesome to free the tissues so that the flaps may be approximated and sutured. The flaps tear readily so that care must be taken in forcing the needle through them. The scar resulting from the trauma of parturition is much smaller and the tissues are much more pliable and easier to suture.

The apparent ease with which vesicovaginal fistulæ may be closed is deceiving sometimes and, unless definite principles are followed, the results will not be uniformly satisfactory. Too many times, I believe, an attempt is made to close the opening before dissecting the bladder wall well away from the vaginal wall. In some instances it may be possible to close the opening in this manner, but I agree with recent writers on the subject who emphasize the fact that the underlying principle of the technique of the operation is the separation of the wall of the bladder from the wall of the vagina. The condition which keeps the fistula from healing of its own accord is the fact that the mucous membrane of the bladder and vaginal wall have healed together, thus forming a continuous mucous membrane surface from the bladder to the vagina. The first essential in the treatment consists in destroying the communication, and the best manner of accomplishing this is completely to dissect the bladder away from the vagina as is done in the operation for the relief of cystocele. If the mucous membrane of the fistulous tract is not freed so that it can be turned into the bladder on the one side and into the vagina on the other, the communication will almost certainly reform. A review of our cases shows that often several operations have been necessary before the fistula closed permanently. Sixty-eight per cent of our patients had been operated on from one to seven times before coming to the clinic. In most instances these operations had apparently been done well; in others I believe the operator had been deceived into performing an operation by its apparent simplicity. Undoubtedly a certain percentage of these patients require more than one operation, and I believe we are justified in repeatedly attempting to try to close the fistula if the sphincter muscle has not been destroyed. If the urethra and the sphincter muscle are destroyed, there is nothing to be gained in operating to close the fistula as the urine will continue to escape. At times the urethra may be destroyed and the sphincter be intact; in these cases the operation should be performed as the absence of the urethra will not cause any great inconvenience. In other cases the sphincter may be divided or torn by trauma, and there is every likelihood that the sphincter will functionate if it is repaired; therefore operation to close the fistula and repair the sphincter should be done. It seems to me that the operability of these cases depends on whether or not there is a sphincter muscle. Even though it is severed, any number of attempts should be made to repair it before the only other feasible procedure is advised, that is, some plan of diverting the urine to the rectum, thereby leaving it under the control of the rectal sphincter; this may be done if the sphincter of the bladder is completely destroyed. Probably Keen's plan is the best one to adopt in these unfortunate cases, that

is, to make a large communication between the vagina and rectum just above the anal sphincter and then close the vaginal outlet. In Keen's case the woman defæcated and urinated for more than 35 years and menstruated for 11 years by rectum. Peterson collected 41 cases in which this operation was performed with comparative success. In one case only the patient died of a kidney infection and that was some months after the operation; the infection was not believed to be due to the entrance of organisms from the colon to the bladder.

The basis of this review is the 78 cases in which operation was done in our clinic from January, 1908, to September, 1919[1]. In 54 of these cases it was possible to close the fistula at one operation; in 16 two operations were performed, and in 1 six operations failed completely to close the fistula. The fistulous opening in these cases varied from the size of a small pin-point to complete eversion and prolapse of the bladder. Complete prolapse of the bladder into the vagina occurred in 2 cases, one following childbirth in which several operations had formerly been done, and one following combined cautery and radium treatment for cancer of the cervix. In the first case the fistula was repaired successfully, but in the second case the repair was not complete; the entire anterior part of the rectum had been destroyed by the use of the cautery, and it was impossible to keep the field of operation clean.

In 75 cases the fistulous opening was single; in the other 3 cases there was more than one opening. The multiple fistulæ did not offer any more difficulties than the single. A large incision in the vaginal wall included all the openings and converted the operation into a single closure after the openings into the bladder had been separately closed.

The bladder sphincter was involved in 10 cases, but it was destroyed in only 3; it was repaired quite satisfactorily in the 7 cases.

One of the ureters was involved with the vesical fistula in 6 cases. I believe that it is very important to determine the relationship of the ureters whenever it is possible. In a few instances the opening of the ureter was found close to the edge of the fistula and it was possible to turn it into the bladder, or at least avoid injuring it. In several of the cases in which the ureter was involved the suprapubic operation was performed; the ureter was transplanted if it appeared to be in good condition, and the opening of the vesical fistula closed. In one of these cases the ureter was thickened and evidently had been completely occluded for a long time so that it seemed advisable to ligate it.

In all cases in which the suprapubic operation was selected, it was selected for some special reason; it was not employed generally in vesicovaginal cases. The patients on whom the suprapubic operation was performed have all done well, and their convalescence was more favorable than might have been expected. While the suprapubic opera-

TABLE III.—Operations Elsewhere

Repair attempted before coming to clinic in....	44 cases
13 patients had had 1 operation.	
15 patients had had 2 operations.	
6 patients had had 3 operations.	
4 patients had had 4 operations.	
3 patients had had 5 operations.	
2 patients had had 6 operations.	
1 patient had had 7 operations.	
No previous operation for repair of the fistulæ	38 cases

TABLE IV.

Patients operated on in the clinic.....	78
54 patients had 1 operation.	
16 patients had 2 operations.	
4 patients had 3 operations.	
1 patient had 4 operations.	
2 patients had 5 operations.	
1 patient had 6 operations.	
Inoperable recurring carcinoma of the bladder ruled out, plastic operation in.....	4 cases
The fistulæ varied from a very small opening to complete eversion and prolapse of the bladder.	

TABLE V. — Extent of Involvement

Bladder sphincter.....	10 cases
Bladder sphincter completely destroyed.....	3 cases
Ureter.....	6 cases
Single fistulæ.....	79 cases
Multiple fistulæ.....	3 cases

TABLE VI. — Type of Operation

Plastic closure: Layer suture; dissection of fistulous tract and closure; inversion of edges by tension through meatus.....	69 cases
Suprapubic operation.....	5 cases
Transplantation of the ureter.....	3 cases
Ureter ligated.....	1 case

[1] I am greatly indebted to Dr. R. G. Andres for his careful study of our case records and the resulting data.

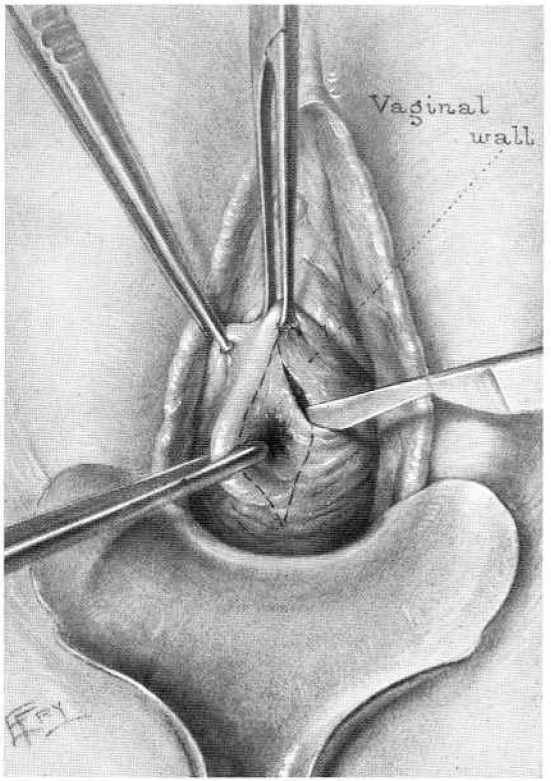

Fig. 1. Dotted line indicating area around fistula to be incised.

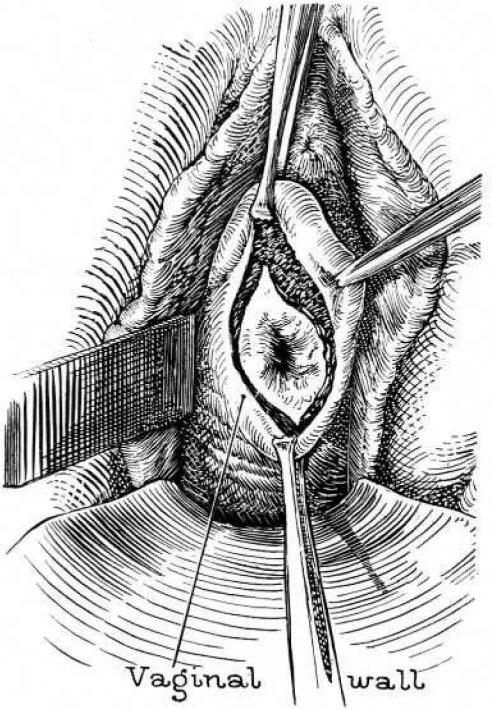

Fig. 2. Incision completed and vaginal wall retracted.

tion offers a good chance for cure, it also offers a greater opportunity for infection, and should not, therefore, be chosen unless especially indicated. Our suprapubic operations were performed extraperitoneally.

Trendelenburg is credited with having performed the first suprapubic operation for vesicovaginal fistula in 1890, and, according to Ward, 27 such operations were reported within the next 14 years. Fewer operations have been reported during the past 15 years, probably on account of the added risk of infection.

Legueu has recently advocated the transperitoneal vesical route for operation in cases of vesicovaginal fistula. One of his 12 patients operated on by this method died. He claims, for this method, wide exposure and every security for healing since in making closure the bladder incision is covered by peritoneum. Such suprapubic operations undoubtedly should be carried out in some of the very bad cases, especially if the ureter and bladder are traumatized. In certain instances the fistulous tract becomes attached to the pubic bone and is thus held in a most inaccessible position, making closure difficult by the vaginal route. In some of these cases the suprapubic operation can be used to advantage.

In most instances cases of vesicovaginal fistula can be dealt with satisfactorily by making plastic closure of the fistulous openings through a vaginal incision. If the opening is small the technique described by C. H. Mayo may be followed, that is, inverting the fistula into the bladder. The inverted fistula is held in the bladder by tension on the purse-string suture which is pulled out through the urethra.

Dr. Crenshaw, of our staff, has closed a number of small vesicovaginal fistulæ by the use of the high frequency current. If the fistula is small it is well worth while to try this method before attempting an operation.

Before any operation is undertaken, an effort must be made to get the tissues in the

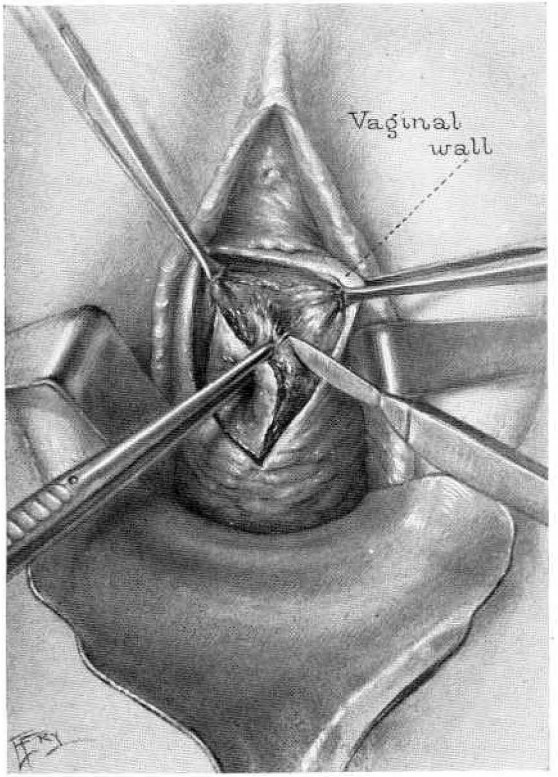

Fig. 3. Dissection of the wall of the vagina from the wall of the bladder.

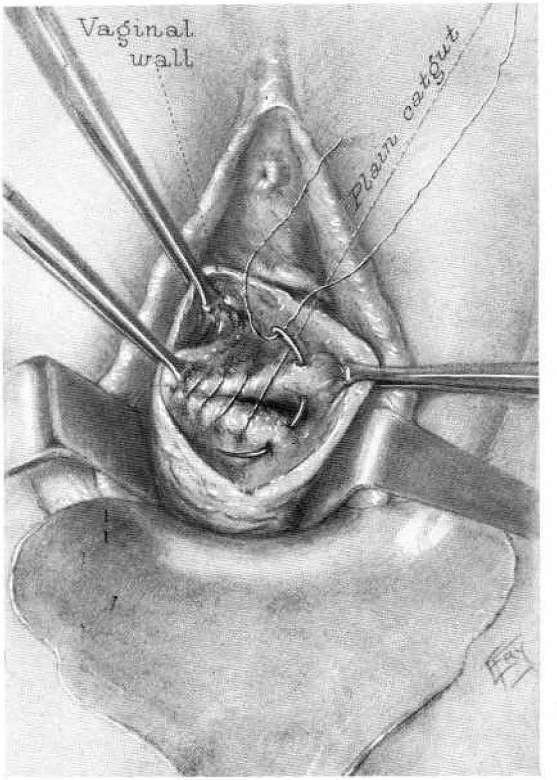

Fig. 4. Suturing the wall of the bladder.

best possible condition for healing. This frequently requires several weeks since often the mucous membrane of the vagina, the labia, and even the skin of the thighs are excoriated and infected, and contain deposits of salts. A cystoscopic examination should always be made in order to determine the position of the ureters, the presence or absence of a sphincter muscle, and whether or not the bladder is completely severed from the urethra. One of the greatest difficulties encountered is trauma to the vesical neck. The vaginal operation certainly should be chosen in all cases of injury near the neck of the bladder, the part difficult to expose by suprapubic incision, so that in such injuries this incision would be distinctly contra-indicated. If the opening in the bladder is high in the vaginal fornix and especially if there is much scar tissue, as there is apt to be following cautery or total hysterectomy, it will be difficult to obtain sufficient exposure by vaginal incision, and in some instances it may seem best to perform the suprapubic operation. The fistula can usually be made accessible, however, so that the operation may be done through the vagina. Very often the perineum is badly torn, and incision into it for exposure is not necessary, but if the incision is necessary it should be made unhesitatingly, and the openings closed at the completion of the operation. One of the chief steps in this procedure is a long incision in the vaginal wall down to the bladder. Usually the incision is begun immediately below the sphincter muscle and extended to and through the fistulous opening, after which the bladder is separated from the vagina for a considerable distance (Fig. 1). I have found it easier to begin this dissection as near the cervix as possible and to bring it forward toward the urethra. Unless this step is thoroughly carried out, the chance for a cure is not good. If the

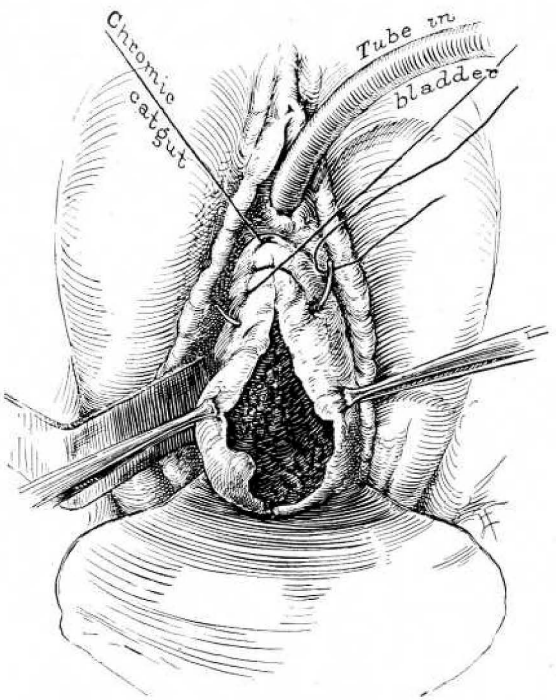

Fig. 5. Suturing the wall of the vagina.

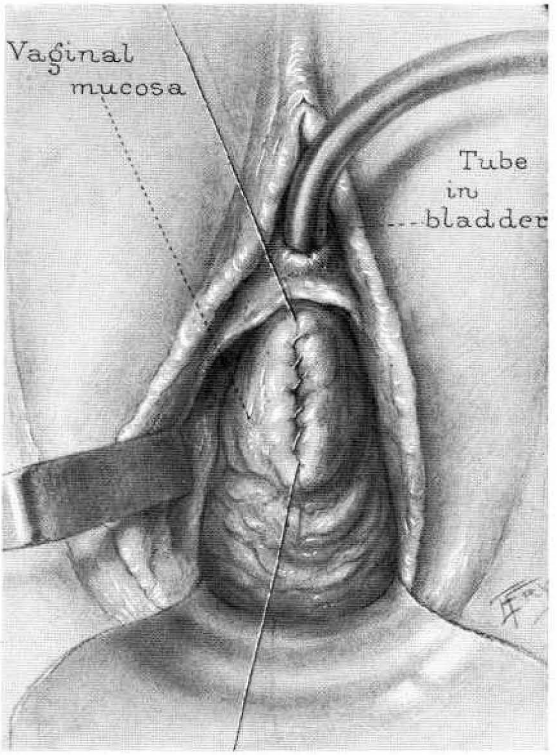

Fig. 6. Closure of the wall of the vagina.

cervix has not been removed, downward traction should be exerted upon it as this helps materially in the exposure (Fig. 2). If the cervix has been removed and the fistula is high in the vagina, it may be best to open the peritoneum widely in order freely to mobilize the bladder and bring the fistula into view. Several years ago Kelly suggested opening the peritoneum and I have followed this method a number of times to great advantage. It must be remembered that loops of intestine are usually caught in this scar and are apt to be injured. This accident happened in one of my operations, but I was able to repair the opening in the intestine without much trouble. Ordinarily I do not believe that it is necessary to open the peritoneum, but in almost inaccessible cases it is helpful. Slight infection may follow, although it was not a complication in my cases. In one case in which I did not open the peritoneum the patient developed a fæcal fistula through the vagina, and I was obliged to repair it by abdominal procedure.

A small curved hæmostat passed through the urethra and into the vagina through the fistula has helped us most to bring the fistulous tract downward into the dissection. The dissection of the bladder should be carried on until the wall is loose and free and until the edges can be easily approximated (Fig. 3). In the cases of extensive injury this is sometimes impossible and it then seems best to close the bladder opening as completely as possible without using tension on the sutures; complete closure can be made later. If too much dissection and tension is employed the circulation to the flaps will be reduced, and sloughing of the tissues will occur. Fortunately many of the tissues may be separated without harm. It is better to perform two or three operations than to carry the procedure too far at one time. The opening in the bladder should be closed with catgut and the edges of the mucous membrane inverted (Fig. 4). The vaginal incision should be closed with chromic catgut and all dead space between

the bladder and vagina obliterated (Figs. 5 and 6). In case the sphincter has been repaired or the urethra sutured back to the bladder it is best to use fine silk sutures in addition to the catgut, being cautious not to penetrate the mucous membrane with the silk.

A retention catheter is left in the bladder for from 8 to 10 days, and great care must be taken to make sure that it drains properly. Patients should be kept quiet for from 12 days to 2 weeks.

There was no mortality in this series of cases, and the ultimate results were very satisfactory in a large percentage. We have recently received information concerning 56 of the 78 patients. Four state that they have derived no benefit from the operation; 6 are considerably improved, although there is still slight incontinence of urine. All the other patients are completely relieved and the bladder function is normal.

In conclusion I wish to emphasize points as follows:

1. Vesicovaginal fistulæ are now more common following operations than following childbirth.

2. All vesicovaginal fistulæ should be considered operable as long as the sphincter muscle of the bladder is intact or can be repaired. If the sphincter has been completely destroyed it will be necessary to consider some other procedure.

3. Suprapubic extraperitoneal operations seem to be indicated if the cystoscopic examination reveals injury to a ureter as well as to the bladder, or it may be indicated if the fistulous tract is adherent to the pubic bone.

4. The plastic vaginal operation consists in completely separating the bladder from the vagina, and closing the two separately and obliterating all dead space.

5. A large percentage of complete and permanent cures follow such operations.

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