Mid-Urethral Sling for Stress Incontinence: Does Urodynamic Pressure Reading Affect Post-Operative Outcome?

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Abstract

The aim of our study was to determine the effect of preoperative urodynamic reading of Valsalva leak point pressure on the result of mid-urethral sling surgery. From January 2010 to December 2014, a total of 207 patients underwent mid-urethral sling surgery at the Toronto Western Hospital. An incontinence questionnaire was sent to 94 patients who accepted to be involved in the study to examine satisfaction post-surgery. Forty-five patients replied and were included in the analysis. The patients were divided into three groups according to valsalva leak point pressure (< 60, 60-80 and > 80 cm H2O) determined on urodynamic testing. Of the forty-five patients who responded to the questionnaire, seven were excluded for only having had stress testing done and two were excluded due to intermittent catheterization. Thirteen patients had evidence of detrusor overactivity on urodynamic testing. Simple linear regression analysis was done for the three groups of the Valsalva leak point pressure values and correlation to satisfaction was found -0.263, -0.236, and -0.148, respectively. In this current study, we could not find a relation between valsalva leak point pressure values and the self-reported satisfaction post-surgical correction.

Keywords

Stress incontinence; mid-urethral sling; Valsalva leak point pressure center

Introduction

Urodynamic reading of Valsalva leak point pressure (VLPP) is associated with stress urine incontinence in the absence of detrusor overactivity[1,2]. It is used to classify urine incontinence severity and differentiate between women who have intrinsic sphincter deficiency and those who have urethral hypermobility[3].

However, the use of VLPP value in patients with stress urine incontinence to help in the decision making
to cure the stress incontinence of urine surgically remains undecided partly because the methodology of performing these measurements has not been standardized\(^4\)–\(^6\).

In the current study we examined the role of VLPP in predicting the satisfaction rate in the surgical outcome of female patients who undergo a mid-urethral sling procedure irrespective to the manufacturer of the sling.

**Patients and Methods**

This retrospective study reviewed the charts of 207 patients who underwent mid-urethral sling procedures for stress urinary incontinence from January 2010 to December 2014 at the Toronto Western Hospital. Research ethics board at the University Health Network accepted the protocol. The consent and validated questionnaire (Norwegian Female Incontinence Questionnaire for Urinary Incontinence. Appendix 1) was mailed to 94 patients who accepted to be involved in the study with a prepaid return envelope. Forty-five patients replied and were included in the analysis. Nine patients were excluded, two on intermittent catheterization and seven whom had only a stress test. Patients were divided into three groups according to the VLPP values:

- Group 1: VLPP < 60 cm H\(_2\)O (\(n = 9\))
- Group 2: VLPP 61-80 cm H\(_2\)O (\(n = 14\))
- Group 3: VLPP > 80 cm H\(_2\)O (\(n = 13\))

All patients underwent a mid-urethral sling surgery based on the surgeon’s preference, which are tension-free vaginal tape (TVT) (1), in/out transobturator tape (TOT) (23), out/in TOT (6), single incision TOT (5) and TVT cadaveric graft (1).

**Table 1. Patients demographics**

|                   | Total Number | \(N = 45\) |
|-------------------|--------------|------------|
| Age               | Mean 60 y    |            |
| Questionnaire     | Mean score 18.62 (min 0 – max 51) |            |
| VLPP < 60 cm H\(_2\)O | 9          |            |
| 61-80 cm H\(_2\)O  | 14         |            |
| > 80 cm H\(_2\)O   | 13         |            |
| Excluded          | 2 on CIC    | 7 only stress test done |
| Detrusor over activity | 12 Yes    | 23 Absent |

VLPP: Valsalva leak point pressure

**Figure 1.** Correlation between Valsalva leak point pressure score (< 60 cm H\(_2\)O) and patient satisfaction.
Results

The questionnaire was mailed to 94 patients. Forty-five patients replied and were included in the analysis. Their mean age was 60.2 (42-89) years old. Mean questionnaire total score was 18.62 (score range from 2-40, with questionnaire scoring 0 totally satisfied and 58 totally unsatisfied). Nine patients were excluded. Two on intermitted catheterization and seven of whom had only a stress testing performed. Twelve patients had evidence of detrusor overactivity on urodynamic test (Table 1).

After the simple linear regression analysis, and the correlation variable was calculated it was discovered that patients who have stress urinary incontinence that undergo surgery with a VLPP score of < 60 cm H2O, 61-80 cm H2O, and > 80 cm H2O were found to have a negative correlation variable of -0.263, -0.236, and -0.148, respectively (Fig. 1, 2 and 3).

Therefore, it is concluded for patients with VLPP scores of < 60, 61-80, and > 80 cm H2O that there is a weak negative correlation between the patients VLPP score and their satisfaction.

![Figure 2. Correlation between Valsalva leak point pressure score (61-80 cm H2O) and patient satisfaction.](image2)

![Figure 3. Correlation between Valsalva leak point pressure score (> 80 cm H2O) and patient satisfaction.](image3)
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Pearson's chi-squared test for age and detrusor overactivity categories between VLPP groups showed no significant difference (Table 2 and 3).

### Discussion

Currently there is no clearly defined consensus on the necessity of preoperative urodynamics (UDS) before offering any surgical correction for female patients with stress urinary incontinence. It seems reasonable to perform UDS investigations in patients with mixed symptoms, failed previous surgery, persistent symptoms\(^7\) or with the presence of genital prolapse\(^8\).

In a series reported by Abdel-Hady and Constantine\(^9\) they found high efficacy of TVT as the first choice of treatment for women with stress urine incontinence, including those with low VLPP. In a different study, Spinosa and Dubuis\(^10\) reported effect of VLPP on patient outcome.

McGuire et al.\(^11-13\) suggested that stress incontinence is due to intrinsic urethral sphincteric deficiency if the VLPP was under 60 cm H\(_2\)O.

But in a recent report by Iancu and Peltecu\(^7\), they reported that a low VLPP (usually less than 60 cm H\(_2\)O) on urodynamic studies may be considered to be a risk factor for treatment failure\(^7,14-18\).

In the present study, we include all patients who had evidence of stress urinary incontinence based on patient history and UDS finding. All patients underwent a mini-urethral sling surgery based on the surgeon's preference which where TVT, TOT both autologous, synthetic and /or cadaveric. The purpose of the present study was not to compare the satisfaction of any surgical technique, but our main objective was to correlate the VLPP value with the outcome of the surgical procedure. We divided the patients for this aim according to the VLPP values into three categories: VLPP values (< 60, 60-80 and > 80 cm H\(_2\)O). Despite those categories the VLPP did not show a statistical difference in the outcome of the mid-urethral sling surgery. The Norwegian Female Incontinence Questionnaire for Urinary Incontinence was used to evaluate the postoperative symptoms and it did not show a difference in satisfaction score between different VLPP values.

We are aware of some limitation in this study: it is retrospective. The number of patients was limited small and there were different procedure techniques used in those patients. The questionnaire for the patient satisfaction was done only in the postoperative period.

### Table 2. Simple linear regression analysis between the three groups

| Variable         | VLPP (cm H\(_2\)O) | Number | Mean Rank | Significance |
|------------------|-------------------|--------|-----------|-------------|
| Questionnaire    | < 60              | 9      | 21.55     | P = 0.26    |
|                  | 61-81             | 14     | 13.5      | P = 0.24    |
|                  | > 80              | 13     | 13        | P = 0.15    |
| Mean             |                   | 16.6   | (Min 2- Max 40) |

### Table 3. Chi-squared test for detrusor overactivity categories against Valsalva leak point pressure groups

| Variable         | VLPP < 60 cm H\(_2\)O | VLPP 61-80 cm H\(_2\)O | VLPP > 80 cm H\(_2\)O |
|------------------|-----------------------|------------------------|-----------------------|
| Detrusor Overactivity | Present | 6 | 2 | 5 |
|                   | Absent    | 3 | 11 | 8 |
|                   |           | P = 0.269 | P = 0.265 | P = 0.45 |
| Age              | 40-50     | 1 | 1 | 5 |
|                  | 51-60     | 4 | 7 | 5 |
|                  | 61-70     | 2 | 3 | 1 |
|                  | >70       | 2 | 3 | 2 |
|                  |           | P = 0.818 | P = 0.797 | P = 0.681 |

VLPP: Valsalva leak point pressure

\(^2\) \(P < 0.05\)
Conclusion

We could not find a relation between VLPP values satisfaction outcome of mid-urethral sling surgical correction for stress urinary incontinence.

Conflicts of Interest

The authors declare no conflict of interest.

Disclosure

The authors did not receive any type of commercial support either in forms of compensation or financial for this study. The authors have no financial interest in any of the products or devices, or drugs mentioned in this article.

Ethical Approval

Obtained.

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## Appendix 1

### Norwegian Female Incontinence Questionnaire for Urinary Incontinence

**Pre- and Postoperative Recording**

| Date for questionnaire completion | Patient number |
|----------------------------------|---------------|
|                                  |               |

Please answer all questions.

(Mark yes, no or not relevant for each alternative in question 1)

### 1. Do you leak urine?

- when you cough
- when you sneeze
- when you laugh
- when you walk up or down the stairs
- when you get out of bed
- when you lift heavy objects
- during physical activity (e.g. running to catch the bus)
- during sports
- during intercourse

(Mark only one alternative for each question from 2 - 6)

### 2. How often do you leak urine in relation to physical activity, when you laugh, cough or sneeze?

- Never
- 1-4 times each month
- 1-6 times each week
- Once per day
- More than once per day

### 3. How much urine do you usually leak during physical activity or when you laugh, cough or sneeze?

- Nothing
- Drops/ moist underwear
- Dripping/ wet underwear
- Running/ passes through all your clothes
- Running down your legs or down onto the floor

### 4. How often do you experience sudden and imperious urge to void leading to urinary leakage before you reach the toilet?

- Never
- 1-4 times each month
- 1-6 times each week
- Once per month
- More than once per day

### 5. How large is the amount of urine you usually leak when you experience sudden and imperious need to void and urinary leakage?

- Nothing
- Drops/ moist underwear
- Dripping/ wet underwear
- Running/ passes through all your clothes
- Running down your legs or down onto the floor

### 6. If you experience both the symptoms described in question 2 and question 4, what is troubling you the most?

- Leakage during physical activities more than leakage related to urgency?
- Leakage related to urgency more than during physical activity?
- Equally trouble by leakage related to urgency as by a leakage during physical activity?
- I don't have leakage as described in question 2 or question 4
### Appendix 1 (CONTINUED)

| Question                                                                                      | Options                                                                                   |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| 7. How many incontinence pads do you use?                                                    | □ None □ 1-3 per week □ 4-6 per week □ 1-4 per day □ More than 4 per day                  |
| 8. How many times have you been treated for cystitis the last 6 months?                       | □ None □ 1-3 per week □ 4-6 per week □ 1-4 per day □ More than 4 times                    |
| 9. How often do you avoid activities (e.g. a hobby, physical training or going out) because you are afraid of leaking urine? | □ Never □ Seldom □ Sometimes □ Often □ Always                                              |
| 10. How often do you avoid places and situations where you are aware of that a toilet is not easily available? | □ Never □ Seldom □ Sometimes □ Often □ Always                                              |
| 11. Is your sexual life influenced by your leakage problem? (To be answered before treatment) | □ Not relevant □ Unchanged □ Some deterioration □ Substantial deterioration                |
| 12. Does your urinary leakage influence?                                                      | □ Yes □ No □ Not relevant                                                                 |
| Your vacations?                                                                              |                                                                                          |
| Your family life?                                                                            |                                                                                          |
| Your social life (going out, meeting friends)                                                |                                                                                          |
| Your sleep?                                                                                 |                                                                                          |
| 13. Is your sexual life influenced by your leakage problem? (To be answered after treatment) | □ Not relevant □ Substantial improvement □ Some improvement □ Unchanged                    |
|                                                                                             | □ Some deterioration □ Substantial deterioration                                           |
| 14. Are you satisfied with the result of the treatment you have received to cure your urinary leakage? | □ Very satisfied □ Moderately satisfied □ Neither satisfied nor unsatisfied                  |
|                                                                                             | □ Moderately unsatisfied □ Very unsatisfied                                               |

Please do not fill in. Will be filled in by a physician

| Parameter                                                                 | Value                                                                 |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Date of incontinence surgery                                             |                        |
| Surgeon ID number                                                        |                        |
| Surgical procedure number                                                |                        |
| Number of previous earlier surgical incontinence procedures to cure incontinence |                        |
| Incontinence surgery performed previously in our department             | □ Yes □ No              |
| Incontinence surgery combined with vaginal surgery                       | □ Yes □ No              |
| Number of micturitions/ 24 hours                                         |                        |
| Mean voiding volume (ml)                                                 |                        |
| Leakage during 24 hours pad test (gr)                                    |                        |
| Maximum closure pressure (cm H20)                                        |                        |
| Leakage during stress test (gr)                                          |                        |
| Residual urine (ml)                                                     |                        |
| Maximum flow (ml/sec)                                                   |                        |
| Height (cm)                                                              |                        |
| Weight (kilo)                                                           |                        |
| Date of interrupted and not completed incontinence surgery              |                        |
| Date of tape surgically adjusted                                         |                        |
| Date of tape transected                                                  |                        |
| Date of erosion surgically treated                                       |                        |
| Complication                                                             | □ Yes □ No              |
| Bladder perforation                                                     | □ Yes □ No              |
| Hematoma >3cm                                                           | □ Yes □ No              |
| Superficial wound infection                                              | □ Yes □ No              |
| Deep wound infection                                                    | □ Yes □ No              |
| Catheter >1 week <1 month                                               | □ Yes □ No              |
| Catheter >1 month                                                       | □ Yes □ No              |
| Tape adjusted surgically                                                | □ Yes □ No              |
| Intestine perforation                                                   | □ Yes □ No              |
| Vascular lesion                                                         | □ Yes □ No              |
| Bleeding >500ml                                                         | □ Yes □ No              |
| Urethral lesion                                                         | □ Yes □ No              |
| Pain 0 to 10                                                            |                        |
| Duration of pain                                                        | □ None □ Less than 2 weeks □ 2 to 12 weeks □ More than 12 weeks              |

Other complications:
Tiajeerizjet meteantafe in Slis elbul elajheidi Tatiaerhe oum Nettjefi Umelkamat

Abdulazeez Gazi, Aou Ali elaiada, Mek Abu Zejicaa, Meej Ahmed Bajarx, Meejelt Smirna, Msedej

Ridamoskis A Mejdi Hsone

Quss emissalik elbuli, Mestshif Tounitro elguibie, Tounitro, Kanada
Quss emissalik elbuli, Kanie eljebel, Gammous elmek elbul elaziz, Gje, Mellk elguibie elmsoudie

Elmstjel. Feh fah beht تم دراسه العلاقه بين ضغط المثانة في سلس البول الإجهادي وتقسيم المرضى إلى ثلاث مجموعات
اعتمادا على الضغط أثناء عمل ديناميكي البول ومن ثم معرفة مدى تأثير نتائج قراءة ضغط المثانة على نتائج عمليات شريط
المثانة في كل مجموعه.