

VESICAL NECK RESECTION FOR NEUROGENIC BLADDER

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THE vesical dysfunction which follows injury or disease of the spinal cord or cauda equina has always presented a problem. The subject received much attention during the recent war and the many civilian accidents today which produce cord injury make it a continuing problem.

In past years the lot of the patient with a neurogenic bladder was unfortunate. If he failed to develop useful automatic control it became necessary for him to wear an undesirable rubber incontinence bag or to be given a permanent cystostomy. In the past decade following the reports of Braasch and Thompson¹ and Emmett,² transurethral resection of the vesical neck has been employed successfully to relieve the major annoyances of neurogenic bladder.

Certain basic facts regarding the anatomy and physiology of the bladder are important. It is composed of smooth or involuntary muscle. The so-called internal sphincter is made up of fibers of the detrusor muscle which are arranged in a circular manner around the bladder outlet. These muscles (detrusor and internal sphincter) receive their nerve supply through the pelvic nerves (parasympathetic) which arise from the second, third, and fourth sacral segments of the cord. Sensory fibers from the bladder are carried over the same nerves. Thus the pelvic nerves may be considered the nerves of micturition. The sympathetic system carries some sensory fibers for pain but the sympathetic nerves are not essential for bladder function which proceeds normally even after division of all sympathetic fibers.

The reflex arc for micturition therefore consists of sensory fibers to the sacral cord which register stretch of the bladder and motor fibers through the pelvic nerve, causing contraction of the detrusor urinae and relaxation of the internal sphincter.

The external sphincter is a striated or voluntary muscle receiving its nerve supply from the external pudendal, a somatic nerve. It is believed that the contraction of the detrusor muscle initiates a reflex which results in relaxation of the external sphincter.

There are centers in the midbrain and cerebral cortex which exert an inhibitory influence on the bladder. Thus, according to Evans,³ bladder function is controlled at several levels. The lowest level is the bladder isolated from all nervous control. The next is sacral reflex action which persists after transection of the cord above the sacral level. Next the midbrain centers coordinate bladder activity at an unconscious level, and finally, centers in the cerebral cortex constitute the highest level of nervous control of urination.

McLellan⁴ has divided neurogenic bladders into four groups.

Group I. **The uninhibited neurogenic bladder** in which there is loss of cerebral inhibition. This may occur in adult patients with enuresis and some brain tumors.

Group II. **The reflex neurogenic bladder**, sometimes referred to as the automatic bladder. This type occurs when there is cord injury above the sacral segments which may be the result of trauma or compression or severe inflammation. Micturition is reflex and may be involuntary. Bladder sensation is abolished.

Group III. **The autonomous neurogenic bladder**. This occurs when the bladder is completely isolated from its nerve supply. It is encountered in lesions of the sacral cord or cauda equina. Bladder sensation is absent.

Group IV. **The atonic neurogenic bladder**. This type results from lesions of the posterior (sensory) sacral roots or when there is interruption of the afferent pathways of the reflex arc. There is complete sensory loss. The most common example of this is the tabetic bladder although it may be seen with diabetes, pernicious anemia, and other diseases involving the sensory pathways of the cord.

Group I may be ignored in this discussion which is concerned with the use of vesical neck resection in treatment. In the other three types, certain prerequisites should exist if transurethral resection is to be considered as a method of treatment.

1. **Residual urine**. This may occur in all three types. It is usually greatest in the atonic and least in the reflex neurogenic bladder although it may exceed 200 cc. even in the latter. Obviously the presence of residual urine indicates the inability of the bladder to empty its contents, a situation which requires relief.

2. **Overflow incontinence** is frequently a result of a large residual urine and may be the patient's most troublesome complaint. Overflow incontinence must be differentiated from total incontinence and from involuntary micturition which may occur in the reflex type of neurogenic bladder. The former generally occurs during sleep or under stress and is manifest by the loss of small quantities of urine. The presence of residual urine is a requisite for diagnosis.

3. **Cystoscopic evidence of neurogenic bladder** must be present. During this examination one may determine sensory loss and whether the bladder is atonic or hypertonic. Increased trabeculation is usually a manifestation of the latter. Observation of the vesical neck establishes the presence of obstruction. The physician must decide if possible whether the lesion is neurogenic or purely obstructive. In older men in the enlarged prostate age group this is not always easy although fortunately the differentiation is not too important as the treatment is the same.

4. One must **allow sufficient time to elapse between an injury to the cord and a decision to resort to transurethral resection**. This is especially true in instances of acute trauma to the cord. Following the initial shock there may be gradual resumption of normal bladder function provided the cord injury is incomplete or due to simple compression which has received appro-

ropriate treatment. Vesical neck resection should be delayed until the extent of nerve injury is finally established and the presence of an appreciable amount of residual urine repeatedly demonstrated.

5. We have not employed **cystometric studies** routinely in selection of cases for transurethral resection. The procedure is not necessary in establishing a diagnosis and the other considerations are more important in selecting cases for operation.

The results of vesical neck resection for neurogenic bladder have been carefully followed in 15 cases. This is a relatively small series but covers a variety of neurologic lesions. We have not included in this group any cases in which resection was performed to relieve urinary retention with large residual urine which occasionally follows the combined abdominoperineal resection for rectal carcinoma. In my opinion many of these are true neurogenic bladders but there are so many other factors involved that it is difficult accurately to classify the cases due to nerve injury alone. All cases of this type, however, have been relieved by transurethral resection of the bladder neck.

Tabes dorsalis. Five patients with atonic neurogenic bladder resulting from tabes have been treated by bladder neck resection. All were men, the youngest 50 and the oldest 63 years old. A large quantity of residual urine was present in each case (the largest 2000 cc.) and overflow incontinence was a troublesome complaint in all but one. Two operations were required in 1 patient to achieve the desired result. In the majority of cases results were exceptionally satisfactory. Three patients consider themselves perfectly normal and in these the residual urine went from 1800 cc. to none, from 2000 cc. to 50 cc., and from 1500 cc. to 100 cc. respectively. Two failures deserve special comment. One who was unimproved following the first resection refused further operation. A second patient who had taboparesis with mental deterioration underwent progressive mental change and was eventually committed to an institution.

Spina bifida. There were 4 patients with autonomous type of neurogenic bladder associated with spina bifida. All had had previous operations for correction of meningocele. The most troublesome complaint was urinary incontinence and 1 had worn a rubber urinal for twenty years. Residual urine was present in all cases, which ranged in amount from 400 to 700 cc., and was in each instance badly infected and ammoniacal. In each of these patients single operation has been carried out. All cases are classified as improved, the conclusion based upon noticeable reduction of residual urine and the elimination of diurnal incontinence. Slight loss of urine during sound sleep may persist. The improved mental attitude of these patients is often striking and their release from a state of social ostracism is gratifying and contributes to the success of the operation.

Herniated intervertebral disk. Two patients with permanent nerve injury (cauda equina) from cord compression due to herniated disk were not relieved of their bladder difficulty following laminectomy and disk removal. One man and 1 woman constituted this group. In each case bladder drainage

by suprapubic puncture cystostomy was performed, followed after an interval by vesical neck resection. Two resections were done in the woman patient. Both were completely relieved and emptied their bladders satisfactorily following removal of the suprapubic tubes.

Spinal cord injury. Two patients had traumatic injury involving the cauda equina. In each instance an autonomous type of neurogenic bladder was present with a large residual urine. Following vesical neck resection both patients were improved with evident reduction of residual urine and satisfactory control.

Retention due to spastic external sphincter. Two cases in this series are worthy of special comment. Each had a neurogenic bladder with urinary retention and a large residual urine. All obstructing tissue was resected from the vesical neck and prostatic urethra. This required two operations in one and three in the second patient. In spite of complete resection neither patient was able to void. Careful postoperative urethrosopic examination in each patient revealed an unusually spastic external sphincter which "snapped" shut as the urethroscope was withdrawn and appeared to remain in spastic closure. This was undoubtedly the explanation of the urinary retention.

Emmett⁵ called attention to a case presenting the same problem and demonstrated the spastic sphincter by means of urethrograms. His patient was not relieved by bilateral section of the pudendal nerves or by anterior rhizotomy of the sacral roots. Relief of the urinary retention finally followed complete division of the cauda equina at the level of the third lumbar vertebra.

Inasmuch as this type of surgery is formidable we conceived the possibility of relieving our patients by weakening the sphincter by sectioning part of the fibers. Accordingly, by means of a specially devised electrosurgical blade attached to the McCarthy resectoscope a superficial sphincterotomy was performed at about 5:00 o'clock on the circumference of the sphincter. The cut was made an estimated depth of one-third to one-half the thickness of the muscle.

The immediate results were encouraging. By compression of the abdominal muscles assisted by some external pressure, the patients were able to void sufficiently to discontinue catheterization and permit them to leave the hospital. A follow-up report however indicates that the late results were unsatisfactory. One patient subsequently developed recurrence of urinary obstruction and has had to resume use of intermittent self-catheterization. The other who is a paraplegic patient has not regained satisfactory urinary control. These cases indicate that at present there is no completely satisfactory treatment for urinary retention due to a spastic external sphincter.

In performing vesical neck resection for neurogenic bladder I have employed the McCarthy resectoscope. I have not found it necessary in all cases to resect the entire circumference of the vesical neck but at least the lower 180° must be carefully resected. In men with even a minor degree of prostatic hypertrophy a complete transurethral resection of the prostate should be undertaken. Multiple resections may be necessary and this is especially true in women where the dictum "too little and repeat" is better than "two much

and regret." I have never seen a vesico or urethrovaginal fistula following transurethral resection in women, but the palpable thinness of the urethrovaginal septum is a constant reminder to proceed with caution.

Summary and Conclusions

In properly selected cases vesical neck resection gives gratifying results in improving patients with neurogenic bladders. In most instances retention can be relieved, residual urine reduced or abolished and troublesome overflow incontinence relieved. Patients are made more comfortable and their care simplified. Although the patient will never have a normal bladder the operation affords the opportunity of leading a more normal existence. The favorable results obtained prove the operation of definite value in the management of patients with neurogenic vesical dysfunction.

References

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