

A Retrospective Analysis of the Presence of Bladder Sensation Following Spinal Cord Injury

Hypothesis / aims of study

The aim of this retrospective study was to evaluate bladder sensation in people with Spinal Cord Injury (SCI). This was done to determine the extent of the population that may be suitable for sensation-dependent bladder emptying, or a self-triggered neuromodulation system to suppress Neurogenic Detrusor Overactivity (NDO). We aimed to assess sensation of bladder filling or fullness, how this sensation is reported as manifesting and whether this reported sensation was reproduced during standard cystometry.

Study design, materials and methods

A retrospective analysis of patients with chronic SCI who had undergone standard cystometry in one spinal cord injury centre was conducted. Reports were analysed to extract information on injury, urological management and bladder sensation.

Before investigation, patients were asked if they have bladder sensation, how this presents and whether it is used in their standard management. The type of sensation was categorised as normal, reduced, bladder pain, absent or as non-specific bladder awareness.

During cystometry patients are asked to record sensation of urge, on a discrete five-point scale [1]. Sensation was considered 'matched to urodynamic findings' where an escalation in score was recorded as the bladder filled or episodes of neurogenic detrusor overactivity were detected at their onset, prior to leakage.

Data was anonymized and then analysed using Microsoft Excel.

Results

Data was collected from 345 urodynamics reports. Of these 345, 17 had infra-sacral injuries and 15 had incomplete records, both were excluded. A SCI population of 313 was analysed, of this population 35% had complete SCI and 65% had incomplete injuries. Patient characteristics are outlined in table 1.

Bladder sensation was present in 77% of the whole group, in 93% of those with incomplete injuries and 45% of those with complete injuries.

Figure shows the type of sensation patients reported as linked to bladder filling. There were 221 records of those with self-reported sensation, of all injury levels, that had been instructed to record sensations during bladder filling. Eighty-seven percent of these reports matched recorded sensations with urodynamic findings. Of those classified as having non-specific bladder awareness (n=51), 67% matched urodynamic findings. Whereas 84% of those with reduced sensation (n=57), 97% with normal sensation (n=108) and 100% with bladder pain sensations (n=5) matched urodynamic findings.

Examples of non-specific bladder awareness included: "sensation of discomfort in lumbar region", "leg and abdominal spasms" and "Autonomic Dysreflexia symptoms with increased spasm". These sensations were prevalent in 21% of the whole group, or in 32% of complete injuries and 14% of those with incomplete injuries.

Interpretation of results

These results indicate that some form of sensation is prevalent in almost all those with incomplete SCI and in close to half those with complete SCI. This builds on previous work that found sensation was prevalent in 100% of incomplete injuries (n=21) and in 82.4% of the patients with complete lesions below T10 (n=34), and 38.9% of the patients with complete lesions above T11 (n=18) [2].

The number of complete patients in whom sensation was reported is high given the 'complete' nature of the injury. However, in two previous studies of bladder sensation following spinal-cord injury results have been similar [2,3]. These data suggest that sensation dependent emptying may be a suitable bladder management option in people with complete lesions. Patients should be thoroughly assessed to confirm that preserved sensation would enable voiding to occur at low, safe, pressures. The range of non-specific bladder awareness sensations reported requires further assessment regarding their precise nature and reliability.

For ongoing management of NDO following SCI, stimulation of the pudendal nerve may be approach available in the future that is able to immediately suppress detrusor contractions. Our results indicate that people with both complete and incomplete injuries may use a system where stimulation is triggered by the user to stop NDO on demand. This approach would avoid the difficult issue of detecting detrusor overactivity in a chronic setting without indwelling catheters.

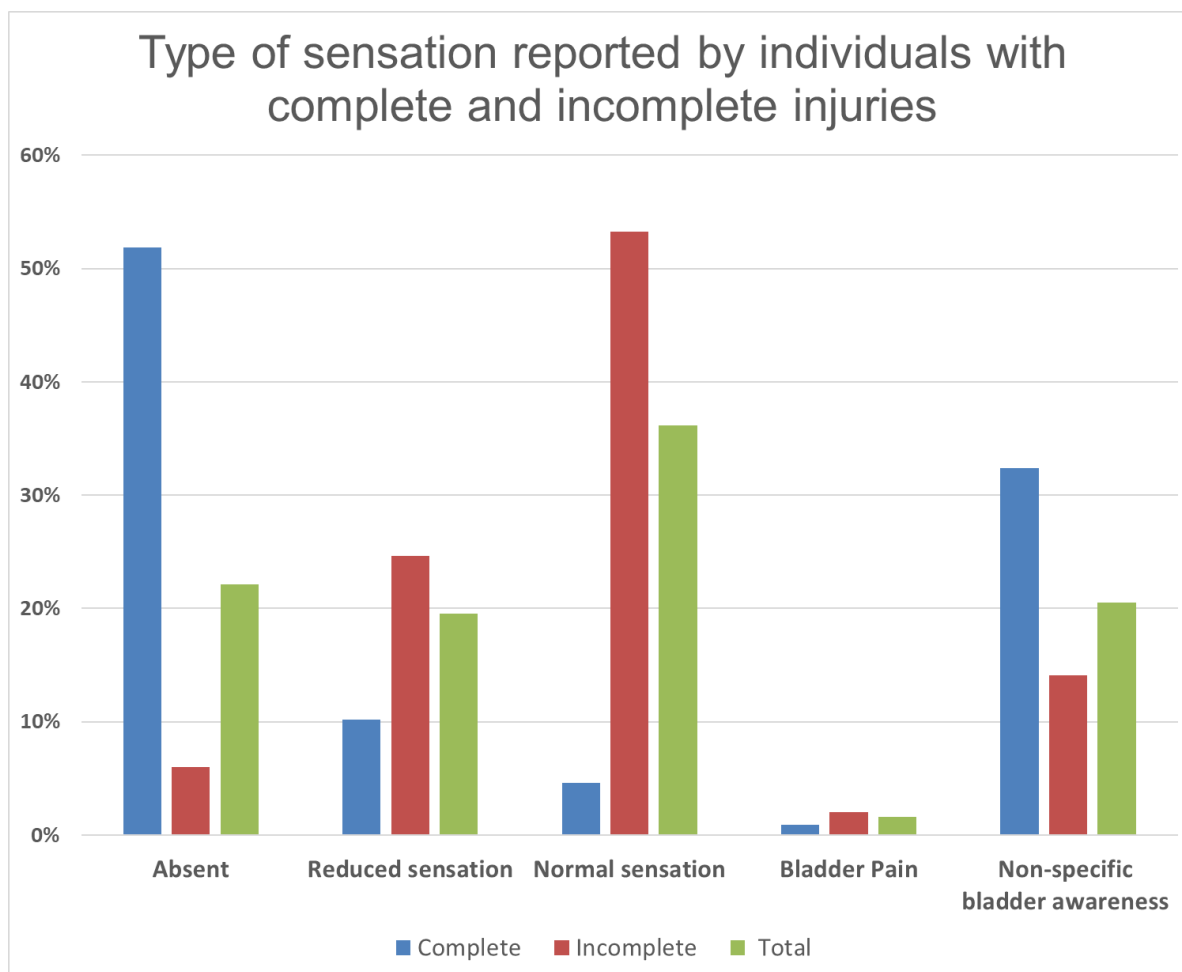
Concluding message

The majority of people with chronic SCI have some form of bladder sensation. This sensation presents in different ways and may not always be reproduced during urodynamic investigation. Determining presence and quality of bladder sensations could open new options for individual bladder management, including those with complete SCI.

Table 1

Age	Mean (std)	50 (17)
Sex	Male	232 (74%)
	Female	81 (26%)
ASIA Grade	A	109 (35%)
	B-D	204 (65%)

Figure 1



References

[1] Craggs MD. Objective measurement of bladder sensation: use of a new patient-activated device and response to neuromodulation. *BJU International*. Blackwell Science Ltd; 2005 Sep 1;96(s1):29–36.

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[3] Wyndaele JJ. Investigation of the afferent nerves of the lower urinary tract in patients with complete and incomplete spinal cord injury. *Spinal Cord*. Nature Publishing Group; 1991 Sep 1;29(7):490–4.