Staff Meeting Bulletin
Hospitals of the » » »
University of Minnesota

Urinary Incontinence in the Female

Volume XV | Friday, April 28, 1944 | Number 23

STAFF MEETING BULLETIN
HOSPITALS OF THE . . .
UNIVERSITY OF MINNESOTA

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INDEX

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I.

No. 23

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
CALENDAR OF EVENTS
May 1 - May 6

Visitors Welcome

Monday, May 1

9:00 - 10:00 Roentgenology-Medicine Conference; L. G. Rigler, C. J. Watson and Staff, Todd Amphitheater, U. H.

9:00 - 11:00 Obstetrics and Gynecology Conference; J. L. McKelvey and Staff, Interns Quarters, U. H.

12:30 - 1:30 Pediatrics Seminar; The Measurement of Growth; Dr. Bosma, W-205 U. H.

12:30 - 1:30 Pathology Seminar; Lesion in the Liver Resulting from Transfusion; Ellery James, 104 I. A.

4:00 Preventive Medicine and Public Health Seminar; Laboratory Resources in Sanitary Science; Dean M. Taylor, H. A. Whittaker, 6th Floor, H. S. Lounge.

Tuesday, May 2

8:00 - 9:00 Surgery Journal Club; O. H. Wangensteen and Staff, Main 515, U. H.

9:00 - 10:00 Roentgenology-Pediatrics Conference; L. G. Rigler, I. McQuarrie and Staff, Eustis Amphitheater, U. H.

11:00 - 12:00 Urology Conference; C. D. Creevy and Staff, Main 515, U. H.

12:30 - 1:30 Pathology Conference; Autopsies, Pathology Staff, 104 I. A.

12:30 - 1:30 Physiology-Pharmacology Seminar; The Storozoite Transmissionof Plasmodium Lophurae to Pekin Ducklings; J. T. Litchfield, Jr., 214 M. H.

4:30 - 5:30 Obstetrics and Gynecology Conference; J. L. McKelvey and Staff, Station 54, U. H.

4:00 - 5:00 Pediatric Grand Rounds; I. McQuarrie and Staff, W-205 U. H.

5:00 - 6:00 Roentgen Diagnosis Conference; A. T. Stenstrom; M-515 U. H.

Wednesday, May 3

9:00 - 11:00 Neuropsychiatry Seminar; J. C. McKinley and Staff, Station 60, Lounge, U. H.

10:30 - 12:30 Otolaryngology Case Studies; Out-Patient Ear, Nose and Throat Department; L. R. Boies and Staff.

11:00 - 12:00 Pathology-Medicine-Surgery Conference; Aplastic Anemia; E. T. Bell, C. J. Watson, O. H. Wangensteen, and Staff, Todd Amphitheater, U. H.

12:30 - 1:20 Physiological Chemistry Journal Club; Current Literature Reviews; Staff, 116 M. H.

12:30 - 1:30 Pharmacology Seminar; Oxytocic; Elizabeth M. Cranston; 105 M. H.

4:30 - 5:30 Neurophysiology Seminar; The Vasomotor System in Anoxia; E. Gellhorn, 113 M. S.

Thursday, May 4

9:00 - 10:00 Medicine Case Presentation; C. J. Watson and Staff, Todd Amphitheater, U. H.

10:00 - 12:00 Medicine Rounds; C. J. Watson and Staff, East 214 U. H.

12:30 - 1:30 Physiology Chemistry Seminar; The Use of Heavy Isotopes as Tracers; H. G. Wood, 116 M. H.

5:00 - 6:00 Roentgenology Seminar; Reviews of Recent Radiological Literature; Staff, M-515, U. H.

Friday, May 5

9:00 - 10:00 Medicine Grand Rounds; C. J. Watson and Staff; Todd Amphitheater, U.H.

8:30 - 10:00 Pediatrics Grand Rounds; I. McQuarrie and Staff.

10:00 - 12:00 Medicine Ward Rounds; C. J. Watson and Staff; East 214 U. H.

11:45 - 1:15 University of Minnesota Hospital General Staff Meeting; Use of Curare in Anesthesia; R. T. Knight, Frank Cole, Powell Hall Recreation Room.

1:30 - 2:30 Medicine Case Presentation; C. J. Watson and Staff, Eustis Amphitheater.

1:00 - 2:30 Dermatology and Syphilology; Presentation of selected cases of the week; Henry E. Michelson and Staff; W-306 U. H.

1:30 - 3:00 Roentgenology-Neurosurgery Conference; H. O. Peterson, W. T. Peyton, and Staff, Todd Amphitheater, U. H.

Saturday, May 6

9:00 - 10:00 Medicine Case Presentation, C. J. Watson and Staff, Main 515 U. H.

9:15 - 11:30 Surgery-Roentgenology Conference; O. H. Wangensteen, L. G. Rigler, and Staff, Todd Amphitheater, U. H.

10:00 - 12:00 Medicine Ward Rounds; C. J. Watson and Staff, E-214 U. H.

11:30 - 12:30 Anatomy Seminar; Staff Report on Meeting of Anatomists in Chicago; The Contributions of Dutch Scientists to Anatomy; S. P. Miller, I.A. 226.

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Friday, May 5 - 12:00 Noon

Special Showing of the Russian Film, Experiments in the Revival of Organisms, with comments by J. B. S. Haldane. Regular Meeting follows.

II. URINARY INCONTINENCE IN THE FEMALE

George E. Rogers

The main purpose of this paper is to present the results of the surgical therapy for patients complaining of urinary incontinence who were admitted to the gynecological service over the four-year period from 1940 to 1943 inclusive. Only incontinence due to disturbances of urethral function will be discussed. The anatomy and physiology are detailed in the staff bulletin and only a few of the essential features of these will be presented. Some of the more recent studies of urethral sphincter function will be given in addition to a few remarks regarding the various operative procedures employed and the pre-operative workup and postoperative care of the patients.

Anatomy

The female urethra measures about 4.0 to 4.5 cm. in length. It passes downwards and forwards from the neck of the bladder to end at the external urethral meatus just anterior to the vaginal introitus. For purposes of description it is divided into three portions, the upper, middle, and lower thirds. The main muscular coat of the urethra is circular and is continuous with that of the bladder. It is thickened over the upper third of the urethra and the neck of the bladder to form the internal involuntary urethral sphincter. It is also thickened somewhat in the region of the external meatus to form the external involuntary urethral sphincter. In addition to these involuntary sphincters, a voluntary sphincter is described lying between the two fascial layers of the urogenital diaphragm and covering the middle and upper thirds of the urethra.

In its course downwards, the urethra passes through the pelvic diaphragm, the urogenital diaphragm, and between the anterior muscles of the superficial perineal compartment. The pelvic diaphragm is composed of the levator ani and coccygeus muscles enclosed between two layers of fascia. It is weakest in its anterior portion where it is reinforced by the urogenital diaphragm which lies at a slightly lower level. The superior fascia of the pelvic diaphragm, the endopelvic fascia, is reflected upwards upon the pelvic viscera. It supports the vesical neck of the urethra but laterally it is stretched from one pelvic wall to the other and surrounds the bladder above the level of the urethra. The anterior portion of each levator ani muscle is said to supply some fibers to the urethra upon its postero-lateral aspect.

The urogenital diaphragm, or triangular ligament, is stretched across the anterior portion of the pelvic outlet at right angles to the vaginal canal and is pierced by the urethra and vagina. It is a firm, musculofibrous structure attached anteriorly to the ischiopubic rami. It is composed of two layers of fascia together with the muscles enclosed within them. Posteriorly, the two layers of fascia blend together to form a rounded margin, and the middle portion of this joins the central point of the perineum. The muscles contained within the triangular ligament include two vague muscles known as the deep transverse perineal muscles running from the inferior ram of the ischia to meet in the midline behind the vagina, and the membranous sphincter of the urethra arising from the inferior rami of the pubis. These fibers run transversely, some passing anterior to the urethra, some inserting into the sides of the urethra, and others meeting the muscle of the opposite side between the urethra and the vagina.

The superficial perineal compartment contains three sets of muscles. The superficial perineal muscles arise from the tuberosities of the ischia and are inserted into the central tendinous point of the perineum. The ischiocavernous muscles arise from the tuberosities of the ischia and ensheath the crura of the clitoris. The bulbocavernosus muscles arise from the central point of the perineum, and pass forward on either side of the vaginal introitus to insert into the body of the clitoris. The only significance which this has in relation to the present topic is that these structures are occasionally used for reconstruction of urethral supports.

The trigone muscle should be mentioned. It is a thin, triangular sheet in the base of the bladder. Its fibers pass beneath the internal orifice of the urethra to attach to the posterior wall of the urethra along the inner half of its length. It is said to aid in the opening of the internal urethral sphincter, and tearing of the trigone muscle results in internal sphincter spasm.

Davies feels that there are three muscle layers arranged around the urethra which act as three individual voluntary sphincters. These consist of some fibers from the levator ani muscles, the so-called membranous sphincter, and the bulbocavernosus muscles. Kennedy believes the main voluntary sphincter is composed of muscle fibers of the levator ani muscles arising from the "white line" and is attached to the arcuate ligament, the fibers uniting in a median raphe beneath the middle and inner thirds of the urethra to form a sling for this portion of the urethra. He thinks this sphincter exerts a small force about the middle third and a much greater force about the inner third of the urethra augmenting the internal involuntary sphincter.

It should be pointed out that, at the time of surgery, the components of urogenital diaphragm and the urethral sphincters do not stand out as individual structures as described in the usual standard textbooks of anatomy.

Physiology

The innervation of the bladder and the proximal portion of the urethra is not entirely clear. Observations in this regard have been contraindicatory. The most generally accepted view is that they are supplied by both the sympathetic and parasympathetic divisions of the autonomic nervous system. The sympathetic fibers arise from the lumbar spinal segments and reach the bladder through the hypogastric ganglia. It supplies inhibitory fibers to the detrusor muscle and motor fibers to the trigone, internal sphincter, and the smooth muscle of the proximal portion of the urethra.

The parasympathetic supply arises in the sacral segments, largely the second and the third, and reaches the bladder through the pelvic nerves. It is said to supply motor fibers to the detrusor muscle and inhibitory fibers to the internal sphincter.

The remainder of the urethra is innervated by branches of the pudendal nerve.

The afferent pathways from the bladder and the vesical neck travel in both the pelvic and hypogastric nerves; those from the urethra in the pudendal nerves.

The bladder is capable of adjusting its tone, and as a result can adapt its capacity to changes in the volume of its contents with relatively little alteration in intravesical pressure. As the volume increases the adaptation is always to a slightly higher pressure than formerly existed.

Tension is the normal stimulus for the sensory end organs in the bladder wall. As the bladder becomes distended by the accumulation of urine and the intravesical pressure reaches a certain value, rhythmical contractions of the detrusor muscle occur. As the pressure rises further, the contractions end in the movements leading up to the micturition reflex. This consists of strong contraction of the detrusor muscle accompanied by relaxation of the internal sphincter and opening of the other sphincters. This reflex usually occurs at a pressure of 15-18 cm. of water.

The act of micturition is essentially reflex in nature although it is usually initiated by an effort of the will and can be voluntarily restrained or interrupted under normal conditions. The voluntary restraint consists in inhibitic of the detrusor muscle and contraction of the voluntary sphincter muscle with a reciprocal increase in the tone of the internal involuntary sphincter. It is thought that the involuntary sphincter is not under voluntary control and that

its reaction to voluntary effort to control micturition is entirely secondary to the effect on detrusor activity. The centre for voluntary control is said to be situated in the hindbrain while the reflex centre is located in the sacral portion of the spinal cord.

Causes of Incontinence

The causes of urinary incontinence in the female may be congenital or acquired. The former consist of such things as defects ranging from partial epispadias to absence of the urethra or exstrophy of the bladder, aberrant ureters opening into the urethra beyond the main sphincter, faulty or incomplete development of the musculature of the vesical neck and urethra or of the pelvic fascia supporting the bladder and urethra, and defects of innervation in such lesions as spina bifida. These do not concern us in this report except to point out that defects of innervation or faulty development of the fascial supports may not be sufficient to produce incontinence until some degree of trauma has been added.

Obviously, vesico-vaginal fistulae or complete loss of the urethra and/or the base of the bladder due to extensive damage at the time of operative delivery will result in incontinence. Vesico-vaginal or uretero-vaginal fistulae may occur secondary to trauma at the time of surgery.

Our present study is limited to acquired incontinence due to less extensive damage. The incontinence is usually the result of trauma incident to labor although occasionally it may develop following vaginal surgical procedures for the correction of cystocele or uterine prolapse. Some people believe that the primary trauma is to the urethra and its sphincters while others claim it is due to damage of the periurethral supporting structures. It is likely that in the majority of cases both factors come into play. Kennedy believes that trauma to the sphincters and the periurethral tissue causes the sphincters to be partially fixed to the adjacent pubic rami by fine or dense bands of scar tissue. These bands of scar tissue distort the internal involuntary sphincter with fixation at some points so that it cannot contract freely. As well he thinks there is direct damage to the voluntary sphincter in the midline beneath the middle and inner thirds of the urethra.

Studies of Urethral Sphincter Function

Recent studies of the function of the urethral sphincters by Kennedy have shown a number of interesting findings. With roentgenological methods, he was able to demonstrate a series of conditions associated with incontinence.

His method of study was as follows. After the bladder had been drained with a catheter, 200cc. of a 3% solution of sodium iodide was introduced into the bladder. The catheter was withdrawn and a special two-layered sac, 5.5 cm. in length, was placed in the lower bladder and urethra, where it was held in position and was slowly filled with a 25% solution of sodium iodide. This sac was attached to a manometer which could be raised to obtain any desired pressure in the sac. X-ray pictures were taken at various pressures, and due to differences in density each picture revealed separate contours of the bladder and of the trigone and urethra so that the relationship of the bladder to the urethra could be observed. The pressure in the sac was equal and opposite in direction to the forces exerted by the urethral sphincters as they contract to prevent the escape of urine from the bladder. Hence, the efficiency of the sphincter control could be determined by varying the pressure in the sac. In normal cases the internal sphincter began to dilate at 30 to 40 cm. of fluid pressure, while the middle third (voluntary sphincter) showed no signs of involuntary dilatation until a pressure of 40 to 50 cm. was reached and some control was still present at 80 cm. of fluid pressure. In the abnormal cases dilatation of the sphincters began at a lower pressure level.

X-ray pictures were taken, as well, at a constant pressure of 30 cm. with

the patient relaxed, when the patient made an effort to hold urine, and when she made a voluntary effort to void. In the normal individual, the base of the bladder and the upper end of the urethra were located high in the pelvis behind the symphysis pubis in the "relaxing" state. There was little or no change in the findings in the "holding state" as compared to the "relaxing" position. In the "voiding" state the bladder floor and the urethra were pushed downwards between the pubic rami into the vagina, the inner portion of the urethra was dilated widely while the outer portion was dilated little, and the external urethral meatus was displaced down in the direction of its long axis out of the pelvis for a distance of one-half to one cm. In the abnormal patient, the bladder floor and the urethra showed various degrees of descent and dilatation even in the "relaxing" state.

From these observations Kennedy concluded that, in the presence of traumatic incontinence, the bladder and the urethra in the "relaxing" state revealed various degrees of changes characteristic of the "voiding" state in the patient with urinary control. There is continuous loss of sphincter muscle tone or permanent distortion of the sphincter surrounding the inner third of the urethra with various degrees of descent of the bladder and urethra. Kennedy felt that the sphincter mechanism functioned with its greatest efficiency when the urethra was replaced as far as possible within the pelvis restoring it to its maximum length and normal elevated position.

Similar studies have been reported by Barnes using a modificatdn of Kennedy's technique. In addition, he has carried out cystometric studies on patients with incontinence who had some associated degree of pelvic floor relaxation or uterine prolapse in an effort to evaluate the role of the forces of expulsion. If the cystometrogram was obtained with the uterus drawn down to the position which it occupied when the patient was on her feet, it was found that the intravesical pressure was elevated as compared to the normal. A similar situation was demonstrated in the case of large rectoceles pressing on the bladder. He concluded that conditions causing a rise of intravesical pressure above normal could play a part in the production of urinary incontinence when there was an associated decrease in the urethral resistance.

Operative Procedures

Various operative procedures have been devised for the relief of urinary incontinence in the female. The simplest type of operation is the so-called "Kelly stitch" operation in which plication of the region of the vesical neck is carried out with two transverse mattress sutures.

Kennedy's repair is much more extensive. After adequate mobilization of the urethra with the freeing of any adhesive bands, two layers of transverse mattress sutures are placed beneath the urethra along its entire length. This enfolds the urethral wall and restores undamaged urethral wall beneath the urethra. The voluntary sphincter is reapproximated with three silver wire sutures which are placed far laterally near the pubic rami to catch the retracted edges of this muscle. The vaginal mucosa is then closed with interrupted catgut sutures after the excess mucosa has been excised.

Royston and Rose carry out a similar procedure but, in addition, they plicate the region of the vesical neck longitudinally in certain cases in which they feel that they have demonstrated tearing of the trigonal muscle.

Kennedy's procedure restores the urethra to its normal position above and behind the pubis with associated lengthening of the urethra. Some observers advocate advancement of the external urethral meatus to a point just below the clitoris as a method of further lengthening the urethra.

Various types of muscle and fascial transplant operations have been devised. For the most part they have been reserved for cases in which one or more attempts using the usual methods of repair have been unsuccessful. The

principle of these various procedures is to form a sling beneath the inner portion of the urethra with elevation and stricture at this point. Goebell, Frangenheim, and Stoeckel used the pyramidalis muscles and their fasciae. These were passed posterior to the symphysis and were united beneath the urethra. The latter carried out the usual form of urethral plication in conjunction with the muscle transplant. Miller also uses the pyramidalis muscles but brings them down anterior to the symphysis pubis. Frangenheim and others have utilized strips of the rectus abdominis muscles and their fasciae. Transplantation of the gracilis muscle, of the levator ani muscles, of strips of fascia lata or fascia from the external oblique muscles, and of the bulbocavernosus muscles have been described.

During the years 1940 to 1943 two main types of urethral plication, which will be designated as transverse and complete, have been used in our cases. For the most part these have been carried out in conjunction with other procedures for the correction of associated cystoceles, rectoceles, enterocelos, and uterine prolapse or uterine pathology. The latter include colpoperineoplasty with or without cardinal ligament advancement and partial cervical amputation, colpoperineoplasty plus ventral fixation of the corpus uteri, vaginal hysterectomy, and a few cases of Watkin's interposition operation. In one case advancement of the urethra was done along with complete plication of the urethra.

In many instances the transverse plication consisted of the "Kelly stitch" operation, while in others the urethra was plicated transversely throughout its entire length. In the complete plication a modified Kennedy operation was used with a longitudinal plication of the region of the internal urethral sphincter added (similar to that described by Royston and Rose). Chromic catgut was utilized throughout except in a few of the early cases in which linen was used for plicating the internal sphincter.

The majority of the operations have been performed under local anesthesia using a solution of one-half of one percent novacaine with or without adrenaline. This has proved entirely satisfactory in most of the cases although occasionally it has been necessary to supplement the local anesthesia with a general anesthetic.

Pre-operative Workup

As a rule, our patients are hospitalized for about four or five days preceding the planned date of operation. While the workup of each patient is being completed, an attempt is made to clean up the vagina as much as possible by the use of acroflavine tampons and saline douches in order to reduce to a minimum the danger of postoperative infection of the operative site.

General workup of each patient is carried out in addition to certain specific investigations of the urinary tract. A catheterized urine and culture is obtained in every case. Cystoscopic examination is carried out by the urology department paying particular attention to the presence or absence of relaxation of the urethral sphincters, of urethritis or urethral stricture, and of a cystitis or infection of the upper urinary tract. Studies of sphincter function, as described by Kennedy, have not been done. In any case in which the history of trauma is minimal and/or the extent of the anatomical lesion seems insufficient to explain the incontinence, X-rays of the lumbosacral spines are taken to rule out the possibility of a spina bifida occulta. Such individuals should be warned in advance that the operation may not prove successful.

Since the planned operative procedure is elective, surgery should be postponed or avoided if any contraindications are brought to light. An advanced cardiac lesion may be a contraindication to surgery at any time. A chronic infection of the cervix uteri should be treated and cleared up since infection of the operative site might result in breakdown of the repair with failure of maintenance of the restored urethra. An infection of the urinary tract should be treated by the usual

means and surgery delayed until this has completely subsided. The effect of urethral dilatation can be observed in cases with a urethritis or urethral stricture before surgery is undertaken.

Postoperative Care of the Patient

It would seem that the local anesthesia has certain definite advantages. The patient is conscious on her return to the ward so that active movements can be instituted at once to aid in the prevention of postoperative complications such as pneumonia and thrombophlebitis. As a rule the patient is not nauseated and is able to tolerate oral fluids and medications satisfactorily. Sulfadiazine is administered as a prophylactic measure against urinary tract infection until the patient is voiding satisfactorily. It is usually necessary to leave a straight male catheter in place for a period of about 5 days after surgery and it will have to be reinserted if the patient is unable to void. Once voiding has commenced, the residual urine is checked until it has reached negligible amounts. An acroflavine pack, which is inserted at the conclusion of the surgery, is left in the vagina for three to four days after which sterile saline douches are given. Perineal lights are used to aid in healing. When the patient is voiding satisfactorily she is encouraged to attempt shutting off of the urinary stream during the act of micturition as a method of exercising the voluntary urethral sphincter.

Results

Our results are summarized in the following tables.

As noted in Table 2, 145 patients without incontinence were operated upon over the four year period. One of these subsequently developed a large cystocele with associated incontinence. Anterior colporrhaphy plus complete plication relieved the urinary symptoms. Three others returned with minor degrees of incontinence which was not sufficient to warrant a second operation.

It must be assumed that no urethral plication was performed in those patients in which none is described in the operative records. (Table 3.) It is also assumed that the incontinence in those cases was considered minor in degree and, for this reason, the various operators did not consider urethral plication necessary. However, it has been learned that plication is necessary even in patients with occasional incontinence and since the beginning of 1943 routine plication has been done in all cases even though the incontinence is minimal. As well, urethral plication is now performed as a prophylactic measure in the majority of vaginal plastic procedures carried out on patients without incontinence.

Repeat operative procedures were performed on five patients in the incontinence group. One patient had a colpoperineoplasty without urethral plication in 1940. Eighteen months later she returned with a uterine prolapse and associated incontinence. A ventral fixation of the uterus was carried out with complete relief of the incontinence. In a second case two previous repairs had been done elsewhere. She was first seen here in 1940, at which time a colpoperineoplasty with transverse urethral plication was performed. A recurrent cystocele developed six months later and within ten months the patient has marked urinary incontinence. The incontinence was cured by repair of the cystocele and complete plication. A third patient returned with a large recurrent cystocele and marked incontinence nine months after colpoperineoplasty with transverse plication. An anterior colporrhaphy with complete plication was performed but this patient has failed to return for followup study. The fourth patient in the group had no plication performed at the time of the original operation in 1940. The urinary incontinence soon reappeared. Examination 21 months later revealed no adequate anatomical lesion. X-ray of the lumbosacral spines were negative. Complete plication was carried out without relief. The last patient had a colpoperineoplasty and ventral fixation in 1940. No urethral plication was performed. A year later the patient returned with incontinence. Examination showed a huge entero-

cele and a moderate cystocele. Relaxation of the urethral sphincters was noted on cystoscopic examination. The incontinence was alleviated by complete urethral plication plus colpoperineoplasty.

As seen in Table 4, 15 cases were unimproved following surgery. Complete plication was performed in 4 of these patients and transverse plication in 9 instances. Eleven of these patients were not reinvestigated. Lumbosacral spines had been checked in only one case prior to surgery and they were negative. Two patients had recurrent anatomical lesions, a cystocele and an urethrocele. None of these eleven patients had further operations. Studies were repeated on three patients. In only one of these did cystoscopy reveal relaxation of the urethral sphincters. No spina bifida was present in this case. No adequate anatomical lesions were demonstrated in these three patients and none have been reoperated. The fifteenth case had had a subtotal hysterectomy performed elsewhere 2 years ago. Urinary incontinence developed soon after surgery. Investigation prior to operation here revealed a relaxation of the urethral sphincters but no urethrocele or cystocele. X-ray of the lumbosacral spines was negative for spina bifida. A complete plication and advancement of the urethra was done without effect on the degree of incontinence.

Of the eight cases who were worse following surgery, one has been discussed in the group of five patients who had repeat operations. This patient had no plication at the time of the original surgery but was still worse after complete plication had been carried out at a later date. In the other seven cases, complete plication was performed in three and transverse plication in one. None of these seven patients have been readmitted for reinvestigation. One of the patients returned at seven months with severe incontinence. In a second case, cystoscopic examination revealed redness of the trigone. There was no evidence of spina bifida. A relaxation of the urethral sphincters and a granular urethritis was noted in a third patient. Urethral dilatation was done but the patient failed to return for further follow-up. A recurrent cystocele and urethrocele doubtless explained the incontinence in a fourth case. One of the remaining three patients was definitely neurotic and may have exaggerated her complaints. In another cystoscopy revealed competent sphincters but marked elevation of the trigone.

TABLE I

OPERATIONS - 1940 - 1943 INCLUSIVE

	Incontinence	No Incontinence
Colpoperineoplasty	110	72
Colpoperineoplasty plus ventral fixation	42	27
Colpoperineoplasty Vaginal hysterectomy	42	42
Watkins Interposition Operation	3	4
Urethral plication alone	5	1
	202	146

(348 operations on 342 patients)

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TABLE II

No Incontinence Pre-Operative	146
Urethral plication	72
Returned with some incontinence	4
Re-operated	1
Second operation not indicated	3

- - -

TABLE III

Types of Plication

Complete	76	38%
Transverse	93	46%
None described	33	16%
	202	100%

(202 operations on 197 patients)

- - -

TABLE IV

197 Incontinent Patients

Returned for follow-up	170 (86%)
Of these:	
No incontinence	72.5%
Improved	14.1%
Unchanged	8.8% (15*)
Worse	4.7% (8*)

*Number of patients

- - -

TABLE V

Adequate Anatomical Lesions (urethrocele only in 4)	195
No Follow-up	27
Of 168 followed:	
No incontinence	71.0%
Improved	13.0%
Unchanged	8.9%
Worse	7.1%

- - -

TABLE VI

Incontinence without adequate anatomical lesion	7
At follow-up:	
No incontinence	4
Improved	2
Unchanged	1

- - -

TABLE VII

Results of Plication

	Complete	Transverse	None	Total
No Incontinence	74.2%	70.4%	64.3%	70.9%
Improved	13.7%	14.8%	10.7%	13.7%
Total	87.9%	85.2%	75.0%	84.6%
Unchanged	6.0%	11.1%	7.1%	8.5%
Worse	6.0%	4.0%	17.9%	7.0%

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TABLE VIII

Results by Years

	1940	1941	1942	1943
No Incontinence	69.5%	69.0%	65.7%	75.6%
Improved	13.0%	13.3%	20.0%	10.4%
Total	82.5%	82.3%	85.7%	86.0%
Unchanged	8.7%	8.9%	11.4%	6.1%
Worse	8.7% (4)	8.9% (4)	2.9% (1)	8.2% (4)

- - -

TABLE IX

Previous Plastic Operations	12	After incontinence operation:	
Complete Operation	10	No incontinence	5
Perineorrhaphy only	2	Improved	5
Subsequent pregnancy	3	No follow-up	2

- - -

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III. GOSSIP

I heard George F. Keck, consulting architect, Chicago, speak on "Functional Housing Methods." Modern industry builds a machine and then houses it in a structure which suits the unit. The atom smasher in the rear of the Physics building is an example of this type of functional architecture. The original atom smasher was housed in an airplane hangar, but because of the large sparks which came from the apparatus it was necessary to build a protecting wall about the unit. Mr. Keck believes that we should build our houses around our functional needs and desires. The houses of the future will face south in this climate in order to take advantage of the sun for heating and illumination. The front of the building will be made of transparent glass in the form of double thickness panes with a vacuum between. There will be a projection from the front of the dwelling to obstruct the sun and its rays in the summer and to allow them to come under in the winter time. The angle of this projection will be based on the projection of the sun's rays during the different seasons. The rear of the house to the north will be solid and well insulated. It will contain corridors, storage rooms, garage, etc. The floors will be heated and not the air in the room. It has already been found practical to blow hot air into the floors in the winter time, and cool air in the summer time. There will be no basement or attic. The top of the house will be flat and by turning a faucet it can be covered with several inches of water for cooling purposes. Houses will be built in units with adult quarters to be occupied by the adults, even after the family arrives. Additional units for the children will be added to the side of the main dwelling. They will have their own entrance, and during their adolescent years will live in their own house. Gardens will be grown in front of the windows. Wild life can be observed through the windows by the children from their own rooms. Persons who have lived in these houses, insist that it makes them feel like a day in the spring even during the coldest months. Stairs will be eliminated thus decreasing the number of falls which last year were the commonest cause of accidental deaths. Special methods for securing privacy are devised. Windows can be washed in a minimum of time. Post-war planning will have to extend main streets east and west, and houses will be placed at such intervals that there will be no obstruction to the sun's rays. The planting designs will obscure the view of the house ahead. When the children are grown, their house is shut off and rented separately or detached and moved away. Prefabricated homes of this type will be produced post-war at the rate of 75 a day by one firm which has already arranged a production schedule. It is estimated that it will take between 25 and 50 years to effect this ultimate change in architecture. This and many other interesting things I learned this week at the Center for Continuation Study by sitting in on a course for Hospital Administrators who came to the University to learn about all sorts of things which might affect their work, namely, radio activity, public health, preventive medicine, social planning, distribution of income, cartels, the financial future, neuropsychiatry, humanities in the modern world, development in public administration, localism versus centralized government, measurement of attitudes, of personality, of job possibilities, changes in the American family, changes in the American population, rural sociology, and social reconstruction after the war. President Coffman would have been pleased by another one of his predictions coming true, namely that one day, educated men and women would come back to the University to learn about developments in other fields which affect their daily lives. Interest in the Continuation course in Surgery for May 8, 9, 10 at the Center for Continuation Study is running high. The rehabilitation conference on May 11 will be followed by a course in Public Health Administration on May 12 and 13. Medical Technologists will come May 15, 16, 17. A review course for those who have taken the Kenny Technique training will be held May 22 to June 3. This will overlap with the nurse anesthetists, June 1 to 3. June 19 to 24 inclusive, eight outstanding clinicians and investigators in Infantile Paralysis will collaborate with eight of our members.....