Review

Development and evaluation of the management of the neuropathic bladder

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The history of the development of the urological management of the neuropathic bladder in spinal cord injury (SCI) patients is both an important and interesting subject though its major part is fairly recent and thus still short.

Little is known about SCI in ancient times, but there is no doubt that most or all SCI patients would have died very soon after injury. The Smith Surgical Papyrus is frequently quoted in this connection: it describes SCI as an ailment not to be treated.¹ This does not exclude that somewhere, someone may have started to catheterise a spinal paralysed master or relative. Urinary catheters have indeed been used for more than 5000 years.²

However, through the last century and the first part of this century, SCI meant an early death. Gradually physicians began to appreciate the importance of urological treatment when they found that urinary problems were amongst the main threats to life.

In 1833 Curling described in the *London Medical Gazette* how he had noticed that in SCI patients urinary retention, bladder distension and overflow incontinence occurred.³ He proclaimed that it was necessary to drain the bladder with a catheter, but admitted that in any event, urinary infection and sepsis would lead the patient to an early end.

During the disastrous World War I, medical services were confronted with large numbers of patients with spinal trauma. Rules for proper bladder management were proposed. Cystostomy or manual bladder expression were presented as alternatives to transurethral catheterisation.^{4–6} But the final outcome for the patient remained unchanged.

Between the Wars tidal drainage, derived from Laver's automatic bladder irrigator,⁷ was propagated again.⁸ The continuous bladder rinse, the rhythmic filling and emptying were meant to lower the incidence of severe urinary infection and to promote early recovery of bladder function, but its use was difficult and problems frequently occurred.

During World War II, a dramatic change in SCI treatment arose from the efforts of a few men, among

whom the leaders were Sir Ludwig Guttmann and Donald Munro. By developing and installing comprehensive patient management, they succeeded in proving that SCI patients, when properly treated and rehabilitated, were often able to return to their family and into society where they could live a valuable and gratifying long life. Very important in this management, was the proper treatment for the spinal shock bladder from the postinjury period. By 'non touch' intermittent transurethral catheterisation (IC) and the use of antibacterial drugs, the rate of urinary tract infection and urinary sepsis could be substantially lowered.⁹ During the following 20 years, this message spread slowly but surely throughout the world.

A little later, clean intermittent self-catheterisation was proposed for different kinds of bladder retention.¹⁰ It was used for SCI patients during spinal shock, also for the longer term treatment. Despite this evolution, the morbidity of urological–nephrological pathology continued to remain high for some time. Chronic pyelonephritis, kidney stones, amyloidosis and secondary hypertension were still among the leading causes of death after SCI in the late sixties and early seventies.^{11–13}

But knowledge increased and methods for the accurate diagnosis and the optimal treatment gradually improved. As a result, urological complications no longer had their dubious first place amongst the causes of mortality from the late 70s, at least for those patients who were treated and followed up in a comprehensive way.

Today, many basic data are known about lower urinary tract physiology and about the pathophysiology caused by a spinal cord lesion. In the acute period of spinal shock, proper bladder drainage by IC is used by most doctors; others prefer a fine bore cystostomy, and a few still use indwelling transurethral catheters. Without doubt, it is best not to leave a catheter in for a long period. If an indwelling drainage is necessary, complications can be limited by strict catheter care. The importance of a team approach to urinary bladder management has been stressed.¹⁴

Following the spinal shock period, a clear diagnosis of bladder–urethral function has to be made. This can be done by clinical studies, but urodynamic investigation is better. Also in SCI patients, efficient lower urinary tract function means a good interaction of the detrusor and sphincter.¹⁵ Dysfunction of either structure and dyssynergic activity between them can be readapted into a dynamically safe unit which permits sufficient continence and reliable micturition in the majority of patients. The basic rehabilitation techniques—suprapubic tapping for the upper motoneuron (UMN) type and or straining/Crédé for the lower motoneuron (LMN) type of neuropathic bladder—continue to be useful, but it is necessary to follow the urodynamic evolution closely.

Pharmacotherapy can be of great help.¹⁶ Intermittent catheterisation (IC) has gained great popularity now also for long term treatment. It is used in LMN lesions and in combination with detrusor relaxing drugs for those with UMN lesions. Long term results have been described and would seem to be satisfactory.

For some patients, despite treatment by the methods described above, results remain poor. They continue to have severe incontinence and/or retention. Their urodynamic parameters may indicate danger for the upper urinary tract. Chronic or recurrent urinary tract infection may occur. In these patients, other forms of treatment require to be used.

To increase bladder capacity and lower the intravesical pressure in the presence of a hyperreflexic or a hypocompliant detrusor, bladder augmentation or substitution with bowel segments can be performed. The late results and complications have to be carefully evaluated, especially as some studies would suggest an oncological risk. To cure outlet obstruction, incision or resection of the external sphincter and/or the bladder neck can be done. The technique of sphincterotomy, originally described by Cosbie Ross (1956), is still used with different variations proposed by different authors.¹⁷ Permanent and non-permanent urethral stents may become a valuable alternative procedure.

When the urethral pressure is very low and severe stress urinary incontinence occurs in a patient with a large flaccid urinary bladder, urethral resistance can be increased by different means. A penile clamp is rarely used nowadays because it endangers the urethra and the penile skin by causing pressure ulcers. The implantable artificial sphincter has found its well defined indications.¹⁸ For symptomatic treatment of urinary incontinence in the male patient, a condom sheath with a collecting bag has been in use for a long time and the modern disposable types which are glued to the penile shaft have become very popular.¹⁹

One of the main problems of urological treatment concerns incontinent tetraplegic women. When intermittent catheterisation is not possible or practical, it is often necessary to use an indwelling catheter. But innovations have appeared, such as the use of electronic means to control urinary voiding and continence and they offer a very valuable alternative form of treatment in selected patients.^{20–22}

Urinary diversions such as an ileal conduit or a cutaneous ureterostomy are much less frequently used than they were some 30 years ago. This is partly due to better primary diagnosis and better primary treatment, with a resulting lowering of the incidence of severe renal complications. But regular follow-up also plays an important role as it permits the discovery of complications or of dangerous dynamic conditions at an early stage.

To conclude, an important change has occurred in the urological management of SCI patients during the past 50 years.

In 1979 Herbert Talbot warned that 'we have come to the end of the beginning. It is time to start to consolidate our gains and bring the message to our colleagues'. In 1995, this would appear to have been in the main achieved, but our efforts must continue. The evolution in urological management will go on. It remains to be seen what the next century will bring.

Looking back, one feels permitted to say: 'a nice job has been done'. Looking to the future one can add: 'but there is still a lot to achieve'.

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