

RETRO-PUBIC SUSPENSION OF THE URETHRA AND BLADDER NECK IN THE TREATMENT OF FEMALE STRESS INCONTINENCE

BY

J. A. CHALMERS, M.D., F.R.C.S., M.R.C.O.G.

*Consultant Obstetrician and Gynaecologist
The Royal Infirmary, Worcester*

STRESS incontinence in the female shares with several of the other common gynaecological disorders the attribute that, although for its treatment there are many and diverse methods, none of these is universally satisfactory (Millin and Read, 1948). Delinotte and Arnaud (1949) recently observed that Couvelaire in 1945 was able to detail 33 procedures directed to the cure of stress incontinence and new methods have recently been described in this country by McIntosh Marshall (1948), Shaw (1949), and Barns (1950).

The essential requirements for any operation are (1) that it shall give good results in the cure of the disability for which it is carried out, (2) that it shall be safe and easy for the patient, and (3) that it shall not present any undue technical difficulty for the operator. It is in the light of one or more of these criteria that some of the operations commonly performed for female stress incontinence are unsatisfactory.

The present paper is a preliminary account of experience during the past 2 years of the Marshall-Marchetti operation, which was described by Marshall, Marchetti, and Krantz, in April 1949. Since then it has achieved considerable popularity in the United States and, towards the end of the same year, Douglas stated that 90 cases had been treated in the New York Hospital by this method. In this country, however, the operation appears to be less widely known than it seems to deserve, and it is felt therefore that it is worth while putting on record one's admittedly limited experience in view of the satisfactory results achieved in the 22 cases so far treated.

Stress incontinence is commonly associated with utero-vaginal prolapse, and most cases will

respond to a vaginal plastic repair of the prolapse, but even in skilled hands failure to cure the incontinence will occur in a varying proportion of cases (30 to 50 per cent—Delinotte and Arnaud, 1949; 10 per cent—Stallworthy, 1940; 10 per cent—Read, 1950a; and 5 to 10 per cent—Douglas Miller, 1947). It is for this type of case that the urethral sling operations have been devised, but opinion is widespread amongst both urologists and gynaecologists that these are dangerous procedures, particularly where one or more previous unsuccessful operations have led to much scarring and adherence between the urethra and the anterior vaginal wall. Moir (1950) prefers the Aldridge to the Millin operation because the direct approach to the dissection of the upper urethra by the vaginal route offers less chance of injury, but Badenoch (1950) refuses to accept the considerable risk associated with either the Aldridge or the Millin operation. Perrin (1946) describes the Goebell-Stoeckel operation as "long, difficult, grave and perilous". McLaren (1950) regards any form of sling operation as a very serious matter for the patient, and Heyn (1950) points out the technical difficulty in the preparation of the urethra in the region of the bladder neck. Apart from the dangers of the operative injury to the bladder and urethra, the post-operative period with its difficulties may try both patient and surgeon to the utmost (McIntosh Marshall, 1949), and urinary obstruction may require treatment by dilatation of the urethra or periurethral resection (Read, 1950a). Jeaffreson (1949) considers that the sling becomes inactive in such cases a few days after operation, and Marshall (1949) and Arthur (1949) have pointed out that it is soon replaced merely by a mass of fibrous tissue.

Cameron (1947) pointed out that the use of fascial sutures has fallen into disfavour since the survival of such a suture is problematical. This criticism appears equally to apply to the urethral sling operation and, if the same effect can be achieved for the patient with a less ambitious and less dangerous operation, the sling operations should be discarded.

X-ray cystography has shown that stress incontinence is essentially due to the descent of the bladder neck on straining (Malpas, Jeffcoate, and Lister, 1949) and after successful repair the bladder neck can be shown to be elevated (Millin and Read, 1948; Marchetti, 1949; Muellner, 1949; Read, 1950b).

Retro-pubic suspension of the urethra and bladder neck was originally described by Hepburn in 1920 and 1927, and Miller (1945) suggested that it might be useful in stress incontinence. Marshall and Marchetti first undertook the operation for stress incontinence in June 1944. The urethra and bladder neck are exposed in the retro-pubic space and fixed to the periosteum of the posterior aspect of the pubes and of the lower part of the rectus muscles. A firm catheter is placed in the urethra and, with the patient in the Trendelenburg position, a vertical midline sub-umbilical incision made down to the rectus muscle. The muscles are separated and the bladder exposed and with the urethra freed from the back of the pubes by digital dissection down to within $\frac{1}{2}$ inch or so of the external meatus. This is usually easy, although occasionally adhesions from previous plastic operations will give rise to some difficulty. When the urethra has been freed tissue forceps are placed on either side in the region of the neck of the bladder and pulled upwards. They can then be used as tractors to elevate the urethra and bladder neck. The urethra is identified by the indwelling catheter, and catgut sutures are placed in the vaginal wall on either side of the urethra about $\frac{3}{4}$ inch from the midline and passed through the periosteum covering the posterior aspect of the pubic bone. [In their original paper Marshall, Marchetti, and Krantz advised that these sutures should transfix the urethral wall, but in order to reduce the danger of the operation I have placed the stitches more laterally, and Marchetti (1949) states that his

technique has been modified in the same way.] Two or three pairs of sutures can be placed alongside the urethra and should be tied only when all have been placed. Above the level of the upper margin of the pubes the anterior surface of the bladder in the region of the bladder neck is transfixed on either side of the midline and should be stitched to the posterior aspect of the rectus muscles. As a result the bladder neck is elevated and suspended at a higher level than before (Figs. 1 and 2). The wound is closed in layers with or without drainage to the retro-pubic space according to the amount of bleeding encountered.

The post-operative course in all my patients has been uncomplicated although catheterization on one or two occasions has been necessary in one or two patients. Marshall, Marchetti, and Krantz (1949), and Peightal (1949) describe haematuria post-operatively but this has not been encountered in any case and there seems no reason why it should occur in the absence of trauma. The catheter has been removed immediately after operation in all cases.

The somewhat similar operation described in 1947 by Everard Williams relies on fixation of the bladder to the periosteum of the upper margin of the pubes by 4 or more sutures placed serially transversely on either side of the midline, and the "cervico-cystopexie" of Perrin on fixation of the anterior aspect of the bladder to the rectus muscles by means of linen thread. I have used the former operation with an excellent result in one patient, aged 48 years, who had severe stress incontinence following an instrumental delivery in her only pregnancy. A severe cystocele and rectocele were present, but a vaginal plastic operation, which restored the normal vaginal anatomy, failed completely to cure her stress incontinence. An Everard Williams operation in 1950 was successful and there has been complete control of micturition since operation. In spite of this, however, I feel that the Marshall-Marchetti operation offers a greater area of attachment of the urethra and bladder neck, and consequently a greater prospect of permanent cure, and in some cases with great elongation of the urethra the Williams operation may not sufficiently "take up all the slack". Another difficulty is that the periosteum

on the upper margin of the pubes is more closely adherent to the bone than that on the posterior aspect and consequently it is more difficult to insert the sutures and they are more liable to cut out than those at a lower level as in the Marshall-Marchetti operation. The Perrin operation offers little or no support for the urethra, and therefore elongation of the bladder neck area may readily lead to recurrence of symptoms in the same way as utero-vaginal prolapse may recur after hysteropexy.

The selection of cases is important and it is essential that complete neurological and urological investigation be carried out (Williams, 1947). Where there is associated prolapse of the uterus and vaginal walls a vaginal plastic operation should be used in preference to the retro-pubic operation, but where a vaginal operation has achieved anatomical correction of the displacement without cure of the stress incontinence the retro-pubic operation should be employed. A group of cases will be found in which severe stress incontinence is present but in which the only prolapse to be detected consists in a slight descent of the anterior fornix and of the upper urethra and bladder neck. In these cases a finger placed in the anterior fornix, and pushing it upwards, should lead to control of the incontinence and if this test is positive the operation should offer a good prospect of cure.

The retro-pubic sling operation of McIntosh Marshall (1949) was undertaken in 4 cases of severe stress incontinence where previous vaginal plastic repairs had been unsuccessful. Convalescence was perfectly smooth in only one of these cases, but considerable difficulty was encountered from prolonged retention of urine in the 2nd case and from extensive local sepsis in the 3rd. A similar case has been described by Rickford (1950). In all these cases the ultimate result was excellent, but in the 4th case extravasation of urine and widespread sepsis following sloughing of the urethra resulted in death 2 days after operation. In this case there had been extensive scarring following two vaginal plastic repairs, and the dissection of the urethra had been extremely difficult. That this fatality is not an isolated instance has been confirmed in conversation with many of my colleagues, and

I am satisfied that a considerable number of fatal cases has occurred and that there is a far from negligible mortality associated with the retro-pubic sling operations. My experience has impressed me with the dangers of these operations as noted by Moir, Badenoch, McLaren, and others. In consequence I welcomed the publication about this time of the paper of Marshall, Marchetti, and Krantz (1949), and the opportunity of trying out a procedure which promised good results with greatly less risk to the patient than the sling operations.

The first patient was operated upon in August 1949, and since then 21 more cases have been treated by this operation with uniformly satisfactory results. The age of the patients has ranged from 24 to 72 years. In 10 patients utero-vaginal prolapse had previously been treated by one or more vaginal plastic operations which had in each case failed to relieve the stress incontinence. The operation was undertaken as a primary procedure in the remaining 12 cases, in whom the only prolapse was restricted to the anterior fornix. Three patients were nulliparous, but the others had borne from 1 to 5 children.

Convalescence was uneventful in all cases except one in whom a discharging sinus at one end of a Pfannenstiel incision persisted for 8 months, until the removal of a silk suture which had been used to fix the urethra.

In all cases micturition has been well controlled ever since operation with the exception of Case 9. In this woman, the retropubic space was drained through the lower end of the wound. Four months after operation, after a heavy fall, a wound hernia occurred at this point and stress incontinence returned. Exploration showed that the bladder had herniated through the track of the drainage tube, but when this was replaced and the bladder neck again suspended from the rectus muscle full control of micturition was restored and has been maintained ever since. At this second operation the urethra was found in good position firmly fixed to the posterior aspect of the pubes and it was not disturbed.

In 2 cases ventri-suspension was carried out by intra-abdominal plication of the round ligaments, and in a 3rd case sterilization by Pomeroy's method.

Everard Williams (1950) points out that preg-

nancy is the supreme test of the success of this operation, but no patient in my series has become pregnant since operation. Marchetti (1949), however, observes that the correction of the defect is made at the outer periphery of the birth canal, and fixation is to a position where trauma from overstretching in subsequent labours is unlikely. He has recorded successful vaginal delivery without interference with the control of stress incontinence in several of the cases in his series.

COMMENT

This paper records 2 years' experience of the operation of retro-pubic suspension of the urethra and bladder neck. This operation is indicated where severe stress incontinence in the female has persisted in spite of a vaginal plastic repair or in those cases unassociated with utero-vaginal prolapse, and in whom physiotherapy and conservative treatment have failed to effect a cure. It has the advantages over the Millin and other retro-pubic sling operations of greater ease of performance and greater safety for the patient, particularly in those cases where there has been previous vaginal surgery. As far as this preliminary survey goes results have been extremely satisfactory and there is every hope that a permanent cure will be achieved in a large percentage of cases. The post-operative course has been straightforward and uncomplicated except in one case, where a discharging sinus persisted for 8 months until a silk suture was removed. All patients have been allowed up on the 7th or 8th post-operative day, and have left hospital about the 11th day.

In cases where there is little or no prolapse this operation is preferable to a vaginal repair. The operation may, at the same time, be accompanied by sterilization, ventri-suspension or any other procedure as may be indicated. In younger women it will not compromise the ease of a future vaginal delivery, and good results achieved by the operation are unlikely to be undone by a future delivery.

The anatomical basis of the operation has been clarified by the work of Malpas, Jeffcoate, and Lister (1949), and also by the more recent paper of Ball, Douglas, and Fulkerson (1950), who have shown that in the incontinent multi-

para there is a downward and anterior displacement of the urethra with the dislocation of the bladder neck.

Schinagel (1950) states that there is no stress incontinence if the urethra is loose and not fixed to the pubic arch, and Mulvany (1951) has described his operation of vesico-urethrolisis in which adhesions between the urethra and bladder neck and the pubes are freed. He claims that this operation alone has given successful results in 58 cases during the past 3 years, but it is difficult to reconcile this claim with the above findings and it would seem probable that adhesions must reform rapidly in the retro-pubic space so that the urethra is once again fixed to the pubes.

SUMMARY

1. Twenty-two cases of severe stress incontinence, 10 of them unrelieved by vaginal plastic repair, were corrected by retro-pubic suspension of the urethra and bladder neck.
2. The period of observation has extended up to 2 years.
3. One further case treated successfully by Everard Williams technique is also recorded.
4. The retro-pubic suspension operations are technically easier and are safer for the patient than the sling operations of Millin, Aldridge, and others.

I am indebted to Mr. Everard Williams for his interest and most helpful advice during the present study.

ADDENDUM

While this paper has been in the course of completion Bourne has described to the recent International Congress of Gynaecology in Paris his operation of vaginopexy, which closely resembles that described above. His experience in 10 cases confirms that results are very satisfactory, that the operation is usually technically simple and that the risk to the patient is minimal.

REFERENCES

- Arthur, H. L. (1949): *J. Obstet. Gynaec. Brit. Emp.*, **56**, 671.
 Badenoch, A. W. (1950): *Proc. R. Soc. Med.*, **43**, 261.
 Ball, T. L., Douglas, R. G., and Fulkerson, L. L. (1950): *Amer. J. Obstet. Gynec.*, **59**, 1252.

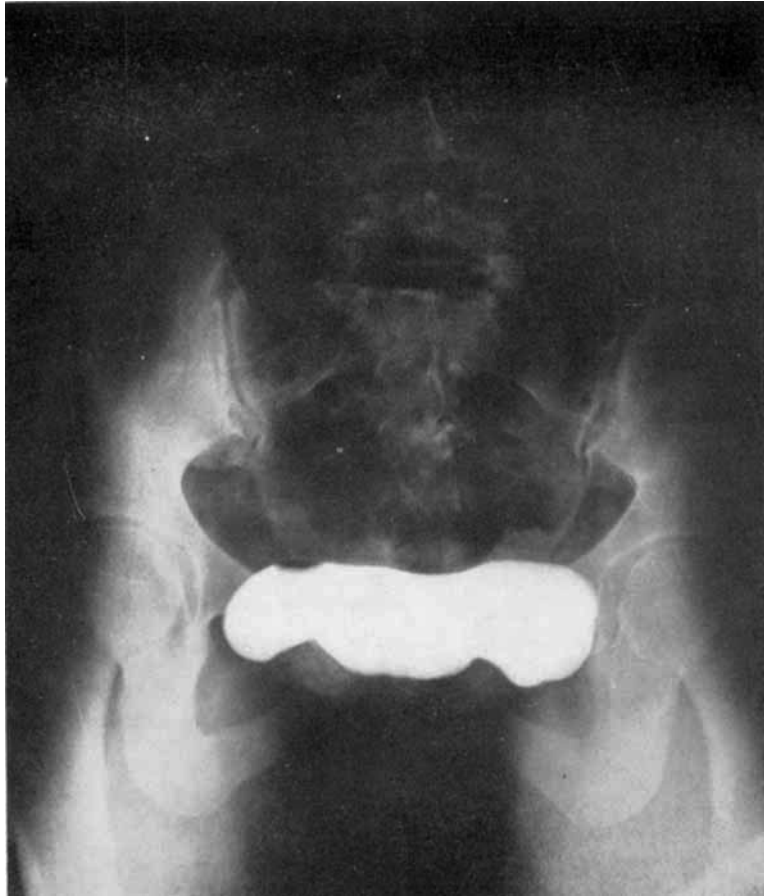


FIG. 1

Case No. 11. Cystogram before operation

Ten ounces of sodium iodide 12½ per cent solution injected into bladder.
Patient standing upright

J.A.C.



FIG. 2

Case No. 11. Cystogram postoperatively
Technique and position as with Fig. 1. (Note the elevation of the
bladder neck in relation to the symphysis pubis)

- Barns, H. H. F. (1950): *J. Obstet. Gynaec. Brit. Emp.*, **57**, 404.
- Cameron, J. R. (1947): *Edinb. med. J.*, **54**, 380.
- Delinotte, P., and Arnaud, L. (1949): *J. Urol., Paris*, **55**, 41.
- Douglas, R. G. (1949): *Amer. J. Obstet. Gynec.*, **58**, 1154.
- Held, E. (1949): *Schweiz. med. Wschr.*, **79**, 1004.
- Hepburn, T. N. (1920): *Surg., Gynec. Obstet.*, **31**, 85.
- Hepburn, T. N. (1927): *Surg., Gynec. Obstet.*, **44**, 400.
- Heyn, W. (1950): *Zbl. Gynäk.*, **72**, 423.
- Jeaffreson, B. L. (1949): *J. Obstet. Gynaec. Brit. Emp.*, **56**, 671.
- McLaren, H. (1950): *Proc. R. Soc. Med.*, **43**, 261.
- Malpas, P., Jeffcoate, T. N. A., and Lister, U. M. (1949): *J. Obstet. Gynaec. Brit. Emp.*, **56**, 949.
- Marchetti, A. A. (1949): *Amer. J. Obstet. Gynec.*, **58**, 1145.
- Marshall, C. McI. (1948): *J. Obstet. Gynaec. Brit. Emp.*, **55**, 126.
- Marshall, C. McI. (1949): *J. Obstet. Gynaec. Brit. Emp.*, **56**, 671.
- Marshall, W. P., Marchetti, A. A., and Krantz, K. E. (1949): *Surg., Gynec. Obstet.*, **88**, 509.
- Miller, D. (1947): *Edinb. med. J.*, **54**, 379.
- Miller, J. R. (1945): *Amer. J. Obstet. Gynec.*, **49**, 591.
- Miller, J. R. (1949): *Amer. J. Obstet. Gynec.*, **58**, 1153.
- Millin, T. (1950): *Proc. R. Soc. Med.*, **43**, 257.
- Millin, T., and Read, C. D. (1948): *Postgrad. med. J.*, **24**, 3, 51.
- Moir, J. C. (1947): *Edinb. med. J.*, **54**, 368.
- Moir, J. C. (1950): *Proc. R. Soc. Med.*, **43**, 257.
- Muellner, S. R. (1949): *Surg., Gynec. Obstet.*, **88**, 237.
- Mulvany, J. H. (1951): *J. Obstet. Gynaec. Brit. Emp.*, **58**, 449.
- Peel, J. H. (1950): *Proc. R. Soc. Med.*, **43**, 742.
- Peightal, T. C. (1949): *Amer. J. Obstet. Gynec.*, **58**, 1153.
- Perrin, E. (1945): *J. Urol., Paris*, **52**, 239.
- Perrin, E. (1946): *Lyons Chir.*, **41**, 270.
- Read, C. D. (1950a): *Amer. J. Obstet. Gynec.*, **59**, 1260.
- Read, C. D. (1950b): *Proc. R. Soc. Med.*, **43**, 255.
- Rickford, B. (1950): *Proc. R. Soc. Med.*, **43**, 261.
- Schinagel, G. (1950): *J. Urol., Balt.*, **64**, 573.
- Shaw, W. (1949): *Brit. med. J.*, **1**, 1070.
- Stallworthy, J. (1940): *J. Obstet. Gynaec. Brit. Emp.*, **47**, 391.
- Williams, E. (1947): *Proc. R. Soc. Med.*, **40**, 361.
- Williams, E. (1950): Personal communication.