

## **OUTCOMES AND COMPLICATIONS OF SPHINCTEROTOMY WITH BLADDER NECK INCISION IN NEUROLOGICALLY HEALTHY MALE PATIENTS WITH VOIDING DYSFUNCTION**

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**Summary.-** **OBJECTIVES:** To evaluate the efficacy, complications and outcomes of sphincterotomy with bladder neck incision in patients with voiding dysfunction (VD).

**METHODS:** We evaluated our prospectively established urologic urodynamic database and identified the records of 30 male patients with VD that underwent sphincterotomy between October 1993 and December 2008. The IPSS and urodynamics were analyzed before and after surgery, we recorded the outcomes and complications. Numerical data were analyzed with Student's *t* and Wilcoxon tests ( $p < 0.05$ ). ANOVA was used for the follow up.

**RESULTS:** Thirty patients underwent sphincterotomy with a mean age of 41 years (range 18-63 years). Statistical differences ( $p < 0.05$ ) were found for: maximum flow rate ( $17.61 \pm 7.7$  vs  $23.5 \pm 12.19$  ml/s), detrusor pressure ( $73.53 \pm 21.51$  vs  $47.4 \pm 16.24$  cmH<sub>2</sub>O), maximum cystometric capacity ( $462.74 \pm 224.2$  vs  $382.2 \pm 167.48$  ml), functional urethral length ( $64.3 \pm 22.6$  vs  $42.2 \pm 18.4$  mm), Maximum urethral pressure ( $120.1 \pm 46.8$  vs  $59.23 \pm 22.67$  cmH<sub>2</sub>O), total urethral closure area ( $3315 \pm 1269.7$  vs  $1189 \pm 49.23$  cmH<sub>2</sub>O\*mm) and postvoid residual volume ( $161.3 \pm 177.9$  vs  $57 \pm 100.8$  ml). The IPSS improved and was stable at 60 months ( $p < 0.02$ ). No significant as-association was found to develop incontinence after the procedure.

**CONCLUSION:** Sphincterotomy for male patients with dysfunctional voiding improves voiding dynamics with a low rate of complications and minimum risk of incontinency.

**Keywords:** Sphincterotomy. Dysfunctional voiding. Urodynamics.

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**Resumen.-** **OBJETIVO:** Evaluar la eficacia de la esfinterotomía con cervicotomía en pacientes masculinos con diagnóstico de disfunción miccional (DM) neurológicamente sanos y describir las complicaciones.

**MÉTODOS:** Se realizó un estudio retrospectivo, observacional y longitudinal para evaluar los pacientes masculinos con el diagnóstico de DM, sometidos a esfinterotomía de Octubre de 1993 a Diciembre de 2008. Se evaluó el IPSS y el estudio urodinámico pre y postquirúrgico y la presencia de complicaciones. Las variables cuantitativas con se analizaron mediante T student y Wilcoxon. Se realizó un análisis de la varianza



de Friedman y Q Cochran con  $p < 0.05$  como significativo.

**RESULTADOS:** Treinta pacientes fueron sometidos a esfinterotomía, con un promedio de edad de 41 años (rango 18-63 años). Se encontraron diferencias estadísticamente significativas ( $p < 0.05$ ) para tasa de flujo máximo ( $17.61 \pm 7.7$  vs  $23.5 \pm 12.19$  ml/seg), presión del detrusor al flujo máximo ( $73.53 \pm 21.51$  vs  $47.4 \pm 16.24$  cmH<sub>2</sub>O), capacidad cistométrica máxima ( $462.74 \pm 224.2$  vs  $382.2 \pm 167.48$  cmH<sub>2</sub>O), longitud uretral funcional ( $64.3 \pm 22.6$  vs  $42.2 \pm 18.4$  mm), presión uretral máxima ( $120.1 \pm 46.8$  vs  $59.23 \pm 22.67$  cmH<sub>2</sub>O), área de cierre total uretral ( $3315 \pm 1269.7$  vs  $1189 \pm 49.23$  cmH<sub>2</sub>O\*mm) y orina residual ( $161.3 \pm 177.9$  vs  $57 \pm 100.8$  ml). Para el IPSS se encontró una diferencia significativa con que se mantuvo a los 60 meses ( $p < 0.02$ ). No se encontró una asociación significativa para incontinencia posterior a la esfinterotomía.

**CONCLUSIÓN:** La esfinterotomía con cervicotomía en pacientes masculinos con DM mejora la dinámica miccional con una baja tasa de complicaciones y con mínimo riesgo de incontinencia.

**Palabras clave:** Esfinterotomía. Disfunción miccional. Urodinamia.

## INTRODUCTION

Micturition is a complex phenomenon that includes urethral sphincter relaxation followed by the contraction of the detrusor. Dysfunctional voiding (VD) is the malfunction of this mechanism (1, 2). Dysfunctional voiding is defined as an intermittent and/or fluctuating flow rate due to involuntary intermittent contractions of the peri-urethral striated muscle during voiding, in neurologically normal individuals (3).

Patients with this disease often have a normal voiding sensation and control of micturition process. The bladder can be affected because of the flow resistance at the time of bladder emptying for the inadequate opening of the urethra, this will generate bladder instability. The urodynamic study show a low flow rate with a high post void residual volume with a low, normal or high detrusor contraction also an inadequate drop in the urethral pressure during the detrusor contraction gives an abnormally high close urethral pressure (4,5).

Sphincterotomy was initially performed by Ross et al. for the treatment of neurogenic detrusor sphincter dyssynergia (6,7). From that moment

hereinafter, the sphincterotomy has been carried out onto patients with suprasacral spinal lesions with detrusor sphincter dyssynergia. The objective of the sphincterotomy is to reduce the high pressure of the urinary system in order to stabilize and improve the renal function, prevent urosepsis, reduce the urinary leaking, improve the vesicoureteral reflux and prevent the use of urethral catheters (8,9). This procedure has his peak in the sixties but was until the eighties when the urethral pressure was recorded before and after the procedure showing a drop in the pressure of 33% when the Collins blade was used (10). This give us the idea to make a cut in the sphincter of patients with DV as an option for patients that failed pharmacological treatment.

The propose is to evaluate the efectiveness of the sphincterotomy in male patients with DV.

## METHODS

We performed a prospective, observational and longitudinal study approved by our institutional review board to evaluate male patients DV who underwent sphincterotomy with bladder neck incision between October 1993 and December 2008 in our department.

There were included in the study patients with clinical, radiological and urodynamic diagnosis of DV with the following criteria: International prostate symptom score (IPSS) more than 12 points, urinary tract infections history, failure to pharmacological treatment and an adequate bladder filling perception (micturition reflex). All patients had a multichannel urodynamic study before and after the procedure with a Wiest Jupiter 8000 equipment, according to ICS standars. We excluded patients with urinary tract infection (UTI), coexistence of urological diseases and any illness that contraindicated surgery.

## Technique

All patient had preoperative antibiotic and regional anesthesia, a urethrocistocopy was performed, then with a 20 Fr Sachse urethrotome with half circle blade, a cut at 12 o'clock position all the length from the bladder neck to the bulbar urethra crossing the sphincter with a depth of 6 mm (until the visualization of the periurethral fat or fascia) was performed. Another two cuts in the bladder neck at 8 and 4 o'clock were performed (until the visualization of the pericervical fat) afterwards selective fulguration of bleeding vessels was performed. All patients used a 22 Fr catheter with irrigation for 48 hours.

We evaluated the patients at 3, 6, 12, 18, 24, 36, 48 and 60 months after the procedure with IPSS, complete urodynamic study (six months), and uroflowmetry. The analysed parameters were, maximum flow rate (Qmax), maximum detrusor

pressure (DP max), maximum cystometric capacity (MCC), functional urethral length (FUL), maximum urethral pressure (UP max), total urethral closure area (TUCA) and post void residual volume (PVRV). We record the complications of the procedure.

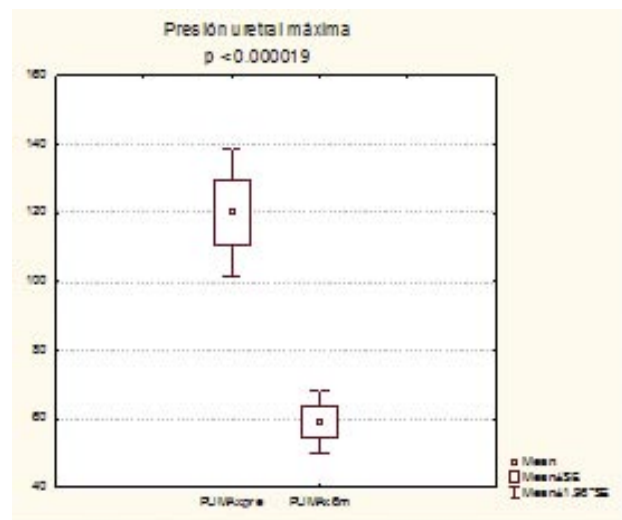
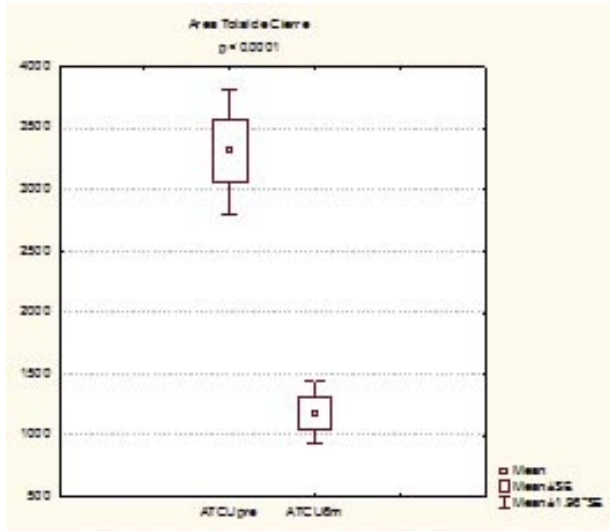
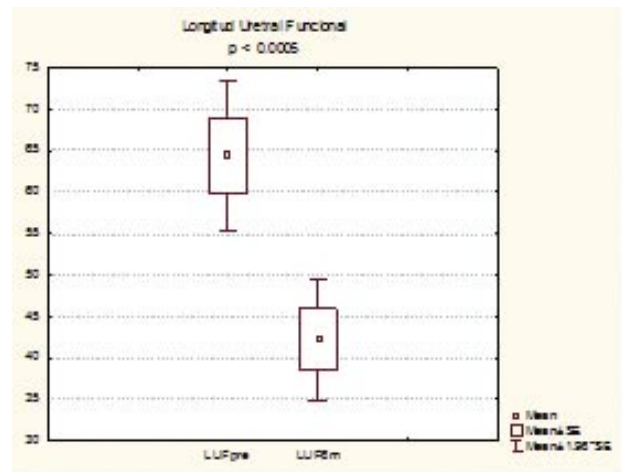
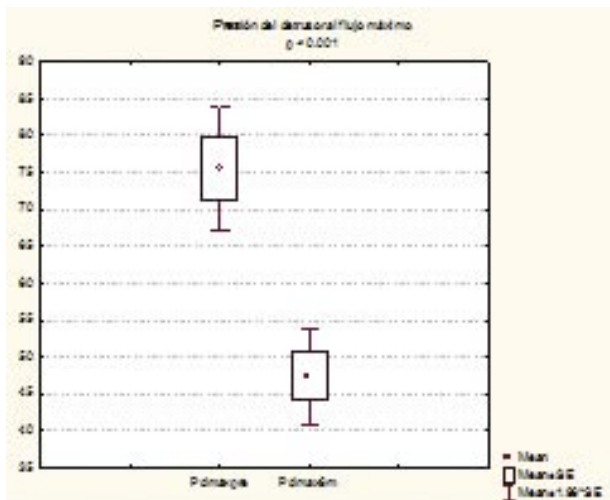
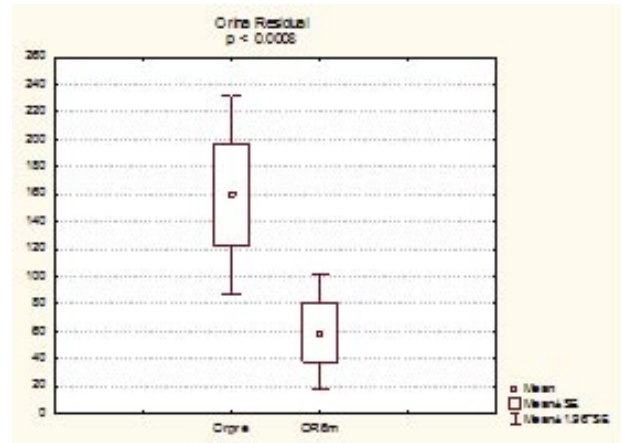
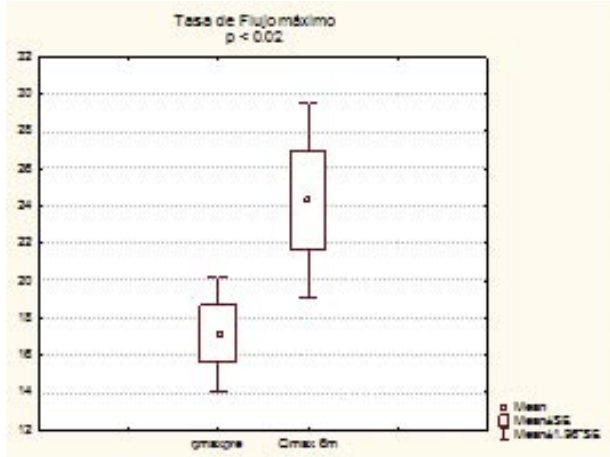


FIGURE 1. Urodynamic parameters before and after the surgery.

Continuous variables were evaluated by Student T test and a Friedman ANOVA. Categorical variables by Q Cochrane, using the statistical package SPSS 17 (Chicago, Illinois). A  $p < 0.05$  was considered statistically significant.

## RESULTS

A total of 56 patients with the diagnosis of DV were treated between October 1993 and December 2008 in our institution. A total of thirty patients underwent sphincterotomy with a mean age of 41 years (range 18-63).

Of the 30 patients we have a complete chart of 27 of them for the analysis. Mean follow up was 28.8 months (range 5-76). All patients had IPSS before and during the follow up (Table I).

All patients had a urodynamic study with DV diagnosis before the surgical procedure and only 24 patients had one at six-months follow-up. We found statistical differences ( $p < 0.05$ ) for Q max ( $17.61 \pm 7.7$  vs.  $23.5 \pm 12.19$  ml/s), detrusor pressure ( $73.53 \pm 21.51$  vs.  $47.4 \pm 16.24$  cmH<sub>2</sub>O), maximum cystometric capacity ( $462.74 \pm 224.2$  vs.  $382.2 \pm 167.48$  ml), functional urethral length ( $64.3 \pm 22.6$  vs.  $42.2 \pm 18.4$  mm), maximum urethral pressure ( $120.1 \pm 46.8$  vs.  $59.23 \pm 22.67$  cmH<sub>2</sub>O), total urethral closure area ( $3315 \pm 1269.7$  vs.  $1189 \pm 49.23$  cmH<sub>2</sub>O\*mm) and post void residual volume ( $161.3 \pm 177.9$  vs.  $57 \pm 100.8$  ml) (Figure 1).

The IPSS evaluation before and after the treatment showed substantial improvement that was maintained at sixty months. ( $p < 0.02$ ) (Figure 2). An ANOVA test was performed for the continuous variables and revealed that for Qmax, post-void

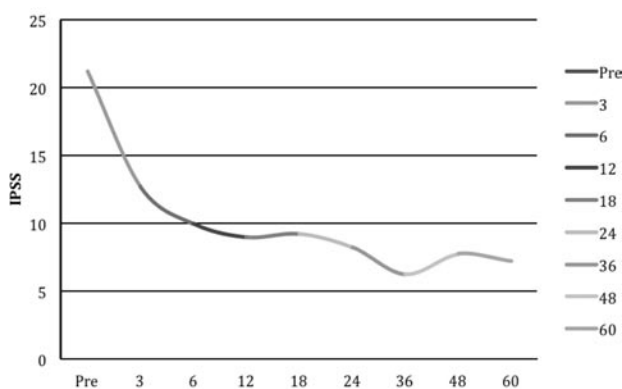


FIGURE 2. Variance of IPSS with Anova Friedman  $p < 0.02$

residual volume and bladder capacity had a statistical differences only at six months but not there after ( $p < 0.05$ ) (Figure 3).

All three patients who had permanent urethral catheterization quit its use after the surgical procedure and they stay without it at one year follow-up.

The turned-up complications were: Three (10%) postoperative bleedings requiring blood transfusion, six patients (20%) with retrograde ejaculation, one (3%) had bladder neck sclerosis that required bladder neck incision, three (10%) had urethral stenoses that required endoscopic treatment, and one (3%) had fluid absorption syndrome that responded to medical management.

All patients were evaluated for the presence or not and characteristics of urinary incontinence in each visit, before the surgical procedure, seven patients had any type of urinary incontinence, of this 71% (5/7), had urgency, after surgery a maximum of 8 patients had urgency at three months, 5 of this patients had this symptom before surgery, so only three patients appear as a symptom, and they recovered all along the follow up. Of the three patients how had stress urinary incontinence after the surgery two were followed until year, of them one referred the use of one sanitary napkin per day, and the other does not used a thing. A Q Cochrane was used to evaluate it, and we do not find association of urinary incontinence with the procedure. Any patient developed total urinary incontinence (Table II).

## DISCUSION

VD implies the inadequate coordination between the sphincter relaxation and detrusor

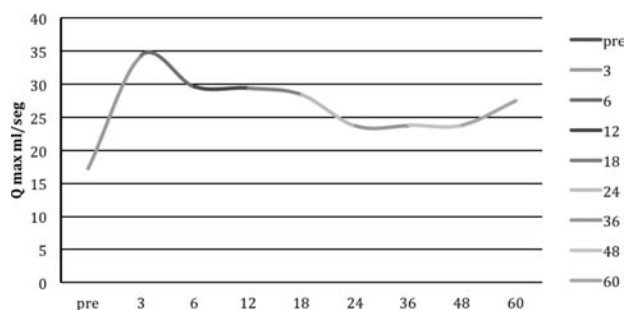


FIGURE 3. A Friedman ANOVA for Q max ( $p < 0.08$ ). B Friedman Anova for post void residual volume (RV), maximum cystometric capacity (CCMax), and voided volume (VV)

contraction, for diagnosis and treatment proposes is important to distinguish if is failure of both components (bladder and sphincter) or only the sphincter. In the first case the is a complex spine lesion, in the second most of the time a neurologic lesion is not found and the patient has a reasonable control of the micturition process.

The etiology of non VD is not clear, it probably depends of a high adrenergic stimulation of the pelvic floor and urethra, favored by stress or psychogenic factors, that predispose to a unspecific prostatitis of the presence of urinary reflux (12,13). VD has not to be mistaken with primary bladder neck obstruction that is noticed in patients with hypertrophy of smooth muscle fibers (14).

The treatment of VD in most of the cases has been limited to antibiotics, anticholinergics, alpha blockers, and Nonsteroidal Anti-inflammatory Drugs; initially the phenoxibenzamine has used with partial response and important side effects (11). Muscle relaxants, pelvic floor exercises, theromotherapy, endo

prosthesis, botulinum toxin, electrical stimulation and physiotherapy has been used with different results (14-20). Sphincterotomy was applied first for patients with suprasacral medullar lesions, Lockhart et al performed this procedure in 60 male patients making a incision at 12 o'clock with a Collins blade, showing a drop of the urethral closure of 33 to 50% (9). After that Barton in a series of 16 patients in which a transurethral resection of the urethral sphincter was performed the maximum urethral pressure drop a range of 63% (8). Reynard et al in a recent methanalysis concluded that sphincterotomy is the standard treatment for patients with neurogenic DSD. At our knowledge this is the first report of the use of this technique in patients with DV.

In our series a total of 26 patients of 56 with the diagnosis of DV respond to the medical treatment (alpha blocker). Thirty patients didn't improve so they underwent to surgical treatment. The subjective evaluation of the patients was record with IPSS having a significantly improvement ( $p=0.02$ ) during the follow up. In the urodynamic evaluation there were improvement in all the parameters, this give us an objective measure to confirm the efficacy of the procedure. Only one patient of 63 year in which the diagnosis could be do to prostate enlargement the diagnosis of DV was consider because the bladder obstructive symptoms were associated with a high maximum urethral pressure (143 cmH<sub>2</sub>O), residual urine of 100 ml, Q max 16.5 ml/s, IPSS 29, with out change in the electromiografity activity during the voiding. Six months after the sphincterotomy the urodynamic study revealed a MUCP of 87.6 cmH<sub>2</sub>O, residual urine of 20 ml, Q max 24.8 ml/seg and an IPSS of zero, this reinforce the diagnosis of DV

The main expected complication for this procedure was the urinary incontinence, Even though, this was not significant as long as the cohort was followed. Before the surgery a total of seven patients had urgency urinary incontinence (UUI), after the procedure this patients continue with UUI but was improved after 6 months of the procedure, UUI could be explained in this patients due the preexistent bladder hyperactivity and the inflammation process. This phenomenon was explained because in our series the TUCA drop in a 70%, this improved the bladder emptying, and a low energy requirement of the detrusor which gives a better control of the bladder activity. (the MDP drop from 73.5 to 47.4,  $p < 0.001$ ). This drop in TUCA of 70% give the patient a total of 30% of the sphincter activity enough to preserve the continence during the bladder filling in which the detrusor pressure doesn't have to be more than 10 cmH<sub>2</sub>O. Of the three patients that developed stress urinary incontinence after the procedure, two of them

TABLE I. PATIENTS CHARACTERISTICS.

| Variable                   | Number      |
|----------------------------|-------------|
| • Patients with VD         | 56          |
| • Sphincterotomies         | 30          |
| • Analysis                 | 27          |
| • Age (range)              | 41 (18-63)  |
| • IPSS before surgery (SD) | 23.5 (7.5)  |
| • History of infection     | 8           |
| • Follow up (range)        | 28.8 (5-76) |
| 3 months                   | 27          |
| 6 months                   | 26          |
| 12 months                  | 18          |
| 18 months                  | 11          |
| 24 months                  | 10          |
| 36 months                  | 7           |
| 48 months                  | 6           |
| 60 months                  | 6           |

VD = Voiding dysfunction, SD= standard deviation.

TABLE II. URINARY INCONTINENCE CHARACTERISTICS.

| Incontinence | Pre<br>n=27       | 3 m<br>n=27      | 6 m<br>n= 26     | 12m<br>n= 18     | 18m<br>n= 11     | 24 m<br>n=10     | 36 m<br>n= 7     | 48 m<br>n=6      | 60 m<br>n=6      |
|--------------|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Si           | 7                 | 12               | 10               | 8                | 7                | 5                | 4                | 2                | 2                |
| No           | 20                | 15               | 16               | 10               | 4                | 5                | 3                | 4                | 4                |
| GT           | 2                 | 1                | 0                | 0                | 0                | 0                | 0                | 0                | 0                |
| E            | 0                 | 3                | 3                | 3                | 1                | 1                | 1                | 1                | 1                |
| U            | 5                 | 8                | 7                | 5                | 6                | 4                | 3                | 1                | 1                |
| T            | 0                 | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                |
| p            | 0.42 <sup>α</sup> | 0.2 <sup>¥</sup> | 0.5 <sup>¥</sup> | 0.3 <sup>¥</sup> | 0.3 <sup>¥</sup> | 0.3 <sup>¥</sup> | 0.4 <sup>¥</sup> | 0.1 <sup>¥</sup> | 0.1 <sup>¥</sup> |

M = months, FD= final drip, S = strain, U = urgency, T= Total urinary incontinence.  $\alpha$ = McNemar,  $\text{¥}$  = Q Cochrane

were followed during one year and only one of them use one pad for protection. The other was followed 60 months and he doesn't use any protection at all.

This is the first report at our knowledge that shows a long term follow up functional evaluation of male patients with VD, that underwent to sphincterotomy.

## CONCLUSION

The sphincterotomy for male patients with DV is a safe procedure that improves the micturition process with a low rate of complications and a minimum risk of urinary incontinence.

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