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Can the Preoperative Value of VLPP and MUCP Predict the Postoperative Quality of Life?

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Abstract
Objective: The aim of this study was to determine whether low values of VLPP (Valsava Leak Point Pressure) and low values of MUCP (Maximal Urethral Closure Pressure) before operation can predict quality of life (QOL) after anti-incontinence surgery.

Methods: 72 stress incontinent women were included in this study. All women underwent anti-incontinent surgery. We compared the quality of life using I-QOL (Incontinence Quality of Life) assessment with parameters of urodynamic measurement VLPP and MUCP. The women filled in an I-QOL questionnaire before surgery and three month afterwards.

Results: As in other studies, low preoperative value of the VLPP $\leq$ 60 cmH_2O was not related to a statistically lower quality of life (average I-QOL for VLPP $\leq$ 60 cmH_2O was 38.4 and 48.9 for VLPP $>$ 60 cmH_2O). We did not find statistically significant lower quality of life in women with MUCP $\leq$ 20 cmH_2O (average I-QOL 38.2, and for MUCP $>$ 20 39.7). The quality of life was significantly changed after successful anti-incontinent operation, but independently of the preoperative value of VLPP or MUCP, average I-QOL for VLPP $\leq$ 60 cmH_2O was 81.5 and 82.8 for VLPP $>$ 60 cmH_2O, for MUCP $\leq$ 20 cmH_2O 79.5, and 86.4 for MUCP $>$ 20.

Conclusions: Low preoperative values of MUCP and VLPP did not correlate with QOL. Preoperative VLPP and MUCP do not predict the QOL after anti-incontinent surgery.

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Introduction

In 2002 the ICS described urinary incontinence as a condition with any involuntary leakage of urine. Urodynamic stress incontinence is defined as the involuntary leakage of urine during increased abdominal pressure, in the absence of a detrusor contraction [1]. For accurate diagnosis of the type of urinary stress incontinence other methods such as profilometry and leak point pressure measurements are used. The use of profilometry for diagnosis of urethral urinary incontinence is still under discussion. MUCP (Maximal Urethral Closure Pressure) is the most frequently used parameter for the description of urethral function.

MUCP is generally lower in women with stress incontinence, but the values widely overlap [2]. MUCP lower than 20 cmH_2O and VLPP under 60 cmH_2O is a predictor for ISD (Intrinsic Sphincter Deficiency) [3].

VLPP is described as a simple and cheap method to determine ISD in incontinent women [3]. Based on the VLPP value McGuire divided incontinent women in the three groups: VLPP $>$ 90 cmH_2O – women with hypermobility of the urethra, VLPP = 60–90 cmH_2O – incontinent women with hypermobile urethra and ISD, and the group of VLPP $\leq$ 60 cmH_2O – incontinent women with ISD. VLPP and MUCP do not correlate with each other [4, 5, 6, 7]. Design of VLPP has not been standardized to date.

Generally, women with a value of VLPP $\leq$ 52 cmH_2O are older and have undergone hysterectomy, prolapse surgery or an anti-incontinent operation in their history [8]. We can propose that a low value of VLPP associates strongly with severe stress incontinence [8, 9].

Urinary incontinence significantly affects the quality of life. Measurement of the quality of life is very important in the investigation of disease severity and in surgery outcome measurement. It is very important to find the correlation between the subjective quality of life and objective results of urodynamic measurement as MUCP and VLPP.

Nitti [9] classifies stress incontinent women in accordance with VLPP, as does McGuire [3]. The value of VLPP $\leq$ 60 cmH_2O correlates strongly with the degree of stress incontinence. Nitti confirmed that subjective assessment of degree of urinary incontinence according to the questionnaire Seapi-QMN can predict VLPP $<$ 60 cmH_2O, consequently ISD [9]. In addition, a VLPP less then 60 cmH_2O was used to indicate severe intrinsic sphincter deficiency. There is an increasing realization that it is important not only to assess symptom severity using objective investigations but also to evaluate the impact of these symptoms on QOL. The subjective degree of stress urinary incontinence seems useful in predicting the likelihood of a low VLPP and thus ISD [9]. Other authors do not agree and claim that the subjective QOL of incontinent women does not correlate with urodynamic parameters [3, 6, 10]. These authors used correlation between VLPP and the degree of urinary incontinence measured by the pad weight test (PWT), the miction diary and QOL measured by IIQ7 (short form of the Incontinence Impact

Questionnaire) and UDI6 (short form of the Urogenital Distress Inventory). The symptom scores and QOL measures lack correlation to urodynamic measures and are inadequate predictors of the urodynamic outcome [6, 11].

Previous studies have demonstrated that low MUCP and VLPP do not correlate with lower QOL.

The aim of this study was to determine whether low values of VLPP and low values of MUCP can predict quality of life after anti-incontinence surgery.

Material and Methods

72 women with stress urinary incontinence were included in non-randomized, prospective observational, open label longitudinal study. All patients fulfilled the criteria for stress incontinence according the ICS definition 2002 [1]. All women underwent urogynaecological surgery, TVT (61) or opened Burch colposuspension (11). These selected women attended our urogynaecological out-patients‘ unit between January 2003 and May 2005. Patients with significant pelvic organ prolapse (prolapse stage II-III using POP-Q system [12]) and with mixed urinary incontinence were excluded. Before surgery these patients underwent urogynaecological examinations, covering medical history, the questionnaire I-QOL (standardized questionnaire Incontinence Quality of Life by Donald L. Patrick [13]), gynaecological examination, ultrasonography, urodynamic measurement and stress test. The urodynamic measurement was performed on Dantec duet in litothomy position. It covered filling cystometry, profilometry, uroflowmetry. We used a three-way catheter: PVC Richard Wolf Stress-profile Catheter 12Ch. The patients were subdivided according to preoperative values VLPP and further then according to MUCP into these groups: VLPP $\leq$ 60 cmH_2O, VLPP > 60 cmH_2O and MUCP > 20 cmH_2O, MUCP $\leq$ 20 cmH_2O. The comparison of QOL for each group was performed. The control examination was carried out 3 month after surgery.

VLPP was assessed during perineal US examination. We recorded Valsava manoeuvre using translabial colour Doppler imaging of the lower urinary tracts, which allows the documentation of fluid leakage from the bladder [14]. Translabial colour Doppler ultrasound can reliably demonstrate urinary leakage from the bladder through the female urethra on Valsava manoeuvre or coughing in comparison with traditional fluoroscopy imaging [15]. The sensitivity of CDV (Colour Doppler Velocity) was increased by using an ultrasound contrast medium (Levovist).

During the ultrasound examination simultaneous recording of the abdominal pressure was provided. The measurement of the abdominal pressure was performed on a special transrectal balloon catheter. The ultrasound video signal was digitalized by a frame grabber card and displayed on a computer screen. The abdominal pressure was simultaneously recorded with ultrasound signal, and the value of the pressure was superimposed on the ultrasound picture. These pictures were stored in a computer for analysis by slow-motion playback. During each 25-second pressure measurements were provided, and for each measurement one ultrasound picture was stored. Each patient was asked to push and slowly increase abdominal pressure (Valsava manoeuvre) till a leakage of urine appeared. Afterwards the patient was asked to gradually increase the coughing effort until leakage was observed. Each manoeuvre was repeated three times. The beginning of the urine leakage and its pressure and the appropriate intra-abdominal pressure was ascertained exactly from the stored ultrasound pictures by analysis of the slow motion playback. Slow motion playback was preferred because the average reaction time of an operator during on-line measurement was 0.4 s (the reliability of the measurements was tested prior the study). This relatively long time before the beginning of the urine leakage did not allow an exact ascertainment of LPP, especially during coughing. The perineal and introital ultrasound examinations were performed on patients in supine position by Acuson 128 XP10, curved array probe 5 MHz and vaginal ultrasound probe 7.5 MHz. The bladder was filled with 300 ml of sterile saline during US examination.

All women had a positive stress test accompanied by urine leakage during the Valsava manoeuvre. Women filled in the I-QOL questionnaire before the surgery without assistance from medical staff. MUCP in one patient was measured wrongly, and one patient did not fill in the questionnaire before surgery. We examined the patients three months after surgery. This included having them fill in the I-QOL questionnaire, a subjective evaluation, gynaecological control, urodynamic measurement, US examination.

Statistical processing: The data were covered, like the averages, with a standard deviation (SD), in case of expressively unequal disposition as median with quartile range (QR). The continuous variables in two groups of patients were dealt with by means of a *t*-test or Wilcoxon selected as appropriate: in several groups the ANOVA or Kruskall-Wallis test methods were employed. Pairing tests were performed: pairing t-test or more precisely pairing Wilcoxon test.

The significance was determined at the level of 0.05 for all tests. All analyses were undertaken with the statistic software R, version 2.1.1 (www.r-project.org).

Results

The average age in the study group was 57.7 years (SD=10.9), average BMI 27.2 (SD=4.5), and the average parity 2.0 (SD=0.6). TVT (61 women) was the most frequently performed urogynaecological operation. 11 women underwent Burch colposuspension. Only 6 women had already had an urogynaecological procedure in their history (2 Burch colposuspension, 4 vaginal wall repairs). The group VLPP $\leq$ 60 cmH_2O is made up of 60 women (83% of the total) and the group of VLPP $>$ 60 cmH_2O comprises 11 women (15% of total) (Table 1). The average I-QOL in the group of VLPP $\leq$ 60 cmH_2O was 38.4 (SD 21.8), while in the group of VLPP $>$ 60 cmH_2O the average was 48.9 (SD 14.7). However, the difference between these groups is not significant at the 0.05 level of statistic significance (*t*-test, p-value 0.0606).

Furthermore, before surgery 28% of women had MUCP ≤ 20 cmH_2O, and 72% had MUCP > 20 cmH_2O. The group of MUCP ≤ 20 cmH_2O had an average of I-QOL 38.2 (SD 21.6); the group of MUCP > 20 cmH_2O reached a similar average of I-QOL 39.7 (SD 20.2). The difference is not statistically significant at the 0.05 level of significance (*t*-test, p-value 0.7967) (Table 1). The quality of life of stress incontinent women does not depend on the value of MUCP or VLPP.

We placed any women with MUCP ≤ 20 cmH_2O in the group of VLPP > 60 cmH_2O (Table 1).The comparison of the average values of the combination of the elements I-QOL, VLPP and MUCP by ANOVA did not demonstrate any difference between the groups mentioned (p 0.2392), and neither did the Kruskall-Wallis test (p 0.1846).

If we make a group of women just with TVT operation the result are identical. The difference of the value of MUCP before a after surgery is not statistically significant (*t*-test 0.7250 and Kruskall Wallis test 0.7117) as well as VLPP (*t*-test 0.1908 and Kruskall Wallis test 0.4222) (Table 2).

Table 1 – Comparison of I-QOL for both VLPP and MUCP, before surgery

VLPP	MUCP ≤ 20 cmH_2O	MUCP > 20 cmH_2O	total
Count in the group			
≤ 60 cmH_2O	19.0	41.0	60.0
> 60 cmH_2O	0.0	11.0	11.0
total	19.0	52.0	71.0
Mean of I-QOL			
≤ 60 cmH_2O	38.2	37.3	38.4
> 60 cmH_2O	–	48.9	48.9
total	41.5	39.7	40.0
Median of I-QOL			
≤ 60 cmH_2O	41.5	30.7	37.5
> 60 cmH_2O	–	47.7	47.7
total	41.5	39.2	39.8

ANOVA p-value=0.2392, Kruskall-Wallis p-value=0.1846

Table 2 – Comparison of I-QOL for both VLPP and MUCP, before and after surgery in TVT group

	Before surgery			After surgery			Mean	T	Median	W
	N	Mean	Median	N	Mean	Median	difference	p-value	difference	p-value
MUCP	61	44.1	40.0	61	44.8	43.5	–0.7	0.7200	–1.0	0.7100
VLPP	61	39.4	38.0	61	42.8	41.0	–3.4	0.1900	–2.5	0.4200
IQOL	61	37.8	37.5	61	80.9	85.2	–43.1	0.0001	–46.6	0.0001

Lastly, we tested the I-QOL of all women before and after surgery to compare the changes of I-QOL due to surgery. After surgery the subjective quality of life according to I-QOL was dramatically improved (from an average of 40.0 before to 81.6 after surgery). The value of I-QOL was significant higher independently of the type of operation. This change is significant at the 0.05 level of statistical significance ($p<0.0001$). Wilcoxon test was chosen for the comparison of changing I-QOL because I-QOL was markedly asymmetrically distributed (*t*-test, p-value<0.00001). The same result we marked in TVT group. It ensued from subsequent analysis that postoperative quality of life according to I-QOL did not relate to the preoperative values of MUCP and VLPP (Table 3) and even the values of MUCP and MUCP did not change after surgery. TVT and Burch colposuspension are equally effective in the management of female stress incontinence.

Discussion

QOL of urinary incontinent women is measured by specific questionnaires, and various types of specific questionnaires are used. Subjective QOL results for patient with stress urinary incontinence may differ because the instruments can vary in terms of their scope and content. The I-QOL questionnaire is a highly targeted, condition-specific questionnaire that assesses the impact and distress of specific incontinence symptoms. The I-QOL is capable of discriminating between different levels of perceived severity, frequencies of incontinent episodes and stress test pad weights [16]. We chose the I-QOL because it covers all symptoms of urinary incontinence and social problems of incontinent woman, including sexual life, in 22 items. The measurement of subjective versus objective aspects of urinary incontinence is hard to compare. The subjective approach is influenced by the lifestyle, physical activity and needs of the patient. The I-QOL questionnaire deals well with the subjective quality of life and the factors designating the changes

Table 3 – Comparison of I-QOL for both VLPP and MUCP, after surgery

VLPP	MUCP ≤ 20 cmH_2O	MUCP > 20 cmH_2O	total
Count in the group			
≤ 60 cmH_2O	22.0	36.0	58.0
> 60 cmH_2O	0.0	13.0	13.0
total	22.0	49.0	71.0
Mean of I-QOL			
≤ 60 cmH_2O	78.1	83.6	81.5
> 60 cmH_2O	–	82.8	82.8
total	78.1	83.4	81.7
Median of I-QOL			
≤ 60 cmH_2O	79.5	86.9	85.8
> 60 cmH_2O	–	85.2	85.2
total	79.5	86.4	85.2

ANOVA p-value=0.2392, Kruskall-Wallis p-value=0.1846 before and after treatment. QOL is significantly higher following the successful urogynaecological surgery ($p<0.0001$).This result is in accordance with Holmgren [17]. His comparisons between QOL before and after TVT and at follow up were highly significant using UDI6 and IIQ7 questionnaires.

In our study stress incontinent women with VLPP ≤ 60 cmH_2O indicated lower subjective quality of life according to I-QOL than women with VLPP > 60 cmH_2O, but the difference is not statistically significant. The worse I-QOL in stress incontinent women before the surgery did not correlate with low value of VLPP. The subjective quality of life is independent of the value of MUCP. Stress incontinent women with MUCP ≤ 20 cmH_2O did not record worse results in I-QOL than women with MUCP > 20 cmH_2O.

In our study urodynamic parameters VLPP and MUCP do not correlate with the subjective measured quality of life in stress incontinent women by I-QOL, and this result is consistent with the findings of other authors [18, 10, 11, 19]. The low quality of life measured by I-QOL questionnaire cannot predict the values of the urodynamic measurement [10]. In the same article none of the urodynamic measurements correlate to questionnaire UDI6, IIQ7 and none of the questionnaires can supply information on urodynamics. Nager 2001 [4] suggests that the greater degree of stress incontinence correlates to the lower value of MUCP and VLPP. But significant correlation was not found. VLPP is not associated with patient symptom severity, quantity of urine loss, or the effect on the patient QOL [19]. The correlation between the objective and the subjective measurements was weak [19]. Stach-Lempinen 2004 [18] correlated clinical and urodynamic parameters with two specific questionnaires of quality of life to describe subjective and objective changes after the treatment of urinary incontinence and to describe the designating factors of the change after the treatment. She found the pad weight test (PWT) is a better predictor of the quality of life then urodynamics. The QOL is statistically influenced by a change of urinary leakage.

This was also confirmed in our study. The I-QOL questionnaire is the best method of forecasting the effect of the treatment or surgery. Urinary leakage after surgery disappeared, and the I-QOL indicated a great improvement. The urodynamic parameters VLPP and MUCP do not correlate with the subjective measured quality of life in stress incontinent women by I-QOL. The urodynamic parameters VLPP and MUCP help us to establish the right diagnosis. More precisely, they can be used to differentiate the type of anti-incontinent operation. The I-QOL questionnaire is suitable for the evaluation of the effect of anti-incontinent operation. The I-QOL refers to an individual perception of the patient‘s state of health or ill-health. The I-QOL questionnaire effectively describes the subjective quality of life and the factors designating the changes before and after treatment. It is a good method of checking patient satisfaction throughout the treatment. The QOL instruments cannot replace the urodynamic methods but can help our medical strategy about the treatment of a patient and better record our knowledge about subjective medical results of our treatment. Using validated quality of life instruments both in clinical practice and research is advised.

Conclusion

The urodynamic parameters VLPP and MUCP do not correlate with the subjective measured quality of life in stress incontinent women measured by I-QOL. VLPP and MUCP do not predict the QOL after anti-incontinent surgery and also the result of surgery.

References

1. ABRAMS P., CARDOZO L., FALL M., GRIFFITHS D., ROSIER P., ULMSTEN U., VAN KERREBROECK P., VICTOR A., WEIN A.: The standardization of terminology of lower urinary tract function: Report from the standardization sub-committee of the ICS. *Neurourol. Urodyn.* 21: 167–178, 2002.
2. BUNNE G., OBRINK A.: Urethral closure pressure with stress – A Comparison between stress incontinent and continent women. *Urol. Res.* 6: 127–134, 1978.
3. MCGUIRE E. J., FITZPATRICK C. C., WAN J., BLOOM D., SANVORDENKER J., RITCHEY M.: Clinical assessment of urethral sphincter function. *J. Urol.* 150: 1452–1454, 1993.
4. NAGER C. W., SCHULTZ J. A., STANTON S. L., MONGA A.: Correlation of urethral closure pressure, leak point pressure and incontinence severity measures. *Int. Urogynecol. J. Pelvic Floor Dysfunct.* 12: 395–400, 2001.
5. SULTANA C. J.: Urethral closure pressure and leak point pressure in incontinent women. *Obstet. Gynecol.* 86: 839–842, 1995.
6. SWIFT S. E., OSTERGARD D. R.: A comparison of stress leak-point pressure and maximal urethral closure pressure in patients with genuine stress incontinence. *Obstet. Gynecol.* 85: 704–708, 1995.
7. MARTAN A., MAŠATA J., PETRI E., ŠVABÍK K., DRAHORÁDOVÁ P., VOIGT R., PAVLÍKOVÁ M., HLÁSENSKÁ J.: Weak VLPP and MUCP correlation and their relationship with objective and subjective measures of severity of urinary incontinence. *Int. Urogynecol J.* 18: 267–271, 2007.
8. BUMP R. C., COATES K. W., CUNDIFF G. W., HARRIS R. L., WEIDNER A. C.: Diagnosis intrinsic sphincter deficiency: Comparing urethral closure pressure, urethral axis and Valsava leak point pressure. *Am. J. Obstet. Gynecol.* 177: 303–310, 1997.
9. NITTI V. W., COMBS A. J.: Correlation of Valsava leak point pressure with subjective degree of stress urinary incontinence in women. *J. Urol.* 155: 281–285, 1996.
10. THEOFRASTOUS J. P., BUMP R. C., ELSER D. M., WYMAN J. F., MCCLISH D. K.: Correlation of urodynamic measures of urethral resistance with clinical measures of incontinence severity in women with pure genuine stress incontinence. *Am. J. Obstet. Gynecol.* 173: 407–414, 1995.
11. FITZGERALD M. P., BRUBAKER L.: Urinary incontinence symptom scores and urinary diagnose. *Neurourol. Urodyn.* 21: 30–35, 2002.
12. BUMP R. C., MATTIASSON A., BO K., BRUBAKER L. P., DELANCEY J. O., KLARSKOV P., SHULL B. L., SMITH A. R.: The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. *Am. J. Obstet. Gynecol.* 175(1): 10–17, 1996.
13. PATRICK D. L., MARTIN M., BUSHNELL D. M., YALCIN I., WAGNER T. H., BUESCHING D. P.: Quality of life of women with urinary incontinence: Further development of the incontinence quality of life instrument (I-QOL). *Urology* 53: 71–76, 1999.

14. DIETZ H. P., MCKNOULTY L., CLARKE B.: Translabial color Doppler for imaging in urogynecology: A preliminary report. *Ultrasound Obstet. Gynecol.* 14: 144–147, 1999.
15. DIETZ H. P., CLARKE B.: Translabial color Doppler urodynamics. *Int. Urogynecol. J. Pelvic Floor Dysfunct.* 12: 304–307, 2001.
16. OH S.-J., KU J. H., HONG S. K., KIM S. W., PAICK J.-S., SON H.: Factor influencing self-perceived disease severity in women with stress urinary incontince combined with or without urge incontinence. *Neurourol. Urodyn.* 24: 341–347, 2005.
17. HOLMGREN C., HELLBERG D., LANNER L., NILSSON S.: Quality of life after tension free-vaginal tape surgery for female stress incontinence. *Scand J. Urol. Nephrol.* 40: 131–137, 2006.
18. STACH-LEMPINEN B., KIRKINEN P., LAIPPALA P., METSÄNOJA R., KUJANSUU E.: Do objective urodynamic or clinical findings determine impact of urinary incontinence or its treatment on quality of life? *Urology* 63: 67–71, discussion 71–72, 2004.
19. ALBO M., WRUCK L., BAKER J. BRUBAKER L., CHAI T.: The relationship among measures of severity in women undergoing surgery for stress urinary incontinence. *J. Urol.* 177: 1810–1814, 2007.