

THE TWELVE O'CLOCK SPHINCTEROTOMY: TECHNIQUE, INDICATIONS, RESULTS

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URODYNAMIC studies, including electromyography of the pelvic floor and voiding cinecystograms (Cardus 1963, Scott, 1967), have proved that many patients suffering from neurogenic bladder disease have an obstruction at the level of the external sphincter. In selected cases transurethral sphincterotomy is therefore the treatment of choice (Ross *et al.*, 1956, 1963, 1967; Smyth 1966; Currie *et al.*, 1970; Koantz *et al.*, 1972; Maxwell 1972).

Based on some anatomical facts of the external sphincter, we will describe a modified, rather simple, but very effective technique of sphincterotomy and discuss the selection of patients and our results.

Technique

Under general or spinal anaesthesia the resectoscope is introduced and the posterior urethra and bladder neck are inspected. Then the resectoscope is drawn back to the verumontanum into the bulbous urethra (fig. 1). Three or four cuts, each 5-6 mm. deep, are made with the loop electrode in the 12 o'clock region only. The cuts usually begin in the middle of the posterior urethra, distal to the bladder neck and end at the beginning of the bulbous urethra. Bleeding vessels are carefully coagulated (fig. 2). The sphincterotomy is sufficient once the bladder neck is visible from the bulbous urethra. A comparison of the ease with which fluid can be expressed from the bladder before and after the procedure gives further information as to the adequacy of the resection. A No. 24 silastic Foley catheter is introduced and usually left in place for two weeks. Figure 3 shows the same urethra one year after the operation; as a result of the sphincterotomy in the 12 o'clock position the contour of the urethra in this area is somewhat similar to a gothic style window and the bladder neck is visible from the area below the verumontanum.

Clinical Material and Indication

Between 1967 and 1972 17 patients from three to 54 years underwent what we call the '12 o'clock sphincterotomy'. Four patients had unsuccessful previous surgery to relieve the outflow obstruction: two T.U.R. of the bladder neck, one of bladder neck and prostate and one of the prostate. Two patients were admitted



FIG. 1

Area of the external sphincter and verumontanum (below) seen from the bulbous urethra before a twelve o'clock sphincterotomy. Note that the bladder neck is not visible.

FIG. 2

Cuts are made in the twelve o'clock area of the external sphincter system.

FIG. 3

The same urethra one year after a twelve o'clock sphincterotomy: the bladder-neck (in the background) and the verumontanum (below) are visible. As a result of the sphincterotomy in the twelve o'clock position the contour of this area is somewhat similar to a gothic style window.

with a Foley catheter, two had a suprapubic tube, and two had a vesicostomy, one catheterised himself intermittently.

According to our micturition studies the urodynamic findings were as follows. five patients voided reflexly but with detrusor-sphincter-dyssynergia, 11 showed no micturition reflex and therefore had to empty the bladder by straining or Credé. Four of them showed sphincter-dyssynergia with increased EMG activity when straining, seven had an unchanged or no recordable EMG activity of the pelvic floor (fig. 4, A).

Since 1973, 18 other patients underwent the 12 o'clock sphincterotomy. As their follow-up is still too short, they are not discussed here in detail.

The cinecystograms of these patients normally showed a wide open bladder neck and a dilated posterior urethra with a constant narrowing of the urethra at the level of the external sphincter (fig. 5, A).

Thus poor flow, despite satisfactory intravesical pressure, increased, unchanged or no recordable EMG activity of the pelvic floor during micturition and a constant narrowing at the level of the external sphincter in the X-ray either due to detrusor-sphincter-dyssynergia or due to, what we consider, a functional obstruction of the membranous urethra at the level of the pelvic floor in patients voiding by straining or Credé, were the characteristic findings and indicated the operation. Such observations clearly demonstrate that also in patients with areflexia, pressure alone will not bring about opening of the membranous urethra, even when there is no contraction of the pelvic floor (Lapides 1958, Woodburne 1960). Concerning fresh paraplegics with unbalanced reflex bladder, being under control of the Rehabilitationszentrum Häring (Austria) by one of us (H. M.), we perform sphincterotomy in these patients not earlier than one year after the injury, as the appearance of reflex function may be delayed for one year and more. Faced with a shortage of beds these patients are released meanwhile. They are instructed to catheterise themselves intermittently at home or their relatives are asked to do this. If then, micturition is still insufficient, the decision is made whether to do a sphincterotomy or to continue intermittent catheterisation.

Results

There were no complications during the operation; haemorrhage could be well controlled by careful coagulation. The immediate postoperative course was entirely uneventful in all patients. They were discharged within six days after surgery with clear urine and indwelling catheter, which was usually removed one week later. Two patients out of 17 had to be readmitted because of late haemorrhage, which could be managed in both conservatively. All patients became catheter-free and could empty the bladder with good flow (figs. 4, B; 5, B; 6).

The long-term follow-up of 17 patients confirms the good results in 15 patients; two needed a respincterotomy. Since 1973, 18 other patients underwent the 12 o'clock sphincterotomy without complication; however, their follow-up is too short to give final results.

However, together with the relief of the outflow obstruction, increased incontinence is not necessarily, but sometimes a more or less expected but undesirable side effect. It could be managed by external catheter, but nevertheless remained an unsolved problem. Recently, we have successfully cured incontinence

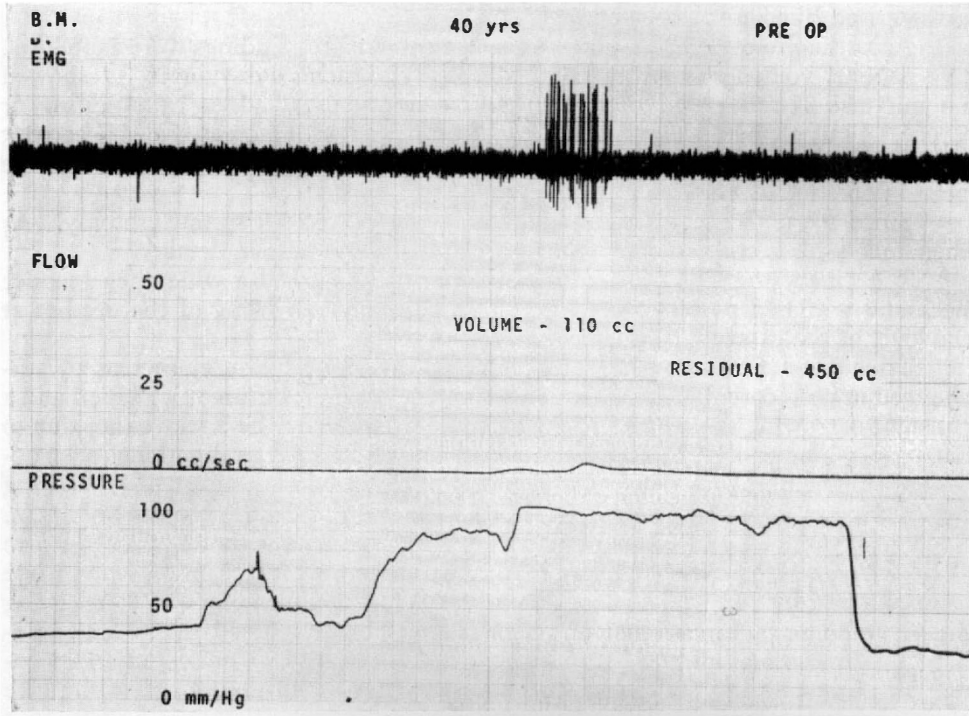


FIG. 4, A

B. M., 40-year-old male traumatic L1 paraplegic since May 1972 with areflexic bladder. Micturition study (25/1/73): poor flow despite high intravesical pressure while straining, poor electromyographic activity of the pelvic floor.

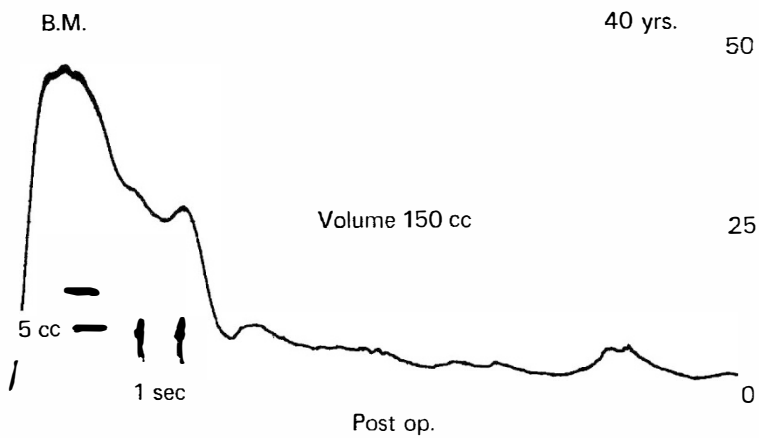


FIG. 4, B

Same patient. Postoperative flow pattern.

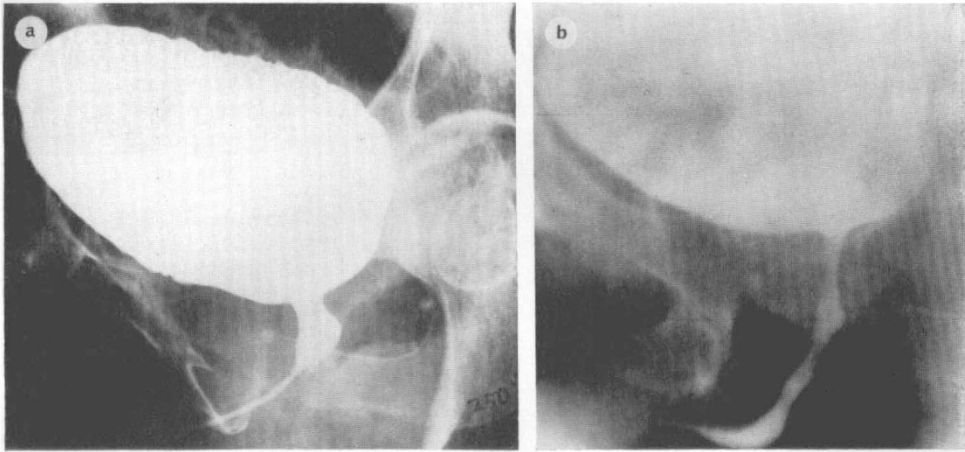


FIG. 5

A, Same patient. Preoperative cystography reveals wide open bladder neck and posterior urethra with constant narrowing of the posterior urethra at the level of the external sphincter. No dye passes this area, neither with nor without catheter in place. B, Same patient. Voiding cysto-urethrogram after transurethral resection of the external sphincter.

by implantation of a newly developed silastic made artificial sphincter, also in three patients of the first 17 cases (Scott *et al.*, 1973, 1974).

Discussion

Contrary to other authors who recommend a sphincter resection at three, nine, and twelve (Ross *et al.*, 1967; Maxwell, 1972) or at three and nine o'clock (Smythe, 1966, Currie, 1970), we consider a sphincterotomy at 12 o'clock as sufficient and preferable. As recently investigated by Oelrich and Sant, the circular striated muscle fibres around the membranous urethra, as well as the longitudinally orientated fibres of the external sphincter, reaching from the posterior urethra up the bladder neck, are greatest anteriorly, traced to its sides and posteriorly the muscle tapers considerably. The relaxation of the external sphincter may be important for the induction of micturition, as it releases the tension on the distal border of the circular smooth muscles. Because of the relative deficiency of the circular fibres and the complete absence of the longitudinal fibres posteriorly, it seems therefore logical to cut the sphincter where it is strongest, in the 12 o'clock region, from the posterior urethra down to the beginning of the bulbous urethra. Similar suggestion were made recently by O'Flynn (1973).

The most frequently reported complication of sphincterotomy is haemorrhage. In contrast to others, who regard the 12 o'clock area as the most hazardous concerning haemorrhage, we believe that this area according to Flocks (1973) and Weyrauch, (1959) contains comparatively fewer and smaller vessels, as bleeding was no problem in our cases, either during or following surgery.

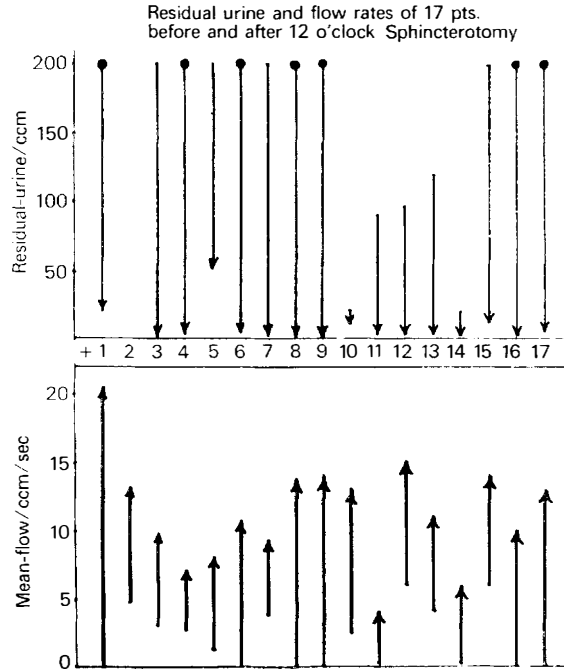


FIG. 6

Pre- and postoperative values of residual urine (above) and flow rates (below). Arrows marked with black dots (above) indicate patients on Foley catheter, suprapubic tube or vesicostomy.

SUMMARY

Outflow obstruction at the level of the external sphincter in patients with neurogenic bladder dysfunction is common and transurethral sphincterotomy the treatment of choice. Based upon the anatomy of the striated muscle fibres forming the external sphincter and its blood supply, we find from our results on 35 patients, 17 of whom had a follow-up of more than three years, a transurethral sphincterotomy only in the 12 o'clock position as sufficient and preferable. The results indicate that this comparatively simple technique is effective in order to diminish outflow resistance at the level of the membranous urethra. Concerning fresh paraplegics with unbalanced reflex bladder, sphincterotomy is usually not performed earlier than one year after the injury.

ZUSAMMENFASSUNG

Viele Patienten mit neurogener Blasenentleerungsstörung haben bei der Miktion eine funktionelle Obstruktion am äußeren Sphinkter in Höhe des Beckenbodens; bei operativem Vorgehen gilt heute die transurethrale Sphinkterotomie als die Methode der Wahl. Auf Grund der Anatomie jener quergestreiften Muskelfasern, die den äußeren sphinkter bilden der Blutversorgung und der Ergebnisse bei 35 Patienten—davon 17 mit einer

Verlaufsbeobachtung von mehr als 3 Jahren wird die Sphinkterkerbung nur bei "12 Uhr" empfohlen. Die Ergebnisse zeigen, daß man mit dieser relativ einfachen Sphinkterotomie-Technik durchaus in der Lage ist, den Widerstand der Harnröhre am Durchtritt durch den Beckenboden ausreichend zu senken. Die Indikation zur Sphinkterotomie wird kurz besprochen. Es wird darauf hingewiesen, daß wir bei frischen Querschnittspatienten mit dem Eingriff normalerweise bis 1 Jahr nach dem Unfall zuwarten.

RÉSUMÉ

L'obstruction de l'écoulement au niveau du sphincter externe chez les malades souffrant de dysfonctionnement neurogénique de la vessie est un phénomène commun et le traitement choisi est la sphinctérectomie transurétrale. Si l'on se base sur l'anatomie des fibres musculaires striées formant le sphincter externe, son alimentation sanguine et nos résultats obtenus chez 35 malades, dont 17 ayant été suivis pendant plus de 3 ans, nous ne considérons la sphinctérectomie transurétrale comme suffisante et préférable que dans la position '12 heures'. Les résultats obtenus montrent que cette technique relativement simple permet efficacement de réduire la résistance à l'écoulement au niveau de l'urètre membraneux.

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