

URETHROVAGINAL FIXATION  
TO COOPER'S LIGAMENT FOR  
CORRECTION OF STRESS  
INCONTINENCE, CYSTOCELE,  
AND PROLAPSE

JOHN C. BURCH, M.D.  
Nashville, Tennessee

From the Department of Obstetrics and Gynecology  
Vanderbilt University Medical School

Reprinted from

AMERICAN JOURNAL OF OBSTETRICS  
AND GYNECOLOGY  
St. Louis

Vol. 81, No. 2, Pages 281-290, February, 1961

(Copyright © 1961 by The C. V. Mosby Company)  
(Printed in the U. S. A.)

# Urethrovaginal fixation to Cooper's ligament for correction of stress incontinence, cystocele, and prolapse

JOHN C. BURCH, M.D.

*Nashville, Tennessee*

STRESS incontinence is a very difficult symptom to relieve surgically. The operation of Marshall, Marchetti, and Krantz<sup>1</sup> is the brightest spot in this otherwise dismal picture. Certainly the results<sup>2,3</sup> from this operation are superior to those achieved by other procedures. However, the Marshall-Marchetti-Krantz operation is not always easy to perform, the field is often deep and bloody, the edges of the urethra are difficult to define, and the periosteum on the posterior aspect of the symphysis is far from ideal as a holding structure.

In attempting to overcome some of these difficulties, we inserted the finger of the left hand into the vagina as the dissection in the space of Retzius was being made with the right hand. This gave the great advantage of bimanual palpation and was of much help in defining the structures and in doing the suturing. This maneuver, however, had its drawbacks as it required frequent changing of the left glove in order to maintain asepsis. This disadvantage stimulated the idea of a double drape arrangement with a sterile glove inserted into the vagina and its cuff sutured to the surrounding drapes. With this arrangement, it is possible to insert the fingers of the left hand into the vagina without fear of bacterial contamination. In passing, it is noteworthy that in the many

cases in which this method has been employed, infection has not been a problem.

## Operative technique

One day, while we were doing a Marshall-Marchetti-Krantz operation, the sutures in the periosteum continued to pull out and it was necessary to look for another point of attachment. An examination of the field revealed that the intravaginal finger was pushing the anterior vaginal wall up to a level as high as the origin of the levator muscle from the white line of the pelvis. Since the white line is the usually accepted origin of the so-called fascia surrounding the vagina it seemed reasonable and anatomically correct to suture this perivaginal fascia to the white line and the underlying levator muscle with three interrupted sutures on each side. This maneuver produced a most satisfactory restoration of the normal anatomy of the bladder neck and, in addition, a surprising correction of most of the cystocele involving the base of the bladder. This demonstrated the possibilities of the operation not only in overcoming the anterior cystocele involving the neck of the bladder but also the posterior cystocele involving the base of the bladder.

Seven operations were performed with this technique. In all of these, an excellent anatomical result was obtained and the structures are holding well at this time. The white line, however, had the same disadvantage as the symphysis. It holds the sutures

*From the Department of Obstetrics  
and Gynecology Vanderbilt University  
Medical School.*

poorly. The final step in the development of the operation to be described was the utilization of Cooper's ligament as a point of fixation. This strong thick band of fibrous tissue runs along the superior surface of the superior ramus of the pubic bone and is ideal from the standpoint of both passing and holding a suture. Cooper's ligament is well known to surgeons and is used as a point of fixation for the conjoined tendon in the repair of inguinal and femoral hernia and in the repair following a radical groin dissection. From the inguinal approach, Cooper's ligament seems to be a rather short structure but when viewed from within the abdomen, the structure is several inches long and affords more than enough room for the necessary sutures.

The present operation, like all operations, will probably not go too smoothly on the first few attempts but, once learned, it goes much better. In doing the operation, a few technical points may be of help. The dissection to expose Cooper's ligament and the fascia surrounding the vagina begins by breaking through the endoabdominal fascia, which descends from the anterior abdominal wall onto the symphysis and superior ramus of the pubic bone. The most convenient breakthrough site is at the lower angle of the abdominal wound and, when the fascia is broken through, the fingers rest on the bare bone of the symphysis. Now with the left index finger in the vagina and continuing in this plane, the endoabdominal fascia is stripped from Cooper's ligament and the side wall of the pelvis by the right hand. This plane is relatively avascular and keeping in it avoids the rupture of many small vessels and prevents a most troublesome ooze. In working downward to the fascia surrounding the vagina, the right hand sweeps the endoabdominal fascia from the lateral structures with a lateral and superior motion.

When the lateral edge of the vagina becomes apparent, further medial dissection will usually outline to some degree the edge of the bladder. The distinctness of the bladder edge is not always sharp, especially in

the obese, and in passing the suture into the perivaginal fascia, one can easily penetrate the bladder. An excellent procedure used by surgeons for many years and resurrected by Dr. Charles Hobby, is the instillation of 30 to 60 c.c. of sterile milk into the bladder through a previously inserted Foley catheter. If the milk is instilled at the start of the operation, however, the bladder becomes full and this fullness will interfere with the dissection. For this reason, the milk should be instilled just prior to making the dissection into the space of Retzius. Now if the milk-containing bladder is perforated by a needle, a drop of milk will immediately notify the operator of his mistake before further damage occurs.

For suture material, No. 2 chromic catgut has so far proved satisfactory. Perhaps stainless steel wire or even fascia may be the eventual choice. The point on the vagina through which the needle and suture have been passed is now matched to Cooper's ligament and the needle is passed through this ligament and tied by the assistant as the operator pushes up with the intravaginal finger (Fig. 1). Three such sutures are passed on each side (Fig. 2).

The abdomen is closed, the legs retracted, and perineorrhaphy and posterior colporrhaphy done if indicated. In case of doubt, it is best to repair the posterior vaginal wall. Special attention should be directed to it because many times it is noted that there is a submucosal band high and just in front of the cervix. Also, this part of the vagina has been elevated in the pelvis as a result of the suspension of the vagina and this changes the slope of the posterior wall so that it is more parallel to the plane of the operating table. Experience has shown that these changes predispose to the development of enterocele unless the cul-de-sac is obliterated. Attention to this point is important and may prevent a bad result.

When hysterectomy is necessary, as in the case of a large abdominal tumor, it may be advisable to perform the hysterectomy before the urethrovaginal suspension. This order of procedure has been the usual one

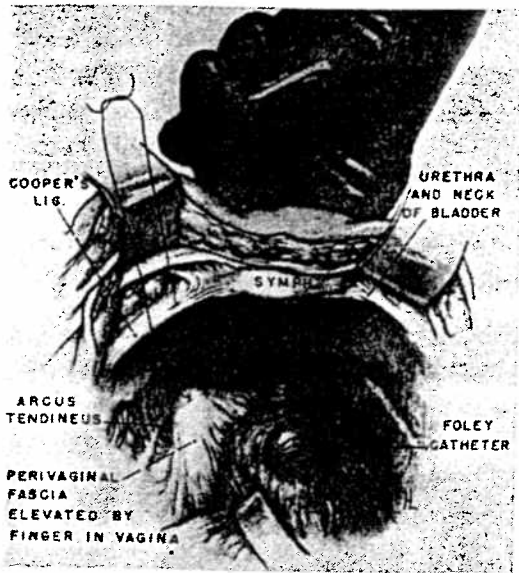


Fig. 1. The suture has been passed through the perivaginal fascia and the wall of the vagina, but not through the mucous membrane. The sutured point is now matched to that point on Cooper's ligament to which it is most easily approximated, and the suture passed through this point and tied.

in the cases reported; however, the order has been reversed at times and either order can be used at the discretion of the operator. After the abdominal closure, perineorrhaphy and posterior colporrhaphy are performed when indicated.

#### Case material

So far 53 patients have been subjected to the operation. The first operation was performed in May, 1958, and the follow-up period ranges from 2 to 17 months. Of the 53 operations, 40 were done by the author and 13 by Dr. Charles Hobdy or by other members of the staff with Dr. Hobdy's assistance.

The age range of the patients according to decades is shown in Table I. It is not surprising that 35 of the 53 patients were between 30 and 49 years of age.

The obstetrical background of the patient as regards parity is listed in Table II. It is interesting that 2 of the patients were nulliparas. The greatest number of patients were para ii and the next greatest number were para iii.

Table III considers the duration of symptoms. In more than half (28 of 53), the symptoms were of relatively short duration (between 0 and 2 years).

Symptoms of pelvic insecurity were present in 45 patients and lacking in 8 patients. The severity of these symptoms is noted in Table IV.

Stress incontinence occurred in 45 of the 53 patients. In 8 cases there was no stress incontinence, the operation being performed to correct a cystocele. In my hands urethro-

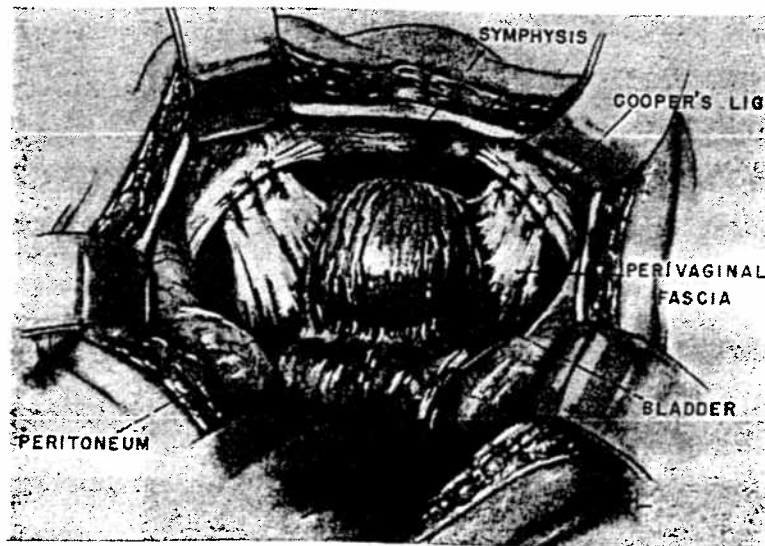


Fig. 2. The lateral edges of the vagina have been approximated to Cooper's ligament by 3 interrupted sutures.

**Table I.** Age range of patients at the time of operation

Age in years	No. patients
20-29	1
30-39	15
40-49	20
50-59	7
60-69	8
70-79	2

**Table II.** Obstetric background of patients

Para	No. patients
0	2
1	5
2	17
3	9
4	13
5	2
6	3
Unknown	2

**Table III.** Duration of symptoms

No. years	No. patients
0-2	28
2-4	12
5-7	7
9-10	2
Over 10	4

**Table IV.** Symptoms of pelvic insecurity found in total number of patients

Degree	No. patients
Mild	6
Moderate	31
Severe	8
None	8

**Table V.** Incidence and degree of stress incontinence

Degree	No. patients
Mild	20
Moderate	19
Severe	6
None	8

vesical suspension has so far achieved results as good as or better than the conventional operations for cystocele. It has a decided advantage, as no mucous membrane is removed and in those cases where it is necessary to insure a functioning vagina in the aged it is my present procedure of choice. Table V lists the stress incontinence according to degree of severity.

Table VI notes the degree of cystocele and rectocele. Unfortunately, it has not been possible to give any statistical evaluation of the prolapse of the uterus from a study of the records, as the descriptions of the degree of uterine descent were lacking in accuracy. Suffice it to say that the majority of the patients did exhibit good evidence of an unclassified prolapse and that 3 of the cases were clearly of third degree or complete prolapse.

In the treatment of stress incontinence the Marshall-Marchetti operation produces a favorable effect on the accompanying cystocele. Goetsch<sup>4</sup> has commented upon this, and Durfee<sup>5</sup> has recently elaborated on this in a most impressive manner. In my opinion, the Cooper's ligament urethrovesical suspension achieves an even greater degree of cystocele correction as fixation is from a firmer structure and the points of fixation are higher, more lateral, and posterior. Because of these advantages, I have used the Cooper's ligament anterior vaginal wall suspension to correct the anterior vaginal wall component of patients exhibiting cystocele, prolapse, cul-de-sac weakness, rectocele, and relaxed vaginal outlet. Hysterectomy is, of course, usually necessary in such cases, and in order to strengthen and tighten the upper supports of the vagina I devised a special method of suturing the cardinal and uterosacral ligaments. This was most effective as far as the supports of the vagina were concerned but it was faulty because it raised the posterior vagina in the pelvis and so deepened the already weakened cul-de-sac. In the later cases a modification of the Moschowitz<sup>6</sup> operation was used to obliterate and strengthen the cul-de-sac (Fig. 3). This can be further improved when reperitonizing the pelvis by

*prolapse*

su  
lea  
pa  
su  
  
pa  
op  
un  
Th  
in  
str  
M.  
th:

Ta  
ex  
—  
—  
—

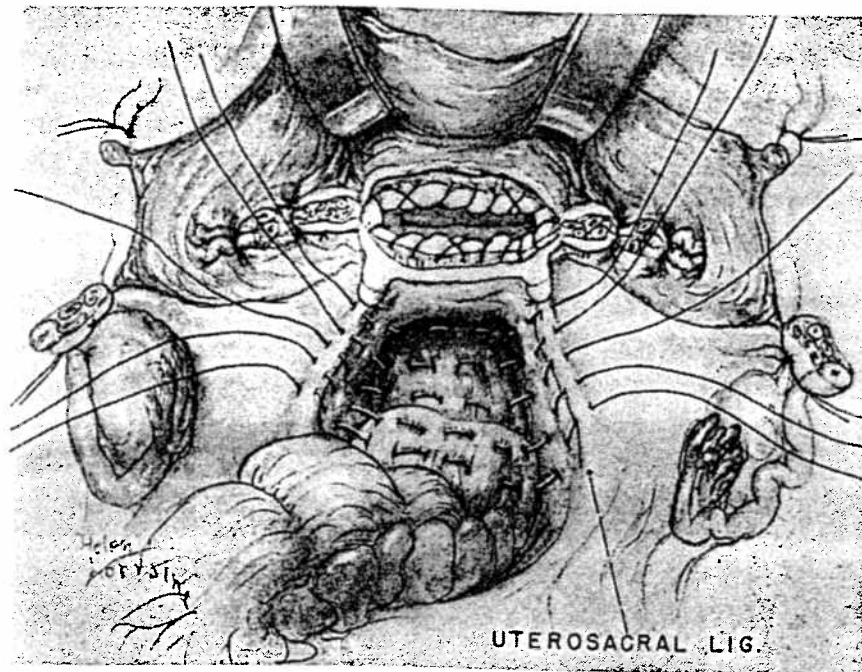


Fig. 3. Placement of the sutures for the obliteration of the cul-de-sac of Douglas. In placing the sutures it is easier to start posteriorly and proceed anteriorly as traction on the posterior sutures pulls up the structures and facilitates the passage of the next lowermost suture. Extreme care must be taken to avoid the ureter on the lateral walls of the cul-de-sac.

suturing the sigmoid colon to the anterior leaf of peritoneum and obliterating the right parasigmoid "gutter" with a few interrupted sutures (Fig. 4).

In Table VII it is seen that 15 of the 53 patients had undergone previous gynecologic operations. Four patients had had a previous unsuccessful operation for stress incontinence. The removal of the anterior wall redundancy in the conventional repair of cystocele and stress incontinence makes both the Marshall-Marchetti and the Cooper's ligament urethrovaginal suspension more difficult. Con-

sidering the more difficult nature of a second operation, the uncertainty of cure for major stress incontinence by conventional means, the distressing condition of these patients, and the high curability of the anterior vaginal wall suspension operations, it is clear that these operations deserve more consideration for the primary attempt rather than being reserved for failures. A detailed list of the various gynecologic procedures previously performed on the patients is noted in Table VII.

Table VIII itemizes the various operations utilized. The anterior vaginal wall suspension operations correct the downward, outward, and upward displacement of the urethrovaginal area, which is the common deformity seen in stress incontinence, by pulling this area inward and upward behind the symphysis. This reduction of the deformity we have described as "recession." In 7 cases the white line of the pelvis served as the point of fixation, while in 46 cases Cooper's liga-

Table VI. Degrees of relaxation found on examination

Cystocele		Rectocele	
Degree	No. patients	Degree	No. patients
1	10	1	11
2	37	2	24
3	6	3	7



Fig. 4. The pelvis is further obliterated when the sigmoid colon is sewn to the anterior or vesical leaf of the peritoneal defect. A few additional stitches are necessary to obliterate the right parasigmoid gutter. (From *Hysterectomy* by John C. Burch and Horace T. Lavelly, Springfield, Ill., 1954, Charles C Thomas, Publisher.)

ment was used. In only one of our cases was any operation done from the vagina on the anterior vaginal wall. This was one of the early cases and a simple anterior wall repair of the Graves' type was employed on the posterior part of a large cystocele. A posterior wall repair was done whenever necessary and this was in 45 cases. Hysterectomy was done in 36 cases—one vaginal and 35 abdominal. The uterus was suspended 5 times. In the remainder of the cases no

uterine operation seemed indicated. The plication of the uterosacral and cardinal ligaments to elevate and fix the upper end was done in 10 cases. This procedure was not satisfactory and was abandoned in favor of the Moschcowitz type of cul-de-sac obliteration, which was used in 5 cases.

#### Results

The results of the operations are itemized in Table IX. A satisfactory correction of the

anterior vaginal wall was initially obtained in every case. So far, this has been maintained. In the immediate postoperative period the anterior wall seems to be markedly overcorrected, but as time goes on it assumes a more normal contour. In one case of total prolapse there is a sagging of the posterior portion of the cystocele but this is well supported by the perineum and the patient is asymptomatic. In the 45 cases of stress incontinence there have been no failures. In one case of total eversion of the vagina following an abdominal hysterectomy, mild stress incontinence persisted for 3 months. The operation was performed in another hospital by an excellent surgeon and con-

sisted of a Cooper's ligament urethrovesical suspension and Brady fixation of the top of the vagina to the anterior abdominal wall. When the catheter is first removed, many of the patients have difficulty in voiding, the degree is about the same as with the Marshall-Marchetti or the sling operation. Either immediately or following the period of urinary retention there is a period in which urge incontinence may occur but with subsidence of urinary infection this vanishes. However, some of the patients continue to complain of mild urinary discomfort from time to time. This is not serious and probably represents about the same number as in the general population.

high  
cystocele

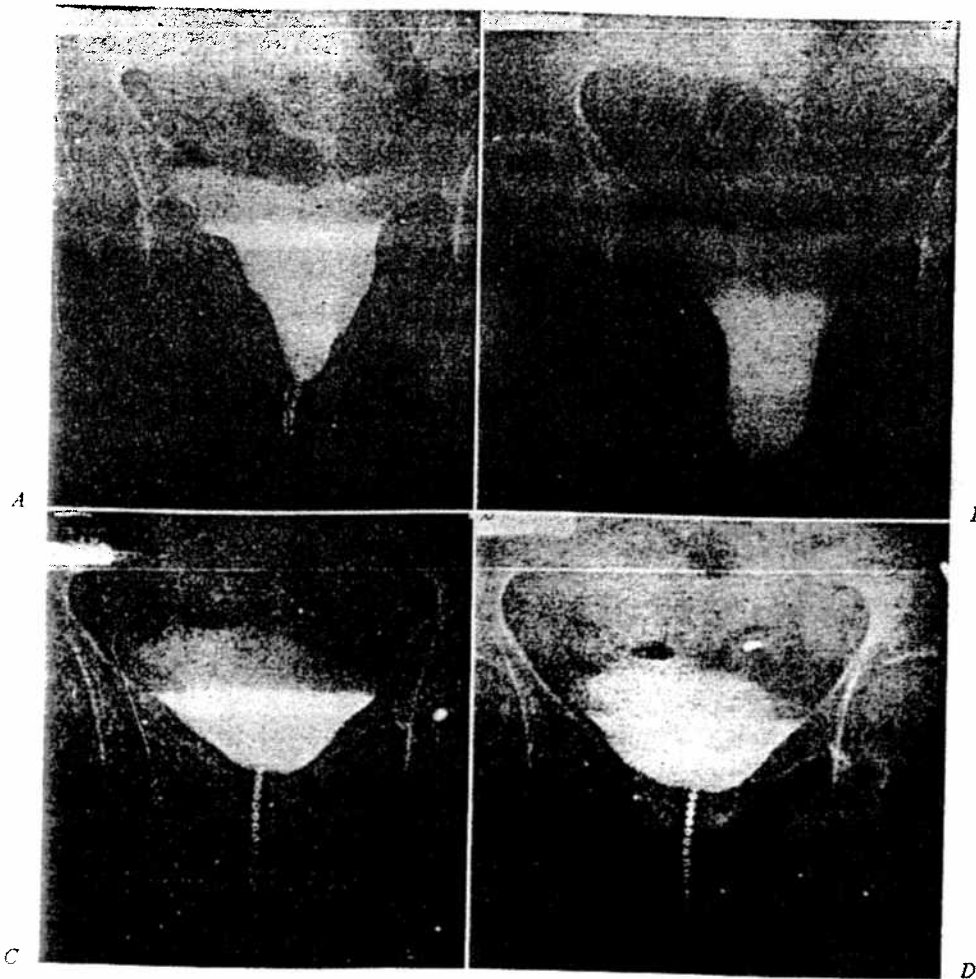


Fig. 5. Cystourethrograms with patient in standing anteroposterior position. A, Preoperative. B, Postoperative. C, Preoperative-straining. D, Postoperative-straining.



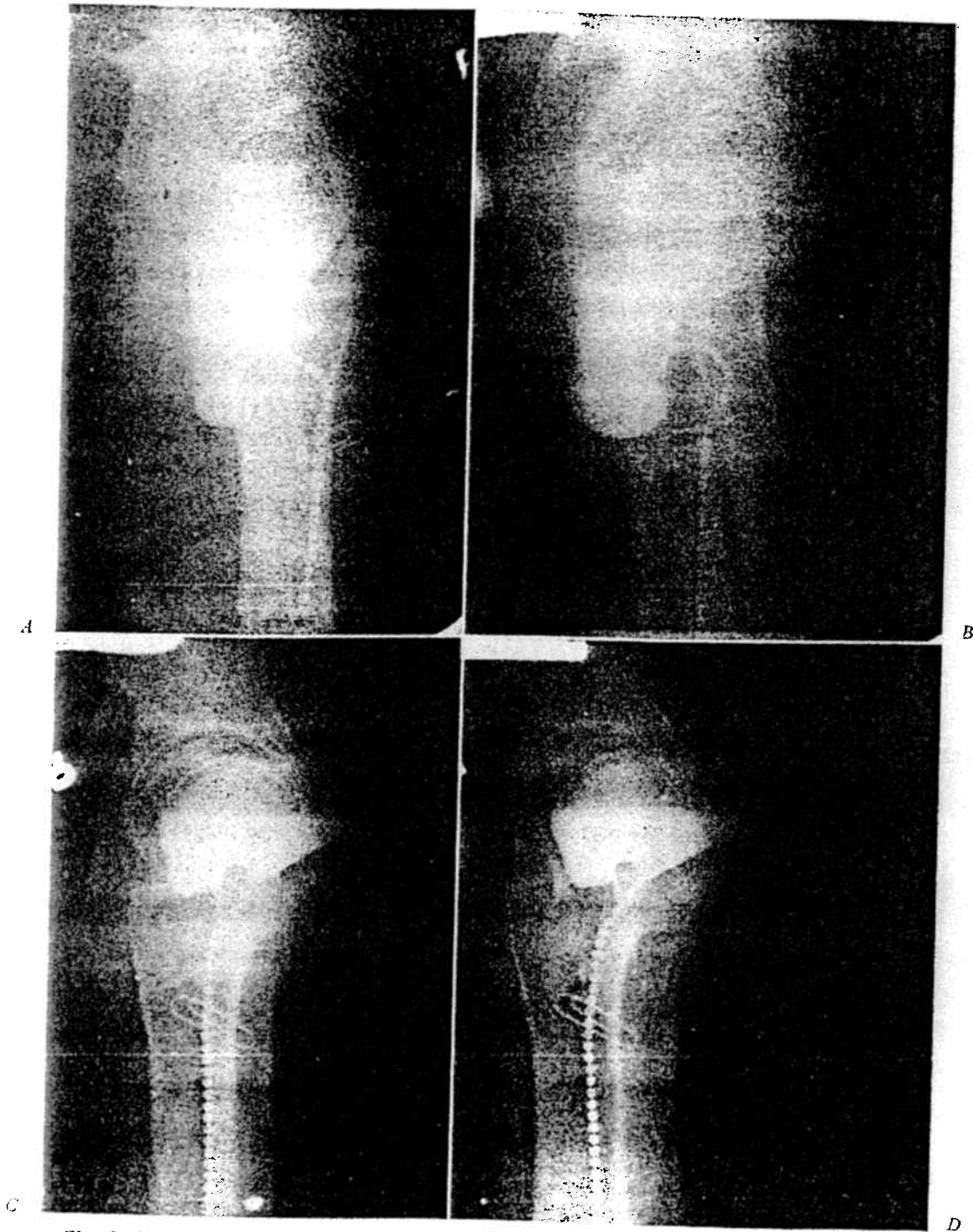


Fig. 6. Cystourethrograms with patient in standing lateral position. *A*, Preoperative. *B*, Postoperative. The notch on the floor of the bladder is posterior to the urethrovesical junction and is of no adverse clinical importance. *C*, Preoperative—straining. *D*, Postoperative—straining.

Postoperative cystograms reveal the remarkable degree of correction obtained by the operation (Figs. 5 and 6). In Fig. 6, a

lateral view, a notch is seen on the posterior or vaginal surface of the bladder. Our urologic consultants report that this is consid-

erab  
nati  
grea  
with  
cant  
Er  
tion,  
follo  
plica  
ligan  
uteru  
nique  
de-sa  
cedu  
intra  
an a  
Since  
nal a  
the M  
opera  
I do  
postop  
probl  
condi  
Moscl  
lar to  
type c  
The  
of the  
the h  
vesica  
plicati

**Con**  
Exp  
throva  
superic  
contine  
of cor  
and gi  
rection  
abdom  
It ca  
terecto  
ment o  
the dar  
enteroc  
priate  
The  
sults fo

erably less prominent on cystoscopic examination. Certainly, it has not assumed any great clinical importance or been associated with permanent residual urine of a significant degree.

Enterocoele has been the chief complication, occurring in 4 instances. Three of these followed a total abdominal hysterectomy and plication of the cardinal and uterosacral ligaments, while one case occurred after the uterus was suspended by the Olshausen technique. In each instance the depth of the cul-de-sac was increased by the operative procedure, and this allowed a greater degree of intra-abdominal pressure to be exerted on an already large and weakened cul-de-sac. Since abandoning the plication of the cardinal and uterosacral ligaments and utilizing the Moschcowitz type of procedure the postoperative results have been much better and I do not believe that the development of postoperative enterocoele will be a major problem in the future. The postoperative condition of the cul-de-sac following the Moschcowitz procedure is remarkably similar to that obtained by the McCall<sup>7</sup> vaginal type of cul-de-plasty.

The vesicovaginal fistula occurred in one of the early cases and was a complication of the hysterectomy and not of the urethrovaginal suspension. It was the first such complication in a series of more than 2,000 cases.

#### Conclusions

Experience with Cooper's ligament urethrovaginal suspension indicates that it is a superior operation for urinary stress incontinence. It achieves a remarkable degree of correction of the deformity of cystocele and gives for the first time a satisfactory correction of almost all types of cystocele by the abdominal approach.

It can be combined with abdominal hysterectomy and perineorrhaphy in the treatment of uterine prolapse, but in these cases the danger of the subsequent development of enterocoele must be recognized and appropriate precautions taken.

The operation also produces excellent results following failures of the usually em-

Table VII. Previous pelvic surgical procedures

No. patients	15
No. patients that had surgical procedures for stress incontinence	4
<i>Pelvic procedures performed</i>	
Curettage	6
Hysterectomy	5
Extrafascial hysterectomy	1
Vaginal plastics	4
Bilateral salpingo-oophorectomy	1
Oophorectomy	1
Tubal ligation	1
Salpingectomy	2

Table VIII. Surgical procedures performed

Urethral recession	53
White line	7
Cooper's ligament	46
Anterior colporrhaphy (Graves')	3
Posterior colporrhaphy	45
Perineorrhaphy	45
Total abdominal hysterectomy	35
Total vaginal hysterectomy	1
Curettage	9
Bilateral salpingo-oophorectomy	16
Plication of uterosacral and cardinal ligaments	10
Appendectomy	27
Marsupialization of Bartholin gland cyst	1
Brady procedure	1
Repair of umbilical hernia	1
Moschcowitz's operation	5
Uterine suspension (Olshausen)	5
Excision of breast tumor	1

Table IX. Results of 53 cases

Fixation of anterior vaginal wall in anatomic position with urethral recession	53
Failure to relieve stress incontinence	0
<i>Postoperative complications</i>	
Recurrence of rectocele and enterocele	4
Ventral hernia	1
Vesicovaginal fistula	1

ployed operations for stress incontinence provided there is enough redundancy in the the anterior vaginal wall to allow approximation to Cooper's ligament.

In those cases of cystocele, stress incontinence, or prolapse in the aged in which it is necessary to maintain a functioning vagina it is a worthwhile and useful procedure.

## REFERENCES

1. Marshall, W. F., Marchetti, A. A., and Krantz, K. E.: Surg. Gynec. & Obst. 88: 509, 1949.
2. Marchetti, Andrew A.: J. A. M. A. 162: 1366, 1956.
3. Marchetti, Andrew A., Marshall, Victor F., and Shultis, Lester D.: AM. J. OBST. & GYNEC. 74: 57, 1957.
4. Goetsch, C.: West. J. Surg. 62: 201, 1954.
5. Durfee, R. B.: AM. J. OBST. & GYNEC. 78: 628, 1959.
6. Moschowitz, A. V.: Surg. Gynec. & Obst. 15: 7, 1912.
7. McCall, Milton L.: Obst. & Gynec. 10: 595, 1957.