

# URINARY FISTULAE IN WOMEN WITH SPECIAL REFERENCE TO THEIR REPAIR BY MARTIUS BULBOCAVERNOSUS INTERPOSITION OPERATION

by

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Urinary fistula is the worst type of injury inflicted on women, mostly as a result of childbirth or various other causes. It is the most troublesome, depressing and deplorable disease. It is to this injury that gynaecology as a speciality owes its origin. It was more than one hundred years ago in the city of New York, James Marion Sims struggled for a long time in the search of a proper remedy and cure for these women with vesicovaginal fistulae. Ultimately, a time came when his noble struggle succeeded and the insult of the ages was wiped out. His achievement and untiring efforts enabled him to establish a hospital devoted entirely to the diseases of women. Marion Sims should be considered as the pioneer of that branch of medical science which before his day had been looked upon as an accessory to obstetrics.

In cases of urinary fistulae, there is constant dribbling of urine which causes irritation, soreness and pruritus. The patients smell of urine and this bad odour makes them shun society. They belong to a very poor class and before they come to the hospital they are thrown out of the family. They go on with protracted and obstructed labour for a number

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of days, with the result that the baby is still-born. To add to this misery pressure necrosis of the soft parts occurs due to prolonged labour and results in the development of a urinary fistula and sometimes faecal fistula also. The extreme misery and suffering of these women, their poverty and humbleness and their disturbed family harmony prompts one to do, as early as possible and as best as possible, something to relieve their sufferings.

This study deals with 36 cases of vesicovaginal fistulae treated by the author in the four year period from July 1957 to June 1961.

The causes of these fistulae are shown in Table I.

TABLE I  
*Etiology*

Cause	No. of cases
Obstetrical trauma	33
(a) Prolonged labour	24
(b) Prolonged labour and forceps	4
(c) Craniotomy after prolonged labour	4
(d) Decapitation	1
Gynaecological trauma	2
(a) Abdominal total hysterectomy	1
(b) Vaginal cystostomy for removal of bladder stone	1
<i>Other</i>	
(a) Drug application in vagina for pruritus vulvae in a post-menopausal woman	1
<b>Total</b>	<b>36</b>

The major cause in these cases is obstetric trauma, which was responsible for 33 or 91.6 per cent of the cases. All these patients were in labour for 48 to 72 hours and in some cases even 4 or 5 days. Prolonged and obstructed labour gives rise to prolonged compression of the bladder between pubic symphysis and the foetal head. This causes devitalization and necrosis of the compressed portion of the bladder which sloughs away within 5 to 10 days. It is really sad to see how badly the bladder can get compressed between the foetal head and maternal pelvis in worst cases of pelvic contraction. Prolonged labour alone was responsible for the fistula in 24 cases; 4 cases were delivered in outside hospitals with forceps after 48 to 60 hours of labour and in 4 cases

portion of the bladder. In one case decapitation was done in this hospital for impacted shoulder presentation. It is quite evident from the prolonged labour and the difficulty which they experienced to deliver before coming to the hospital that the obstetric manipulation by itself was not the cause of fistula. It is quite possible, at least in a few cases, that the pressure necrosis due to prolonged labour and obstetric manipulations both together contribute to the development of fistula.

Obstetric trauma is the predominant cause of fistula in our country. Majority of the cases reported by different authors in India were due to obstetrical cause and only few were due to other causes. This is shown in Table II.

TABLE II

Author	No. of cases reported	Obstetric trauma	Gynaecological trauma	Others
Dass (1954)	26	22	2	2
John (1954)	100	97	1	2
Krishnan (1949)	100	98	Nil	2
Lezarus (1959)	242	230	Nil	12
Present series	36	33	2	1
Moir (1961)	225	62	163	Nil
M. Sadek-Foda (1959)	220	191	25	4
Everette Mattinglay (1956)	149	28	65	56
Moir (1944)	100	36	64	Nil

craniotomy was done. Out of these four cases of craniotomy three were done in other hospitals and in one case craniotomy was done in this hospital. The bladder was so badly bruised and torn that incontinence was noted at the time of operation only. Evidently, this was not due to direct injury but was the result of pressure necrosis and unskilled manipulations by the dai tearing away a

Poorly developed obstetrical services, lack of antenatal and intranatal care, scarcity of medical aid, poverty, ignorance and false belief in people are responsible for the common obstetrical cause in our country. But in countries where the obstetric services are well developed this cause of fistula is not entirely eliminated. Moir (1961) says that carelessness and brute force used to extract the

baby is still responsible for some fistulae in their cases.

In 8.3 per cent or 3 cases other causes were responsible. They were total abdominal hysterectomy for functional uterine haemorrhage in one case, vaginal cystostomy for removal of bladder stone, one case, and application of some indigenous medicine in the vagina in one patient. Two-third of the cases in Moir's (1961) series were due to gynaecologic operations.

The patients in this series were very young. The age relationship of these cases is shown in Table III.

TABLE III  
Age

Age	15-20	21-25	26-30	31-35	36-40	60 years	70 years
No. of Cases	12	7	10	1	4	1	1

This shows that 29 cases or 80.5 per cent were below 30 years and 52.8 per cent were between 15 to 25 years. 70 per cent of cases reported by Dass (1954) were between 15 to 25 years. One-third of the cases in this series were between 15 to 20 years. This young age limits the operative methods to conservative procedures.

The parity at which fistulae occurred is shown in Table IV. In 16 cases, 44.4 per cent, fistulae developed after the first delivery.

In the 10th and 12th para all the previous labours were normal and babies were alive; but in the 9th para all previous labours were difficult ending in still-births.

The duration of fistula in this series is shown in Table V. Sixteen cases, 44.4 per cent, came for treatment within 6 months and 7 cases within a year. The longest time the patient went on with the fistula was 10 years.

TABLE V  
Duration of Fistula

Duration	No. of cases
Upto 6 months	16
7 to 12 months	7
1 to 1½ years	nil
1½ to 2 years	5
3 years	4
4 years	1
6 years	1
7 years	1
10 years	1

#### Identification of Fistula

Fistula is quite obvious when it is large and admits one or two fingers. The fistula, on the other extreme, may be so small that it is not palpable and visualization is far from easy. It is then essential to inject a strong methylene blue solution or ordinary boiled milk into the bladder and taking precaution to inspect with care, using retractors to stretch and displace every part of anterior vaginal wall. The three swab test is ex-

TABLE IV  
Parity

Parity	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
No. of cases	16	3	3	3	1	2	2	Nil	1	1	Nil	1

tremely helpful to differentiate a bladder fistula from a ureteric fistula and to demonstrate tiny fistulae.

When a fistula is being examined, its size, site, scarring of the edges, scarring in vagina, adherence to the pubic ramus, prolapse of the mucous membrane of bladder, patency of urethra and amount of healthy tissue available in the vagina to cover the defect should be noted. Two things are of great value in all cases. Firstly, it is essential to search for tiny fistulae besides a major one. If this precaution is not taken, even if the major one heals by repair the leak will continue and the patient believes that the surgeon has failed to effect a cure. Secondly, the ureteric openings should always be looked for at the edges of the large fistula; if not they will be ligated accidentally during repair and the patient will develop uraemia, or the ureteric opening may directly drain into vagina after repair and is the cause of failure. Such ureteric openings can be turned inwards towards the bladder during operation and drained by ureteric catheters and thus avoided.

These fistulae are classified according to their situation into four categories. The first three are as suggested by Thomas (1945) and last one as described by Krishnan (1949).

1. *Juxta Urethral Fistula*. This is a fistula near the urethra or actually involving the urethra and the internal urinary meatus; a part or whole of the urethra might have sloughed away in some cases.

2. *Midvaginal Fistula*. This is a fistula in the anterior vaginal wall at an appreciable distance from the cervix and from the internal urinary meatus.

3. *Juxtacervical*. This is a fistula adjacent to the cervix and in some cases scar tissue may fix it to the cervix.

4. *Combined*. This is one where the juxtaurethral is present involving the bladder neck and urethra and also the base of the bladder is destroyed.

The various types of fistulae in this series are shown in Table VI.

TABLE VI  
*Types of Fistulae*

Type	No. of cases
Juxtaurethral	20
Juxtacervical	6
Midvaginal	4
Combined	6

There were 20 cases or 55.5 per cent of juxtaurethral fistulae. This is the commonest type described by most of the authors from India. In Krishnan's (1949) cases 45 out of 100 were juxtaurethral and 32 out of 100 in John's (1954) cases were juxtaurethral. The length of urethra was normal in 9 cases; the urethra was half an inch in length in 8 cases and  $\frac{1}{4}$  inch length in 3 cases. The urethra was completely dislocated from the bladder in three cases and the intervening portion was filled with scar tissue. The urethra was blocked in two cases at the proximal end. The fistula was adherent to the pubic bone in two cases. This type of annular sloughing of the bladder neck was described by Mahfouz 1938 and 1957.

Juxtacervical fistulae were present in 6 cases, one was adherent to the cervix and one was adherent to the pubic bone. In all these cases the

cervix was badly torn. There was no case of vesicocervical fistula in this series. In one case the fistula was  $\frac{3}{4}$  inch in diameter and the vesical mucous membrane prolapsed through it. There were 21 cases of juxtacervical fistulae in Krishnan's (1949) series and 8 in Dass's (1954) series.

Midvaginal fistulae, the most favourable and easy to repair, were present in 4 cases only.

There were 6 cases of combined fistulae which were due to extensive destruction of the vesicovaginal septum and in two cases ureteric openings were visualised at the posterior edge of the fistula. There was prolapse of the mucous membrane of the bladder in 4 cases and urethra was completely dislocated in one of them.

There were thirteen cases where bad vaginal stenosis was present and in 2 slight scarring was there. The stenosis was annular constriction either in the middle of the vagina or below the cervix, and it was impossible to get any idea of the fistula before canalising the vagina in these cases.

In two cases rectovaginal fistula was also present and in two cases rectovaginal fistula had been repaired in the same hospital.

These fistulae were from  $\frac{1}{8}$  inch to more than 1 inch in diameter. There were 7 cases where the fistula was less than  $\frac{1}{4}$  inch in diameter; 10 cases where the fistula was  $\frac{1}{4}$  to  $\frac{1}{2}$  inch in diameter; 5 cases where it was  $\frac{1}{2}$ " to  $\frac{3}{4}$ " in diameter; in 7 cases it was 1" in diameter and in 7 cases it was more than 1" in diameter. In 19 cases or 52.7 per cent the fistula was more than half an inch in diameter. In Krishnan's (1949) series of cases,

one-third of the fistulae were of large size. More than one fistula were present in 4 cases. One of these had three tiny holes along the suture line of the previous repair.

*Treatment.* In the treatment of these cases the usual preoperative care is taken. Their general condition and anaemia are improved, as most of the cases in this series belonged to the same category as described by Sir Kedarnath Das in 1928. He writes, "The Bengali woman who presents herself for the relief of this condition is feeble, physically wretched and malaria stricken". This description applies to women in Maharashtra State even to day; and particularly so far women coming with this miserable condition. Infection in the genital tract and urinary tract if any is carefully controlled with suitable drugs. All patients were operated after the menstrual period. All the cases were taken for repair three months after delivery or after repair, except one who was repaired two months after delivery, as advocated by Collins (1960). This gives nature ample time to effect a spontaneous cure and makes the separation of the tissue planes easy. If one waits longer the edges of the fistula sclerose and the vascularity becomes less. They were put on antibiotics 48 hours before operation.

All cases were operated under spinal anaesthesia, except in one old lady, for whom general anaesthesia was used. Spinal gives much better relaxation and minimizes the oozing. In all cases repair was done by the vaginal route in the lithotomy position. Trendelenburg position was given to have a good exposure, particularly for juxtaurethral fistulae.

Knee-elbow, knee-chest positions or Sims' left lateral position was not used in any case. In the opinion of the author if the exposure is difficult in lithotomy position it will be difficult in any other position. It is also difficult to maintain these positions without proper tables and supports. Good exposure and space was made available for repair by paravaginal incision in a few cases. In two the rectum was accidentally opened while making this incision but healed well after primary repair. In cases with vaginal stenosis or annular constriction of the vagina, rim of stenosis had to be incised before repair.

There are innumerable techniques devised for the repair of urinary fistulae. It is not the aim of this paper to discuss all the techniques. In all the cases treated the operative procedure followed was flap-splitting operation with or without Martius bulbocavernosus inter-position operation. The principle of the flap-splitting operation is to mobilize the bladder from the vaginal wall. The mobilization of the bladder should be enough so that no tension is put on the sutures when the bladder defect is closed. The bladder should be gently and carefully mobilized so that no injury occurs during dissection. The separated vaginal flap should be of good thickness and vascularity, otherwise it gives way during closure or afterwards. Moir (1956) believes that the broad union of the vagina is far more effective than the feeble union obtained by stitching the bladder wall. If there is enough healthy tissue present and scar tissue is there it is excised to make good raw surfaces for apposition. Otherwise no excision is done because already there

is deficiency of tissues and attempt should be made to preserve the tissues as far as possible. Fistulae often become incurable because too much tissue has been removed at previous operations. The bladder is closed with first row of interrupted sutures in the direction of least tension and care is taken not to include the bladder mucous membrane in the stitches. The omission of this prevention gives rise to troublesome oozing in the bladder which interferes with healing and blocks the catheter off and on. Second row of interrupted sutures is put in the bladder musculature reinforcing the first and burying them. After closure of the bladder methylene blue is put in the bladder, and defect in the closure is noted by leakage of methylene blue. If there is any leakage that part is properly closed. Vagina is closed by interrupted sutures preferably at right angles to the bladder suture but very often this is not possible and vaginal closure has to be done in any direction of least tension. The suture material used in all the cases was No. 000 chromic catgut or No. 00 chromic catgut for the bladder, and number one chromic catgut for the vagina. Too much catgut should not be used for the bladder as it interferes with healing. This procedure is sufficient for a small fistula. If the fistula is large there is a large dead space left between the bladder and vagina which causes failure in many cases. Mahfouz (1938) obliterates the dead space by taking some of the vaginal stitches superficially through the bladder musculature. In the present series Martius Bulbocavernosus Interposition Operation was done to obliterate the dead space.

*Martius Bulbocavernosus  
Interposition Operation*

This operation was devised in 1928 by Professor H. Martius of Gottingen for the treatment of stress incontinence of urine and special types of vesicovaginal fistulae. Principle of the operation is to mobilize the fatty tissues and the bulbocavernosus muscle from the labium majus and cut through the tissues at the level of clitoris. This fat-muscle flap forms the graft. It is as thick as the thumb and as long as the index finger. It is left attached posteriorly and receives most of its blood supply from the branches of the perineal vessels and retains its viability. The graft is interposed external to the pubic ramus and deep to the labium minus and lateral vaginal wall between the urethra and bladder above and the anterior vaginal wall below.

*Technique.* The labium majus, either right or left, is palpated with two fingers one of which is inside the vaginal wound and the other outside. A ridge, the thickness of the finger, is clearly perceived which contains the bulbocavernosus muscle and the vestibular bulb. An incision is made starting at the level of clitoris and down for three inches longitudinally over the ridge. The space between the fatty tissues and skin is opened and fatty tissue with bulbocavernosus muscle is dissected and cut through anteriorly. This cylindrical graft is free except for its posterior attachment. There is free oozing and complete haemostasis should be secured. The skin between the vaginal wound and labial incision is tunnelled with scissors from within with closed blades. The graft is grasped at the

anterior end and is drawn through the tunnel and placed around the vesical neck and over the suture line. The graft is attached to the muscular tissue of the bladder by interrupted one or two catgut sutures. The free end of the flap is sutured to the opposite side of the vaginal wound as high as possible. The labial skin incision and vaginal incision are then closed. These steps are illustrated in Figs. 1 to 6.

The post-operative care is very important. Patients were nursed on back. The bladder drainage was maintained for 10 to 14 days by means of a rubber catheter with extra 'eyes' cut on the sides through the external urinary meatus. Vaginal or suprapubic cystostomy was not done in any case.

All the 36 cases reported in this series were operated. Nine out of these had previous attempts at repair. The number of previous attempts at repair in these cases is shown in Table VII.

TABLE VII  
*Previous Operations*

No. of previous operations	No. of cases
Nil	27
One	4
Two	3
Three	1
Four	1

The essential operative procedure followed in these cases was flap-splitting operation with the variation of the technique to suit individual cases. There were 16 cases where Martius Bulbocavernosus Interposition Operation was done. Thirteen of these were cases of juxta-urethral fistulae

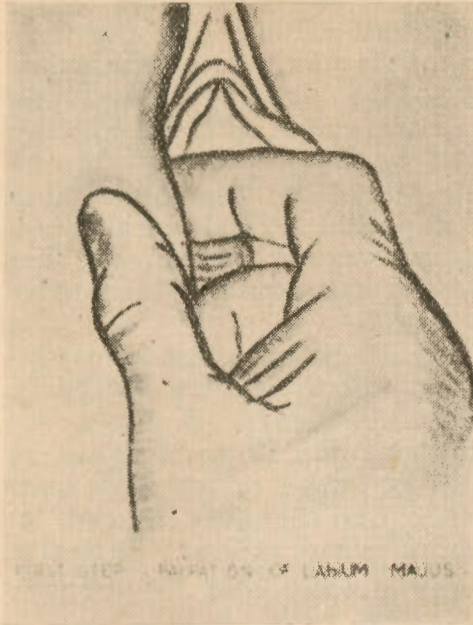


Fig. 1.

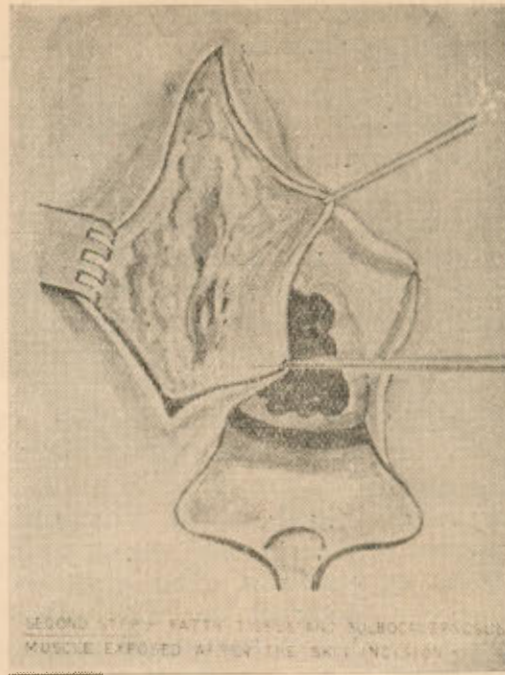


Fig. 2.

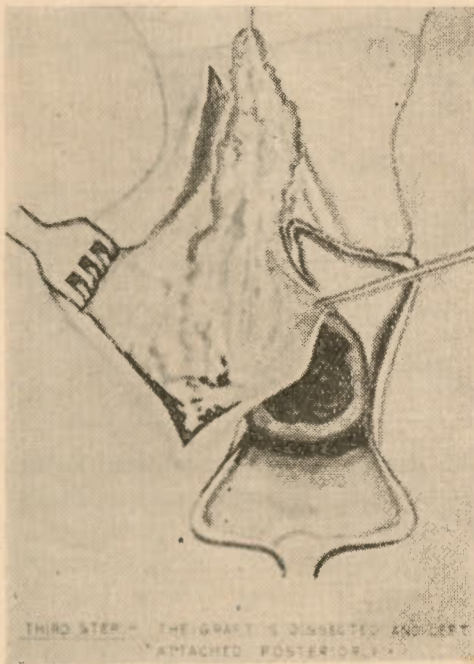


Fig. 3.

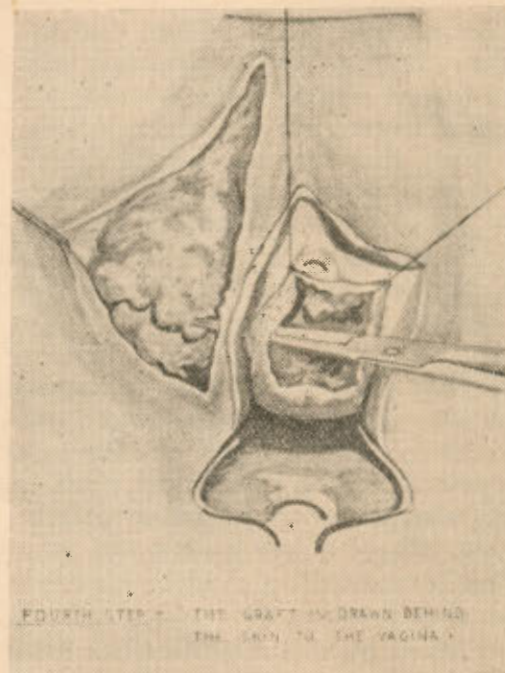


Fig. 4.



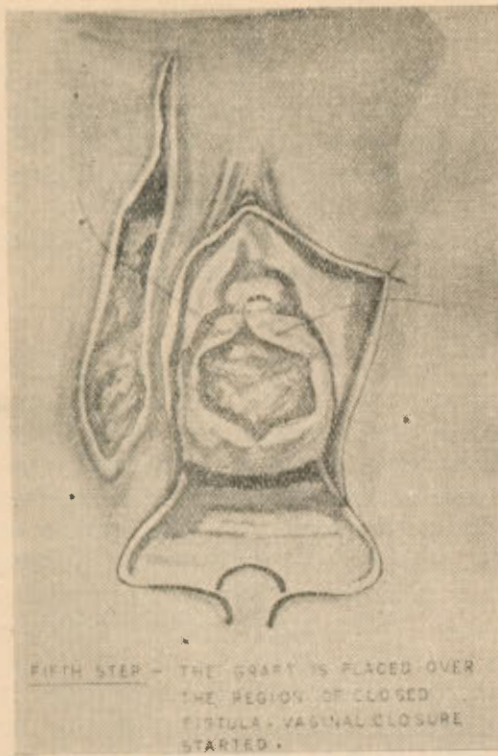


Fig. 5.

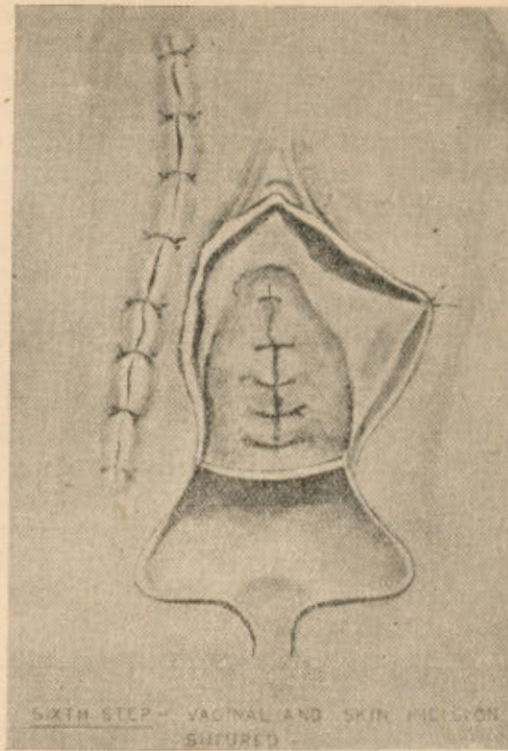


Fig. 6.

and three were of the combined fistulae. In one case the urethra was  $\frac{1}{4}$  inch in length but so badly stenosed that construction of the urethra was done. In two cases of combined fistulae the repair of rectovaginal fistula was done at the same sitting; while in two cases the rectovaginal fistula was successfully repaired previously. In four cases of vaginal stenosis the vagina was canalised and skin-grafting done by a pedicled graft from the skin of the labium majus, as advocated by Patterson and Philip Rhodes (1958). In two cases of combined fistulae the vagina was so badly stenosed by the repair that canalization of the vagina and skin grafting was done. In one case of midvaginal fistula, size less than  $\frac{1}{4}$  inch, associat-

ed with a bladder stone, repair of the fistula was done after removing the bladder stone by vaginal cystostomy starting from the fistula. It was very easy and the bladder fistula healed at first attempt.

*Results.* Out of the 36 cases treated in this series 25 cases or 69.4 per cent were cured. Twenty cases were closed at the first attempt. One of these, who had construction of the urethra for juxtaurethral fistula, healed at first attempt but was left with stress incontinence which was completely relieved by Kelly's operation for tightening of the bladder neck. Three cases required two attempts for closure of the fistula; one case required three attempts and one was closed after the fourth attempt.

Two cases were relieved. One is having occasional stress incontinence. In one case the destruction of the vagina, bladder and rectum was extensive. Both the vesicovaginal fistula and rectovaginal fistula were repaired at the same sitting. The rectovaginal fistula healed at the first repair and vesicovaginal fistula had broken down, but the vagina was so badly stenosed that the patient was completely continent and passed urine periodically from the urethra. This is unintentional colpocleisis but the result was so good with such an extensive destruction that no treatment was advised when she came for follow-up twice. There is danger of breaking up of the rectovaginal fistula in this case.

In 8 cases the operation failed to close the fistula. Two of these are cases of combined fistula and six are juxtaurethral fistula. Only one of these eight was operated twice and rest of them had only one operation. All of them did not come for the second time for repair. One of them was delivered by lower segment caesarean section. These people did not even reply to the post-cards sent to them and could not be followed.

One case died of pulmonary embolism on the 7th day of operation. The bladder was extensively separated in this case and good anatomical closure effected. The results of operation are shown in Table VIII.

The Martius Bulbocavernosus Interposition Operation was done in 13 cases of juxtaurethral fistulae; 9 out of these were completely cured at the first attempt and 4 failed. Two of the cases needed canalization of the vagina and grafting later on. In three cases of combined fistula where graft was used only one healed.

#### Comments

36 cases of vesicovaginal fistulae are reported in this series. 33 cases are of obstetrical origin. Twenty of them were of the juxtaurethral type. These present most of the difficulties during treatment. In the opinion of the author the fistula at the bladder neck is notoriously difficult to close. Shaw (1949), Moir (1961) and Krishnan (1949) are also of the same opinion. Falk (1961) says 'there is no more difficult place where to repair a fistula, where the tissues are delicate and so little tissue to work with.' It is quite difficult to achieve anatomical closure at this place and the physiological function is still much more difficult to be achieved. In 13 cases of juxtaurethral fistulae the Martius Bulbocavernosus Interposition Operation was done, and 9 cases healed at the first repair without any stress incontinence. The thick fat flap is an essential part in the transplantation. The graft is utilised partly to prevent leakage of urine and partly to separate the

TABLE VIII  
Results of Operation

Type of fistula	No. of cases	Cured	Relieved	Failed	Died
Juxtaurethral	20	12	1	6	1
Juxtacervical	6	6	—	—	—
Midvaginal	4	4	—	—	—
Combined	6	3	1	2	—

sutured bladder from the anterior vaginal wall. It forms an excellent support and padding. It is utilised as a protective filling where the suture line needs support and padding. In all cases where the closure of the fistula is done under tension the bulbocavernosus fat flap is used. It is also used to fill the empty space or dead space in large fistulae. The tissues of the fat flap replace the cavernous tissue which is needed to tighten the bladder. The cavernous tissue in urethral wall which is destroyed by trauma or pressure necrosis cannot be replaced by surgery. The tissues of the graft do not necrose easily because of the intact blood supply. They do not become infected also. In the opinion of the author the graft is of immense value for the cure of juxtaurethral fistula where the tissues are very delicate and tear during operation. It is quite possible that the graft, probably through pressure, prevents any leakage of urine. Shaw (1949) reported few cases treated by this graft. Three cases of juxtaurethral fistulae in the author's series healed well when this operation was done, though the repair had broken down on a number of occasions when done without the graft.

The midvaginal and juxtacervical fistulae are very easy to close. The combined fistula offers more difficulties and the cases in our series are such that there was almost complete destruction of the anterior vaginal wall and only a little portion of the urethra and part of the trigone was left. In some cases ureteric openings were at the edges. To add to these difficulties there is bad vaginal stenosis. Even in such cases the

vaginal flap repair with the Martius Bulbocavernosus Interposition Operation helps in some cases. If this is not possible operation of transplantation is the only remedy. But this is the last resort of the defeated surgeon and should not be the first choice. Preston (1951) had done transplantation of ureters in 100 cases with 32 per cent mortality. It shows how dangerous it is and in fact the author has seen here that people prefer constant wetness to vesical exclusion operation.

Every case of vesicovaginal fistula is a problem by itself and presents its own peculiarities. When a vesicovaginal fistula is surrounded by pliable vascular tissue its repair is usually easy. When extensive scarring is present and previous attempts at repair have failed, its closure is comparatively difficult. Ideal time to close any fistula is at the first sitting. Each worker must develop his own technique and learn the pitfalls and tricks by which the failure is avoided. The operation requires infinite patience and every possible way of attack must be known. Every case should be carefully studied and the type of repair to be done should be figured out beforehand. Even then it so often happens that in the middle of the operative procedure the entire procedure has to be altered and entirely different technique has to be used. The work is really exacting and paying, not in terms of money, as Kedarnath Das (1928) says, 'one successful repair of vesicovaginal fistula outways the glory and kudos of one hundred caesarean sections!'

#### *Summary*

(1) Thirty-six cases of vesico-

vaginal fistula are reported. Thirty-three cases or 91.6 per cent were of obstetric origin; 2 were as a result of gynaecological operations and one was the result of drug application in the vagina.

- (2) 80.5 per cent of them were below 30 years of age and in 48.4 per cent the fistula developed after first delivery.
- (3) The type of fistulae and the methods of their identification are described.
- (4) There were 20 cases of juxtaurethral fistulae; 6 cases of juxtacervical fistulae, 6 cases of combined fistulae and 4 cases of midvaginal fistulae in this series.
- (5) The flap-splitting operation and the Martius Bulbocavernosus Interposition Operation are described in detail.
- (6) In 16 cases Martius Bulbocavernosus Interposition Operation was done.
- (7) 25 cases or 69.4 per cent are cured; 2 are relieved; 8 failed and one died.
- (8) The advantages of the Martius Bulbocavernosus Interposition Operation are discussed.

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#### *References*

1. Collins C. G., David Pent and Jones F. B.: *Am. Jour. of Obst. and Gyn.*; 80, 1005, 1960.
2. Dass A.: *Ind. Jour. of Obst. and Gyn.*; 4, 294, 1953-1954.
3. Everette H. S. and Mattingley R. F.: *Am. Jour. Obst. and Gyn.*; 72, 712, 1956.
4. Falk H.: *Am. Jour. of Obst. and Gyn.*; 82, 129, 1961.
5. John M. P.: *Ind. Jour. of Obst. and Gyn.*; 4, 226, 1953-1954.
6. Kedarnath Dass: *Ind. Med. Gaz.*; 63, 698, 1928.
7. Krishnan R. G.: *Jour. of Obst. and Gyn. Brit. Emp.*; 56, 22, 1949.
8. Lazarus H. M.: *Ind. Jour. of Obst. and Gyn.*; 10, 1, 1959-1960.
9. Mahafouz Naguib Pacha: *Jour. of Obst. and Gyn. Brit. Emp.*; 45, 405, 1938; and 64, 23, 1957.
10. Martius, *Gynaecological Operations—1957* Translated and Edited by Milton L. McCall and Karl A. Bolten.
11. Moir J. C.: *Am. Jour. of Obst. and Gyn.*; 82, 124, 1961; and 71, 476, 1956.
12. Patterson T. J. S. and Philip Rhodes: *Brit. Jour. of Obst. and Gyn.*; 65, 481, 1958.
13. Preston P. G.: *Jour. of Obst. and Gyn. Brit. Emp.*; 58, 282, 1951.
14. Sadek Foda M.: *Jour. of Obst. and Gyn. Brit. Emp.*; 66, 372, 1959.
15. Shaw Wilfred: *B.M.J.*; 2, 1261, 1949.
16. Thomas R. C.: (1945) Quoted by Krishnan R. G. (1949).