
Transurethral Sphincterotomy Provides Significant Relief in Autonomic Dysreflexia in Spinal Cord Injured Male Patients: Long-Term Followup Results

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Purpose: An evaluation of the results of transurethral sphincterotomy in spinal cord injured patients for the relief of autonomic dysreflexia is presented.

Materials and Methods: The study describes experience with the treatment of 46 consecutive spinal cord injured males presenting with frequent symptoms of autonomic dysreflexia and inadequate voiding. The selection criteria include patients injured above the thoracic 6 level with subjective symptoms of autonomic dysreflexia who did not want to be catheterized or were unable to perform intermittent catheterization. Patients were studied with complex urodynamics before and at least 3 months after undergoing transurethral sphincterotomy. During cystometrograms the maximum increase in systolic and diastolic blood pressure was recorded. After transurethral sphincterotomy patients were followed for a mean of 5.4 ± 3.1 years (range 1 to 12).

Results: There was subjective relief in autonomic dysreflexia following transurethral sphincterotomy in all patients, which correlated well with a significant decrease in systolic and diastolic blood pressure ($p < 0.0001$). Mean decrease in maximal systolic and diastolic blood pressure after transurethral sphincterotomy was 55 ± 25 and 29 ± 17 mm Hg, respectively. Mean post-void residual urine decreased significantly from 233 ± 151 to 136 ± 0.34 ml after transurethral sphincterotomy. However, there was no significant change in mean maximum voiding pressures.

Conclusions: Blood pressure monitoring during cystometrograms provides an objective assessment of the presence of autonomic dysreflexia due to neurogenic bladder dysfunction, enabling better therapeutic management to control autonomic dysreflexia. Persistence of significant autonomic dysreflexia needs urodynamic evaluation if other factors for autonomic dysreflexia have been excluded.

Key Words: bladder, neurogenic; autonomic dysreflexia; blood pressure; urodynamics

Guttman and Whitteridge reported on the relationship between bladder distention and excessive increase in BP in spinal cord injured patients.¹ Paroxysmal hypertension, referred to as autonomic hyperreflexia with pounding headache, is the usual presenting symptom of autonomic dysreflexia. This is quite often accompanied by profuse sweating above the level of injury, flushing of the face, piloerection, bradycardia and sometimes tachycardia.² It is usually associated with lesions above the level of splanchnic outflow, which is above T6 spinal cord level³ and is most often due to a full bladder. Other less frequent causes include a full rectum, high bowel impaction, ureteral calculi, fractures of long bones and perforated abdominal viscera. It has also been reported during extracorporeal shock wave lithotripsy for the management of kidney stones in SCI patients⁴ and during child delivery in females.⁵ Failure to recognize AD and treat it expeditiously may result in hypertensive seizures and stroke.⁶

Rehabilitation of the neurogenic bladder in spinal cord injury is performed to provide adequate voiding with intermittent catheterization or reflex micturition. The presence of DSD in most of the supraconal lesions is responsible for high intravesical pressure, high post-void residuals and autonomic dysreflexia in higher spinal cord lesions. Intermittent catheterization is the favored mode of treatment but is not always possible due to several reasons including inability to self-catheterize. TURS or stent placement is another option. Electrocautery TURS has a higher incidence of perioperative bleeding and a higher incidence of failure necessitating repeat surgery. Some groups also reported subjective relief from AD in 93% of patients.⁷ On the other hand, our experience with laser TURS has been minimal blood loss during surgery and much lower failure rates compared to traditional TURS. In the present study with CMG and BP monitoring was performed before and after TURS to assess objectively the relief of AD following laser TURS in 46 spinal injured patients.

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Nothing to disclose.

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Editor's Note: This article is the fourth of 5 published in this issue for which category 1 CME credits can be earned. Instructions for obtaining credits are given with the questions on pages 1210 and 1211.

MATERIALS AND METHODS

This is a retrospective study of 46 consecutive male SCI patients who exhibited significant symptoms of AD and had difficulty in voiding. The patients in this study had spinal injury above the spinal level of thoracic 6, and they had exhibited symptoms of AD ascribed to incomplete bladder emptying. Diagnosis of AD was based on a history of repeat episodes of headache accompanied by profuse sweating above the level of injury. This was accompanied by an increase in BP and usually a decrease in pulse rate. To confirm the relationship of AD to bladder distention and inadequate voiding, a CMG study was performed on each patient, and BP was monitored during bladder filling and voiding phase. The study was performed with water infused (50 ml per minute) at body temperature. The CMG study was terminated when the patient complained of severe headache, when systolic BP increased to greater than 160 mm Hg or the patient started passing urine around the catheter.

All patients had complex multichannel urodynamic studies with the same equipment before and after TURS, and simultaneous CMG and electromyogram of the external urethral sphincter were recorded. BP was recorded at the start with empty bladder and during bladder filling, at attempted voiding and also after gentle suprapubic tapping to stimulate voiding. Maximum increase in systolic and diastolic BP was documented. Patients underwent laser TURS.⁸ If needed, vaporization of urethral strictures was also performed at the same sitting.⁹ During followup CMG was repeated about 3 months later to record voiding pressures and adequacy of voiding. During CMG maximum increase in BP was documented. Any subjective symptoms of AD during bladder filling were noted. During followup visits patients were questioned for any subjective symptoms of AD particularly related to voiding. At followup BP was also monitored after stimulating the bladder by suprapubic tapping.

Patients were followed about every 6 months for a mean of 5.4 ± 3.1 years (range 1 to 12). During followup visits residual urine was also documented using an ultrasound recorder (Diagnostic Ultrasound model BV-2500, Bothell, Washington). Urodynamics were repeated only on an individual basis.

Statistical analysis was performed using computer software (GraphPad Prism® 4.0). Data were expressed as mean \pm 1 standard deviation. Comparison of means between the groups was tested using a paired t test and 2-way analysis of the variance ($p < 0.05$ was considered significant).

RESULTS

Of the 46 male patients in the study 31 had no previous transurethral surgery and 15 had more than 1 TURS using electrocautery. Mean age was 47.7 ± 13.2 years (range 24 to 75.0). A total of 31 patients were quadriplegic and 15 were paraplegic (T6 and higher lesions). There were 43 patients with complete motor and sensory lesions (ASIA A and B) and 3 were incomplete (ASIA C).

During CMG the mean maximal systolic pressure before TURS was 160 ± 23 and after TURS was 108 ± 17 mm Hg. Mean maximum diastolic pressure before TURS was 88 ± 15 and after TURS was 62 ± 11 mm Hg. The paired t test

showed a significant decrease in systolic and diastolic BP following TURS ($p < 0.0001$).

Mean decrease in systolic BP and diastolic BP after TURS was 55 ± 26 and 30 ± 17 , respectively. There was also amelioration in symptoms of AD with improved voiding. Mean post-void residual urine decreased significantly from 233 ± 152 to 137 ± 0.35 ml after TURS ($p < 0.0001$). Mean maximum voiding pressures changed from 60 ± 35 to 52 ± 25 but this was not statistically significant. Figures 1 and 2 show the mean maximal increase in blood pressure before and after TURS.

On followup 4 patients still exhibited AD within 1 year of laser TURS, 2 had strictures in the bulbous urethra (from previous electrocautery TURS), and 2 were areflexic and had severe spasticity. Laser TURS was repeated and strictures were vaporized in the 2 patients with marked relief in subjective AD and a significant decrease in BP. Kidney function has been well maintained in all the patients. The majority of the patients who were on α -blockers before TURS were had this replaced with a minimal a dose of 1 mg terazosin at bedtime which most of the patients were not taking after TURS.

Two patients died. One quadriplegic patient with severe spasticity died of cerebral hemorrhage due to the rupture of an intracranial berry aneurysm 2 years after TURS (autopsy confirmed diagnosis). Another quadriplegic patient recently died of pulmonary problems 5 years after TURS.

DISCUSSION

Autonomic dysreflexia usually occurs after the shock phase following spinal cord injury. About 90% of quadriplegics show positive CMG results for AD within 6 months of injury,¹⁰ and it typically manifests with the increase in BP associated with sweating and some decrease in heart rate. AD is usually triggered by full contracting bladder with inability to empty due to DSD. Urodynamics performed early in the rehabilitation phase could help to alert the potential risk of occurrence of AD and prescribe a medical management strategy.

Our previously published study of control nonSCI patients did show an increase in systolic and diastolic pressures during CMG.¹¹ The mean systolic increase was 9.0 mm Hg (range 10 to 18) and diastolic was 6.0 mm Hg (range

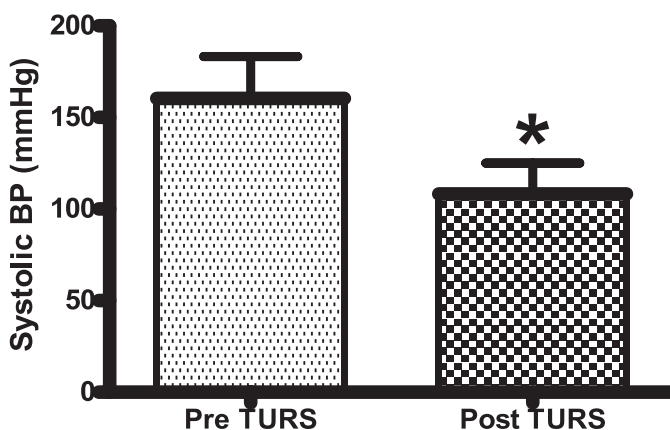


FIG. 1. Mean maximal systolic BP in 46 patients during CMG before and after transurethral sphincterotomy. Asterisk indicates $p < 0.0001$.

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