

TREATMENT OF SPASM OF THE EXTERNAL SPHINCTER REGION OF THE URETHRA

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The following is a report on four patients with traumatic paraplegia and one with paralysis agitans. All these patients had difficulty with micturition because of spasm in the external sphincter region of the urethra. The cases will first be considered individually, followed by a general discussion.

CASE 1

F.B., a male aged 15, was admitted to the Somerset Hospital on 4 January 1956. He had dived into a sandbank and was unable to move his arms or legs. X-rays showed a crush fracture of C5 vertebra. He recovered gradually, and ultimately had a slight return of power to the lower limbs and more marked recovery of the arms, with permanent paralysis of the right hand. Continuous catheter drainage was instituted. He had recurrent attacks of fever and acute epididymo-orchitis.

I took charge of the patient on 13 November 1956, 10 months after the injury, and for 6 months he was constantly encouraged to pass urine by removing the catheter periodically. He passed 6-8 oz. at a time, with a residual of about 9 oz., but almost invariably by the evening he developed retention and the catheter had to be re-inserted.

Investigations

Meanwhile, full investigations were carried out, the relevant factors of which were as follows:

Intravenous pyelogram (IVP). Bladder of small capacity, otherwise nothing abnormal.

Cystoscopy without anaesthesia. Sensation was present but diminished. On passing sounds the patient developed an erection of the penis and spasmodic contractions of his legs. The cystoscope could not be passed on account of severe spasm of the external sphincter and the posterior urethra; finally a general anaesthetic had to be given. There was generalized cystitis, with some soft muco-phosphatic calculi in the bladder. The bladder neck appeared normal, with spasm of the posterior urethra. His erections were subsequently controlled by stilboestrol, 10 mg. *t.d.s.* This also allayed the spasms of his legs.

Urethrogram. No dye entered the posterior urethra, but there was insufficient distension of the urethra for the urethrogram to be of real value.

Cystometrogram (aneroid manometer) was within normal limits. Maximum pressure 30 cm. H₂O.

Urethrometrogram showed increased sphincter tone. Fluid escaped into the bladder at a pressure of 70 cm. H₂O.

Course

On 26 February 1957 a pudendal nerve block was carried out with a poor result. The patient refused a pudendal neurectomy when he learned that it might interfere with his power of erection. It was then decided to use the direct local approach.

On 18 June, 18 months after injury, the external sphincter of the urethra was incised through an external urethrotomy incision. The posterior urethra and the membranous urethra were first widely dilated with sounds and then with the index finger. A self-retaining bivalved nasal speculum was introduced, exposing the anterior wall of the membranous urethra, which was then incised and the edges well separated with curved scissors. A 24-F Foley catheter was left indwelling through the external urethrotomy incision and a plug was left in to control the haemorrhage—this plug was removed after a few days.

When the patient was tested a month later his residual urine varied from 4 to 8 oz., but he no longer developed retention in the evening and was left without an indwelling catheter. An IVP on 26 July showed good bilateral renal function. A urethrogram (Fig. 1) taken on 24 August showed a well-dilated urethral tract.

On 3 September he had a small punch operation, when bites were taken at 4 o'clock and 8 o'clock. Thereafter his residual urine fell to $\frac{1}{2}$ -1 oz., and his urine became macroscopically clear.

On 12 November a peri-urethral abscess and fistula, which had developed at the site of the external urethrotomy, were excised. Thereafter there were no further complications. At no time did he develop incontinence. He passed urine with a good, but interrupted, stream. His frequency was every 2 or 3 hours by day, and 0-1 times by night.

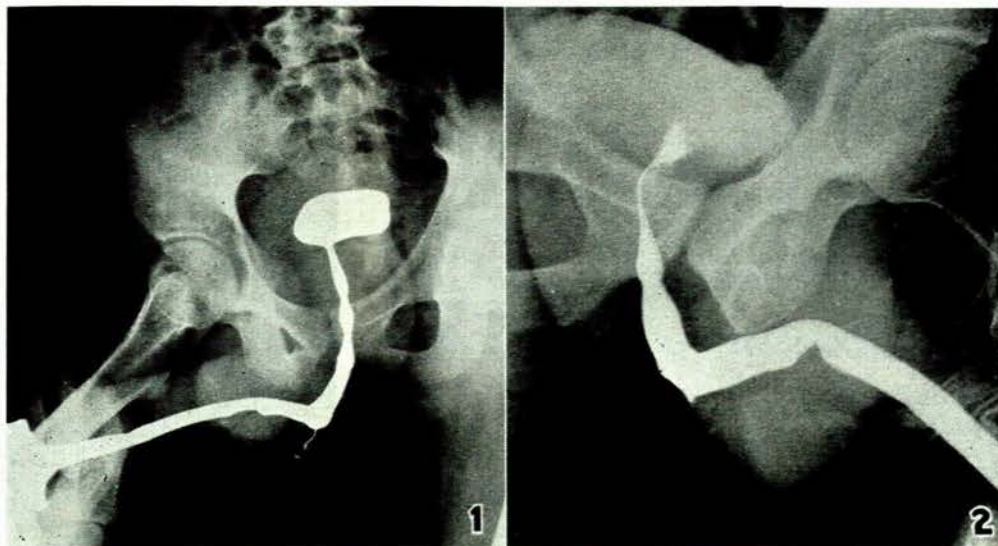


Fig. 1. Case 1—urethrogram, after operation (24 August 1957).
Fig. 2. Case 1—urethrogram, follow-up (16 November 1962).

He was discharged home, and when seen later at the outpatient department, had a residual clear urine of $\frac{1}{2}$ oz.

Follow-up, 10 November 1962

Patient looked fit but thin. Walked with walking-stick.

Micturition:

Frequency— $\frac{D}{N}$: $\frac{\pm 2 \text{ hrly.}}{0-2}$

Sensation—Knew when bladder was full. Started act by light pressure with hand over bladder.

Stream—Varied. Good if large volume.

Incontinence—Nil.

On examination:

Urine—Clear.

Residual urine—Under 2 oz.

Unable to take IVP owing to sensitivity to drug.

Urethrogram—Shown in Fig. 2.

CASE 2

I.B., a male aged 24, was admitted to the Somerset Hospital on 5 September 1956. He had fallen 5 storeys and was unable to move his legs. X-rays of the spine showed spondylolisthesis of L3 and L4 vertebrae, but no lesion at D5, the site of

maximum tenderness. He was anaesthetic from 2 inches below the nipple line downwards and had bilateral Babinski responses. His legs showed no evidence of recovery and repeatedly went into severe flexor spasm. He was treated by continuous catheter drainage. Attempts at natural micturition were unsatisfactory. He also developed attacks of retention and was referred to me on 28 September 1957, more than a year after the accident.

Investigations

Full investigations were carried out.

IVP showed normal kidneys and ureters and a fair bladder capacity, with no relaxation of the bladder neck.

Cystoscopy without anaesthesia showed slight but abnormal sensitivity, no increased trabeculation, and slight relaxation (+1) of bladder neck and posterior urethra.

Urethrogram showed external sphincter in spasm, with no dye beyond it (Fig. 3).

Cystometrogram showed a hypertonic hyper-irritable bladder, with maximum pressure below 70 cm. H₂O.

Urethrometrogram showed marked and persistent spasm at the external sphincter. There was an intermittent escape of small volumes of fluid into the bladder at pressures between 55 and 75 cm. H₂O. At the end of the experiment 60 ml. of fluid were found in the bladder.

Course

The patient was given stilboestrol, with a dosage varying from 1 to 5 mg. *t.d.s.* On removing the catheter he was found to be passing urine well, with fair control and a residual varying from $\frac{1}{2}$ to 4 oz. This was checked at weekly intervals for 8 months. His urine became clear macroscopically. The desire to micturate was sudden and very strong, and the urinal had to be within easy reach to stop him wetting himself. The stream was good, but interrupted. Frequency was every 1-4 hours by day, and 2-3 times by night.

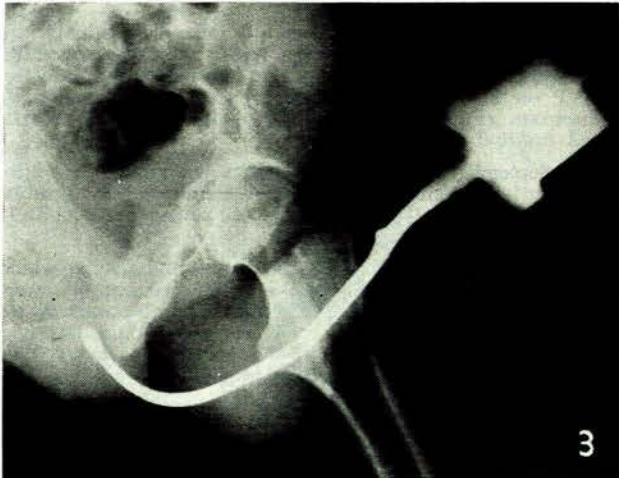


Fig. 3. Case 2—urethrogram, before treatment (19 October 1957).
Fig. 4. Case 2—urethrogram, after treatment (6 September 1958).

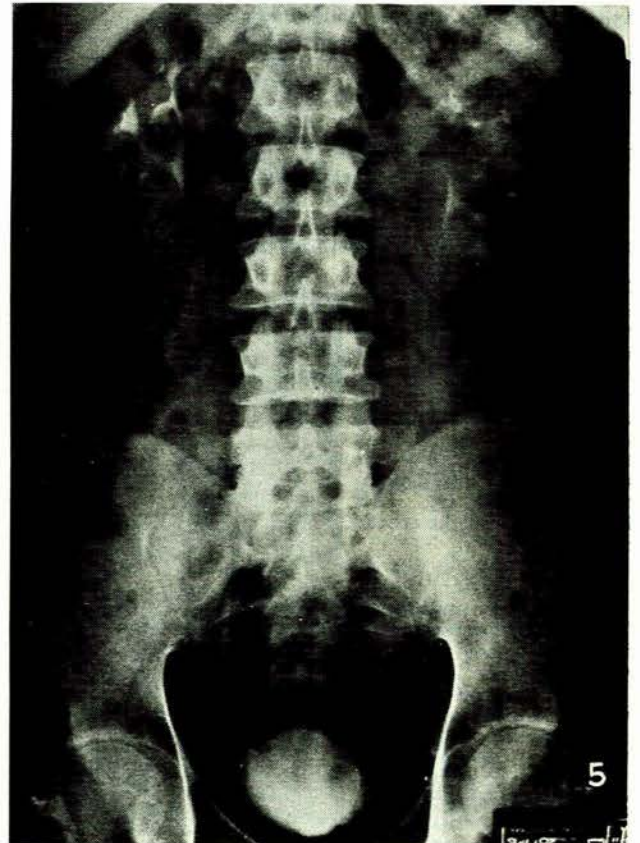


Fig. 5. Case 2—intravenous pyelogram, follow-up (3 November 1962).

A urethrogram taken on 6 September 1958 showed relaxation of the posterior urethra (Fig. 4). The sister in charge thought that the stilboestrol had helped considerably to control the spasms of his legs.

Follow-up, 1 November 1962

The patient looked fit and well and had put on weight.

Micturition:

Frequency— $\frac{D}{N}$: $\frac{2-3 \text{ hrly.}}{2}$

Sensation—He could feel when bladder was full and used pressure with hand over bladder to start stream.

Stream—Good and continuous.

Control—Much better than while in hospital.

He said that spasms of legs still occurred if he moved much, but that they were greatly improved. He had taken no tablets for several years.

On examination:

Urine—Clear.

Residual urine—1½ oz.

IVP—Normal (Fig. 5).

Urethrogram—Shown in Fig. 6.

CASE 3

D.J., a male aged 21, was admitted to the Somerset Hospital on 29 October 1956 with paraplegia, which followed an injury caused by a spraying pump on a farm.

X-rays showed fractures of C7 and D1 vertebrae with subluxation. Both legs were flaccid and paralysed. There was a loss of cutaneous sensitivity below the level of D2. Continuous catheter drainage was instituted, but this was replaced by a suprapubic cystostomy on 13 December, because of acute epididymo-orchitis with rigors. Subsequently, he passed urine

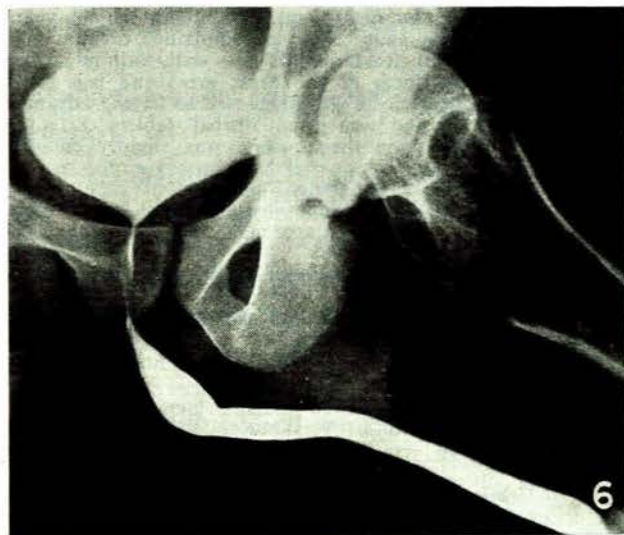


Fig. 6. Case 2—urethrogram, follow-up (3 November 1962).

when the suprapubic tube was clamped, but had a residual that varied between 2 and 12 oz. He also developed intermittent attacks of complete retention.

Investigations

Full investigations were undertaken on 4 June 1957, approximately 8 months after injury.

Cystoscopy without anaesthesia showed that the patient was insensitive to the passage of the instrument, but developed a headache when the bladder was distended. The bladder capacity was reduced and the bladder neck was relaxed. No

undue spasm was noted at the external sphincter. There was a marked cystitis.

Cystometrogram showed a hypertonic, hyper-irritable bladder with a maximum pressure of 90 cm. H₂O.

Urethrometrogram showed a marked spasm at the external sphincter. No fluid escaped into the bladder up to 100 cm. H₂O pressure.

IVP showed bilateral normal kidneys and ureters. The bladder showed a fair capacity with a relaxed bladder neck.

Urethrogram taken on 1 August showed spasm at the external sphincter. A small amount of dye escaped into the bladder, which showed a relaxed bladder neck (Fig. 7).

Course

About 11 months after injury, on 3 September, an incision of the external sphincter by open operation was attempted as in case 1. but the patient bled so freely on incising the bulb of the urethra that this was abandoned after dilating the membranous urethra and the posterior urethra with sounds and index finger. A large Foley catheter was left indwelling. A few months later, on clamping the suprapubic tube, the patient passed urine with a residual varying between nil and 8 oz.

Urethrograms taken on 19 October and on 21 December showed relaxation of the external sphincter and the posterior urethra (Fig. 8).

On 7 January 1958 the operation was repeated. An extensive peri-urethral abscess was excised, external urethrotomy was performed, and the anterior wall of the membranous urethra was exposed and then incised vertically with a diathermy cutting current to lessen bleeding.

Subsequently, the suprapubic fistula failed to close after 14 months of continuous drainage and was excised on 25 February, when some soft stones were removed from the bladder. Thereafter the patient settled down.

For 4 months, at approximately weekly intervals, the residual urine varied from ½ to 4 oz. (usually 2 oz.), and his urine became clear macroscopically. He had good control without incontinence, and passed urine with a good but interrupted stream. His frequency was every 3 or 4 hours by day and twice by night. He became ambulant with the aid of crutches and leg braces, and returned to the farm from where he came. He was subsequently followed-up at the outpatient department, when his urine showed a slight haze and the residual was under 1 oz.

Follow-up, 21 November 1962

Patient looked fit, but thin.

Micturition:

Frequency— $\frac{D}{N}$: $\frac{1-4 \text{ hrly.}}{3}$

Sensation—Knew when bladder was full. Started act by light pressure over bladder.

Stream—Good and continuous.

On examination:

Urine—Clear.

Residual urine—3 oz.

IVP—Within normal limits (Fig. 9).

Urethrogram—Not done owing to oversight.

CASE 4

A.H., a male aged 54, was admitted to Groote Schuur Hospital on 13 January 1962. He complained of difficulty with micturition for 18 months, with urgency and dribbling. Frequency was every 1-2 hours by day and 5 times by night. He complained of haematuria and attacks of fever. He was not impotent. Forty-four years earlier, at the age of 10, he had sustained an accident resulting in partial paralysis of both legs. Nine years earlier (aged 45), he had undergone an

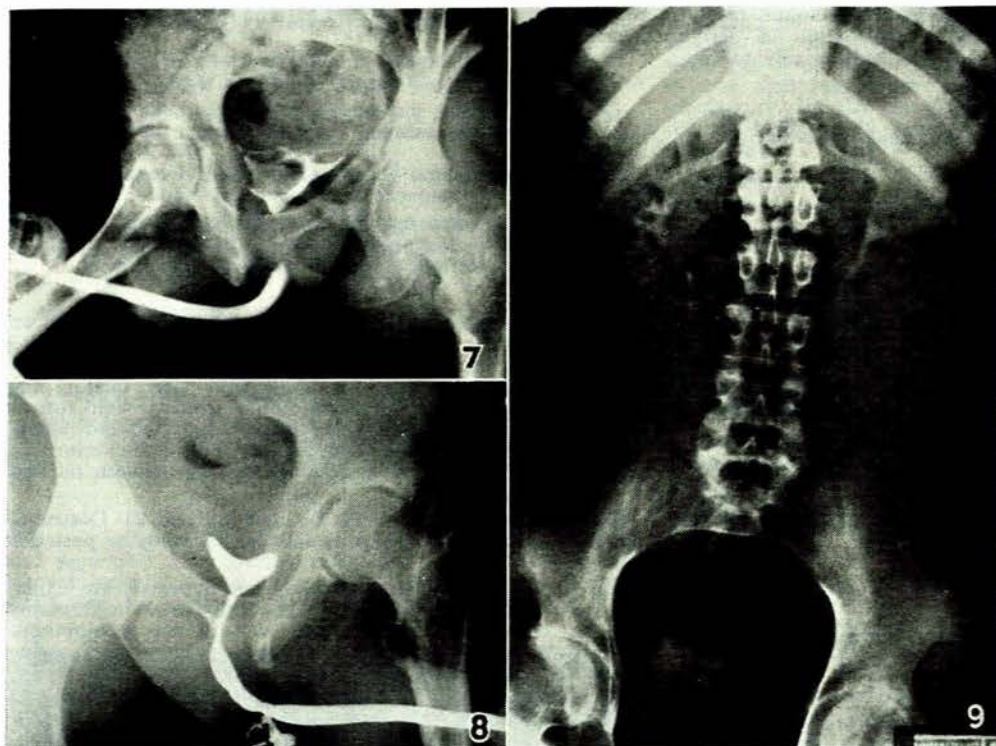


Fig. 7. Case 3—urethrogram, before operation (1 August 1957).
 Fig. 8. Case 3—urethrogram, after operation (21 December 1957).
 Fig. 9. Case 3—intravenous pyelogram, follow-up (19 November 1962).

operation on his bladder for a complaint similar to his present one.

On examination he was a relatively fit man with atrophy and wasting of the lower limbs and flexion deformity. He could walk with the aid of crutches, but was liable to develop flexor spasm of the thigh muscles. There was a suprapubic scar. The prostate was firm and not enlarged. The urine was turbid, with a residual of 7 oz. after micturition.

Investigations

Intravenous pyelography showed dilated calyces on the left side. There was a stone in the bladder region but no cystogram of any value was obtained.

A combined cystogram and urethrogram was performed. It showed marked relaxation of the posterior urethra and spasm of the external sphincter. A cystometrogram was within normal limits, with a maximum pressure of 55 cm. H₂O.

A urethrometrogram demonstrated spasm of the external sphincter, with a maximum pressure of 70 cm. H₂O.

Course

On 26 January a suprapubic operation was performed. An infected diverticulum was removed from the left side of the bladder and a dilated ureter, which was adherent to the diverticulum, was re-implanted in the bladder. The posterior urethra was found to be widely dilated and fixed.

Fourteen days later the residual urine was found to be 10 oz. after clamping the suprapubic tube. At a repeat test using 'carbachol', the residual was 6 oz.

It was decided to remove tissue at the level of the verumontanum and just proximal to the external sphincter. On 23 February a transurethral operation was performed with the cold punch, and tissue was removed at the level of the verumontanum and more distally, at 3 o'clock and 9 o'clock. Seven days later, on clamping the suprapubic tube, the residual urine was found to be 3½ oz. He had some incontinence 5 minutes or so after he had finished micturating.

Three weeks after the first transurethral resection the punch operation was repeated and more tissue was removed

from the roof and sides of the urethra at the same level. Thereafter the residual urine dropped to 1 oz., the stream improved, and the after-dripping diminished. The suprapubic wound closed.

The histology of the tissue removed at the two punch operations was:

1. Smooth muscle and connective tissue. Well-differentiated squamous epithelium and some glandular structures. One fragment contained striated muscle.
2. Active chronic inflammation. Plasma cells, round cells and eosinophils.

Follow-up, November 1962

Patient had died, but unable to ascertain the circumstances.

CASE 5

H.T., a male aged 66, was admitted to Groote Schuur Hospital on 12 January 1962. He complained of acute retention for 4 days. He had previously had frequency (8 - 10 times by

day and 1-2 times by night) and precipitancy for 1½ years. His stream had been good. He also complained of attacks of low backache for 10 years, inability to walk without falling for 1 year, and stiffness of the back, arms and legs for 6 months. On examination he was diagnosed as having advanced Parkinson's disease and was given 'disipal' tablets, 1 t.d.s.

On rectal examination the prostate was slightly enlarged (+1).

On 2 February he had a punch operation.

Cystoscopy showed trigonal hypertrophy, early (+1) trabeculation, no prostatic enlargement and ? bladder neck contracture.

Prostatic tissue was removed all round the clock and he had a bilateral vasotomy.

On 7 February, after removal of the catheter, he still had complete and persistent retention.

A *cystometrogram* on 9 February was not noteworthy, with a maximum pressure of 60 cm. H₂O.

A *urethrometrogram* showed marked increase in external sphincter tone, the fluid overshooting the manometer. A urethrogram showed marked spasm of the external sphincter (Fig. 10).

On 16 February the punch operation was repeated, but on this occasion tissue was removed from each side of the verumontanum only. Subsequently the patient still had complete retention even after administration of carbachol.

On 23 February the external urethral sphincter was cut with diathermy through an external urethrotomy incision as described in case 1. The operation went smoothly and quickly with minimal bleeding. A 24-F Foley catheter was left indwelling through the urethra, and the external urethrotomy incision was plugged. Postoperatively the patient at first voided urine only after carbachol, but afterwards he voided normally and without help.

Three weeks after the operation his residual urine was 3½ oz. There was a certain amount of incontinence owing to precipitancy and inability to reach the urine bottle in time. The external urethrotomy incision healed without trouble.



Fig. 10. Case 5—urethrogram, before operation (9 February 1962).
Fig. 12. Case 5—urethrogram, follow-up (19 November 1962).

Fig. 11. Case 5—urethrogram, after operation (9 March 1962).

A repeat *cystometrogram* on 30 March was essentially the same as before.

A *urethrometrogram* showed a marked diminution in sphincter tone, with maximum pressure of 40 cm. H₂O.

A *urethrogram* taken on 9 March confirmed the absence of sphincter spasm (Fig. 11).

The patient was discharged on 4 April 1962.

Follow-up, 20 November 1962

Patient had retrogressed considerably, now being bedridden, with flexion deformity of his legs. There was persistent dribbling of urine, which was hazy to the naked eye, owing to infection.

IVP. Both renal tracts show slight dilation (+1). Bladder of fair capacity.

On catheterization 12 oz. of urine were found in the bladder, ? residual. After injection of carbachol, 1 ml., the residual urine dropped to 1 oz.

A *urethrogram* was performed (Fig. 12) and showed absence of spasm of the external sphincter and the posterior urethra.

DISCUSSION

Difficulty with micturition owing to spasm of the external sphincter muscle and the adjoining part of the prostatic urethra is a well-known complication of traumatic paraplegia, and the spasm has generally been regarded as being reflex in nature.

Cosbie Ross *et al.* considered that secondary inflammatory changes and fibrosis might also produce a rigidity and obstruction comparable to stricture formation. According to Murnaghan, spasm of the external sphincter is not a common finding in neurogenic disorder of the bladder in parkinsonism. Nevertheless, in the 5 cases reported here, difficulty or inability to micturate was due to spasm of the external sphincter muscle and/or the adjoining part of the posterior urethra. In all these cases, as Band has pointed out, the *urethrometrogram* showed a higher resistance to the flow of fluid than the maximum pressure recorded by the *cystometrogram*. Sometimes the difference was marked: at other times, slight.

A close study of these cases reveals to what extent the function of the bladder varies from time to time in the same patient. In most cases, with the passage of time and with repeated and various treatments, the spinal centres seem to readjust themselves and ultimately to establish a pattern of behaviour that enables the function of micturition to be performed in a satisfactory manner. There are, however, many exceptions.

The standard treatment of spasm of the external

sphincter includes injection of the pudendal nerves with an anaesthetic solution, pudendal neurectomy, injection of alcohol into the spinal theca, and sacral rhizotomy. In addition the direct local approach has been advocated in the past. Donovan punched away the external sphincter in a patient with cauda equina injury. Cosbie Ross *et al.* have reported a series of cases treated by local operation after other methods had been tried and failed. The direct local approach has the advantage of not producing further nerve damage and it does not lead to impotence, thus being of special value in incomplete lesions.

Three procedures have been used in this small series:

1. The punch operation for the removal of tissue at the level of the verumontanum and just distal to this landmark. At this site the operation is simple and almost bloodless. Still more distally, at the level of the external sphincter, the punch operation is fraught with danger from haemorrhage and perforation.

2. The second procedure is incision of the external sphincter under direct vision, using the external urethrotomy approach. Even though my own series is an extremely small one, I consider this operation well worth the effort.

3. Thirdly, there is evidence that stilboestrol may be of value in allaying lower-limb spasm in a young man at a sexually active phase and, under similar circumstances, may also be of value in reducing spasm of the external sphincter of the urethra.

SUMMARY

1. Inability to micturate in traumatic paraplegia and paralysis agitans may be due to spasm of the external sphincter or to excessive tone of the adjoining part of the posterior urethra.

2. Spasm of the external sphincter may be dealt with by sphincterotomy under direct vision, through an external urethrotomy approach.

3. Obstruction to micturition produced by excessive tone in the adjoining area of the posterior urethra is easily dealt with by the punch operation.

4. Stilboestrol may be of value in allaying spasm of the external sphincter and of the muscles of the legs in sexually active young males with paraplegia.

I wish to thank Dr. G. J. Joubert, Superintendent of the Somerset Hospital, and Dr. J. G. Burger, Superintendent of the Groote Schuur Hospital, for permission to publish these cases. I am indebted to Dr. H. van Zyl de Klerk for investigation of cases 4 and 5, and I wish to express my appreciation to Sister H. Doyle of the Somerset Hospital for her endless devotion and skill in the care of the first 3 patients.

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