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RESEARCH ARTICLE

CAN WE PREDICT THE RECOVERY OF BLADDER FUNCTION IN SPINAL CORD INJURY PATIENTS – A RETROSPECTIVE STUDY OF 30 PATIENTS

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ABSTRACT

Today mortality from SCI has declined dramatically partly owing to the improved management of urologic dysfunction associated with SCI. Neurogenic bladder dysfunction represents one of the most common and devastating sequelae of SCI.Urinary continence and volitional control of voiding influence a SCI patient's potential for independence and the ability to function in the workplace. Early prediction of bladder function might optimize counselling and patient-tailored rehabilitative interventions. To investigate whether spinothalamic tract preservation and posterior column sparing are predictors of neurogenic recovery of bladder function after spinal cord injury, a retrospective study of case records of 30 patients were done. The results of the ASIA grade at presentation, initial perianal pinprick sensation (PPP) and position sense of the great toes (PGT) were analysed and then compared to the bladder function at 1 year after SCI. ASIA grading gives an idea of the chances of bladder recovery. Both perianal pinprick sensation and toe position sense also gives an idea for predicting return of bladder function. A patient without initial position sense of the great toes will likely not regain volitional voiding, whereas a patient without initial perianal pinprick sensation will definitely not regain volitional voiding.But these clinical tests, cannot predict detrusor hyperreflexia and sphincter dyssynergia. Therefore, urodynamic study remains an essential component of initial urologic evaluation after SCI.

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INTRODUCTION

In the past, renal failure was the leading cause of death after spinal cord injury (SCI). Today mortality from SCI has declined dramatically partly owing to the improved management of urologic dysfunction associated with SCI. Neurogenic bladder dysfunction represents one of the most common and devastating sequelae of SCI. Urinary continence and volitional control of voiding influence a SCI patient's potential for independence and the ability to function in the workplace. Bladder and bowel control is ranked as the highest preference by individuals with complete SCI and is equally ranked as walking recovery by individuals with incomplete SCI. Early prediction of bladder function might optimize counselling and patient-tailored rehabilitative interventions.

AIM

To investigate whether spinothalamic tract preservation and posterior column sparing are predictors of neurogenic recovery of bladder function after spinal cord injury.

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MATERIAL AND METHODS

A retrospective study of case records of 30 patients were done. The results of the ASIA grade at presentation, initial perianal pinprick sensation (PPP) and position sense of the great toes(PGT) were analysed and then compared to the bladder function at 1 year after SCI. Exclusion criteria- age <18y, presenting later than 72 hours after injury, uncooperative patients/attendants, complete injury patients.

Physiology of Micturition in Sci

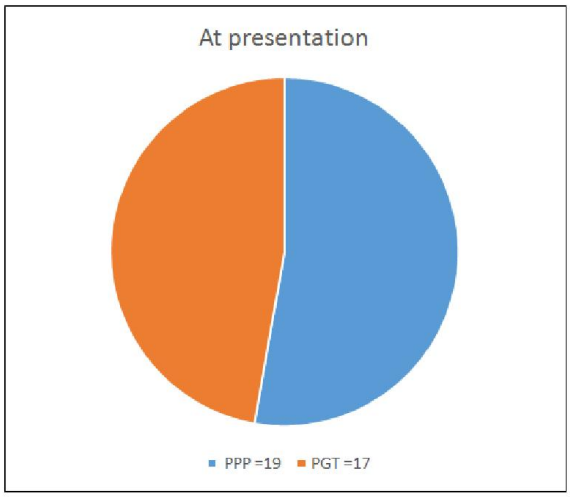
The lower urinary tract has two main functions, the storage and periodic expulsion of urine, which are regulated by a complex neural control system in the brain and lumbosacral spinal cord. This neural system coordinates the activity of two functional units in the lower urinary tract: (1) a reservoir (the urinary bladder) and (2) an outlet (consisting of bladder neck, urethra and striated muscles of the pelvic floor). During urine storage the outlet is closed and the bladder is quiescent, thereby maintaining a low intravesical pressure over a wide range of bladder volumes. During micturition the outlet relaxes and the bladder contracts to promote the release of urine. This

reciprocal relationship between bladder and outlet is generated by visceral reflex circuits, some of which are under voluntary control. Experimental studies in animals indicate that the micturition reflex is mediated by a spinobulbospinal pathway passing through a coordination center (the pontine micturition center) located in the rostral brainstem. This reflex pathway is in turn modulated by higher centers in the cerebral cortex that are presumably involved in the voluntary control of micturition. Spinal cord injury at cervical or thoracic levels disrupts voluntary control of voiding as well as the normal reflex pathways that coordinate bladder and sphincter functions. Following spinal cord injury, the bladder is initially areflexic but then becomes hyperreflexic due to the emergence of a spinal micturition reflex pathway. Studies in animals indicate that the recovery of bladder function after spinal cord injury is dependent in part on plasticity of bladder afferent pathways and the unmasking of reflexes triggered by capsaicin-sensitive C-fiber bladder afferent neurons. The plasticity is associated with changes in the properties of ion channels and electrical excitability of afferent neurons, and appears to be mediated in part by neurotrophic factors released in the spinal cord and the peripheral target organs. After SCI normal functions of the lower urinary tract are lost. The detrusor contracts frequently even at a small bladder volume, which results in urinary incontinence. In addition, the hyperactive bladder can not empty well because the urethral sphincter contracts simultaneously with the bladder (detrusor sphincter dyssynergia), which results in a large residual volume of urine. The malfunction of the lower urinary tract after SCI is caused by remaining and newly emerged bladder and urethral sphincter spinal reflexes. Current treatments have either limited success or troublesome side effects, and many new treatments are under development.

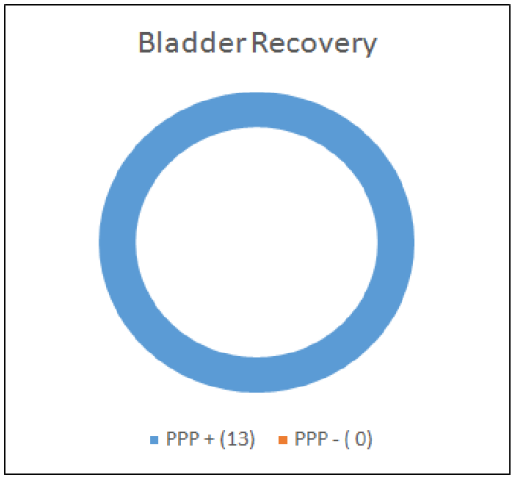
RESULTS

Out of the 30 patients 19 had positive perianal pinprick sensation and 17 patients had positive great toe position sense.

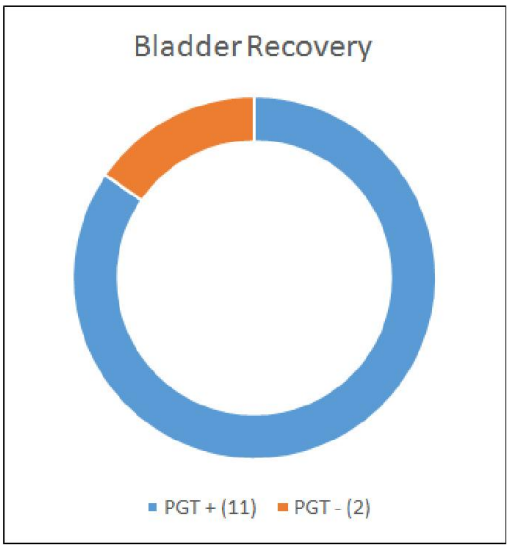
On presentation	number
PPP	19
PGT	17



At the 1-year follow-up visit, 14were voiding volitionally, 13 of the 19 patients with initial preserved perianal pinprick were voiding volitionally, whereas none of the 11 patients who did not have pinprick voided volitionally at 1-year after SCI.

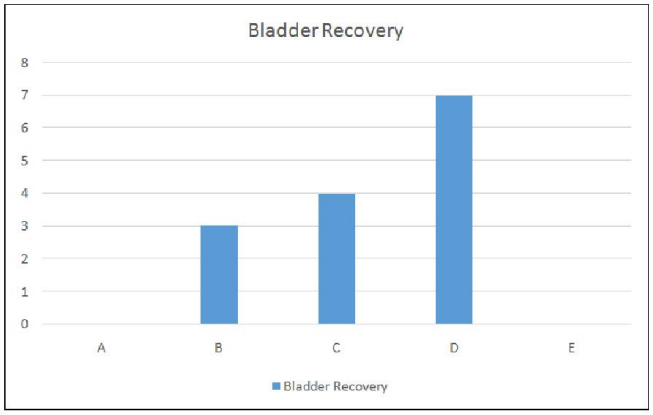


11 of the 17 with initial preserved great toe position sense were voiding volitionally at 1 year, but only 2 of the original 13 without initial toe position sense was voiding volitionally.



There were no patients of ASIA grade A or E in this study. The number of patients with recovery of bladder control were 3, 4 and 7 with ASIA grades B, C and D was respectively.

ASIA grade	number
A	0
B	3
C	4
D	7
E	0



Conclusion

ASIA grading gives an idea of the chances of bladder recovery. Both perianal pinprick sensation and toe position sense also gives an idea for predicting return of bladder function. The negative prediction are noteworthy. A patient without initial position sense of the great toes will likely not regain volitional voiding, whereas a patient without initial perianal pinprick sensation will definitely not regain volitional voiding. But these clinical tests, cannot predict detrusor hyperreflexia and sphincter dyssynergia. Therefore, urodynamic study remains an essential component of initial urologic evaluation after SCI.

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