Pre-operative urodynamic studies: Is there value in predicting post-operative stress urinary incontinence in women undergoing prolapse surgery?

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Dr Karina Janse van Rensburg

Date: 28 March 2013 Signature:

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Abstract

Pre-operative urodynamic studies: Is there value in predicting post-operative stress urinary incontinence in women undergoing prolapse surgery?

Aims of the study

Urodynamic studies (UDS) have been suggested to be performed as part of the pre-operative work-up of patients undergoing prolapse surgery. Some women with POP have occult stress urinary incontinence (OSUI) and even if subjectively continent, have a higher incidence of developing de novo stress urinary incontinence (SUI). The aim of this study was to describe the outcome of a group of patients who had pre-operative UDS and manual prolapse reduction.

Methods

This was a retrospective descriptive study including all women who had prolapse surgery during the period January 2006 to December 2011. Patients received routine pre-operative UDS and manual reduction of prolapse, performed at maximum bladder capacity determined by UDS. Patients demonstrating urodynamic SUI or OSUI were offered a concomitant anti-incontinence procedure. Post-operative follow-up data included symptoms of SUI and clinical evidence of SUI.

Results

The final group consisted of 131 women. The mean age of the patients was 57 years (range 33 to 79) and parity 3.6 (range 0 to 7). The mean body mass index was 32 (range 19 to 53). Twenty-four (18.3%) women had demonstrable SUI on clinical examination at initial presentation in the clinic. At the time of urodynamic studies, forty patients (30.5%) had evidence of SUI determined by either UDS and/ or cough test in the standing position at maximum bladder capacity. Ninety-one women (69.5%) had no evidence of UI on UDS, of which 20(15.3%) demonstrated OSUI (SUI on manual reduction of prolapse at maximal bladder capacity determined by UDS). Of the 40 women with UI on UDS, 36 had 1-step surgery (combination of anti-incontinence procedure and prolapse repair) and 4 had prolapse surgery alone. Of the 20 women with OSUI on UDS, 16 had 1-step (combined) surgery and 4 prolapse surgeries only. Of the 4 who had prolapse surgery alone, 3 complained of post-operative SUI. In the group with no SUI on UDS and manual reduction of POP, 69 of the 71 women had follow-up data. Only 1 had demonstrable SUI on examination. The manual reduction test had a sensitivity of 42.9% and a specificity of 98.5% (95% CI, 92.0-99.9%). The positive predictive value was 75.0% (95% CI, 19.4-99.3%), with a high negative predictive value of 94.4% (95% CI, 86.2-98.8%).

Conclusion

The numbers in our study are too small to determine sensitivity and positive predictive value of UDS and manual prolapse reduction for the detection of OSUI. However, our data shows promise in identifying POP patients without OSUI, which is a complement of the hypothesis. We recommend that UDS can be performed pre-operatively in women undergoing prolapse surgery, to identify patients with urodynamic stress incontinence. Manual reduction of the prolapse at maximum bladder capacity can then be done to identify a subgroup of patients without OSUI. Future research is needed on the true predictive value of reduction stress testing with larger numbers.

Keywords

Stress urinary incontinence, pelvic organ prolapse, urodynamic studies

Abstrak

Pre-operatiewe urodinamiese studies: Is daar waarde in die voorspelling van post-operatiewe druklek in vroue wat prolaps chirurgie ondergaan?

Doel van die studie

Urodinamiese studies (UDS) word voorgestel as deel van die pre-operatiewe ondersoeke voor prolaps chirurgie gedoen word. Sommige vroue met genitale prolaps het verborge druklek, en selfs as hulle subjektief kontinent is, het hulle ‘n groter insidensie van de novo druklek. Die doel van die studie was om die uitkoms van ‘n groep pasiënte wat pre-operatiewe UDS en manuele prolaps reduksie gehad het, te beskryf.

Metodes

Die studie was ‘n retrospektiewe beskrywende studie. Al die pasiënte wat prolapse chirurgie in die tydperk Januarie 2006 tot Desember 2011 gehad het, is ingesluit. UDS en manuele prolaps reduksie tydens maksimale blaaskapasiteit, bepaal deur UDS, was deel van die roetine pre-operatiewe ondersoeke. In die gevalle waar urodinamiese druklek of verborge druklek demonstreer is, is die opsie van ‘n meegaande prosedure vir kontinensie tydens prolaps chirurgie aangebied. Post-operatiewe opvolg inligting het simptome van druklek en kliniese bewys van druklek ingesluit.

Resultate

Die finale groep was 131 vroue reikwydte. Die gemiddelde ouderdom van die pasiënte was 57 jaar (reikwydte 33 - 79) en pariteit 3.6 (reikwydte 0 - 7). Die gemiddelde liggaamsmassa indeks was 32 (reikwydte 19 - 53). Vier-en-twintig (18.3%) vroue het aantoonbare druklek gehad met kliniese ondersoek tydens die eerste kliniek afspraak. Tydens UDS het 40(30.5%) pasiënte druklek getoon tydens UDS en/ of hoestoets in die staande posisie teen maksimale blaaskapasiteit. Een-en-negentig (69.5%) het geen tekens van urinêre inkontinensie tydens UDS demonstreer nie, waarvan 20(15.3%) verborge druklek demonstreer het (druklek met reduksie van prolapse tydens maksimale blaaskapasiteit, bepaal deur UDS). Veertig pasiënte het urodinamiese druklek gehad, waarvan 36 een-stap chirurgie (‘n kombinasie van prolaps herstel en meegaande kontinensie prosedure) en 4 prolaps chirurgie alleenlik gehad het. Uit die 20 vroue met verborge druklek tydens UDS, het 16 een-stap (kombinasie) chirurgie en 4 prolaps chirurgie alleen gehad. Uit die 4 wat prolaps chirurgie alleen gehad het, het 3 post-operatiewe klagtes van druklek gehad. In die groep wat geen inkontinensie tydens UDS en manuele prolaps reduksie gehad het nie, het 69 van die 71 vroue opvolg data gehad. Druklek kon net by een pasiënt met ondersoek demonstreer word. Die manuele reduksie toets het ‘n sensitiwiteit van 42.9% en ‘n spesifisiteit van 98.5% (95% CI, 92.0-

99.9%) gehad. Die positiewe voorspellingswaarde was 75.0% (95% CI, 19.4-99.3%), en die negatiewe voorspellingswaarde was 94.4% (95% CI, 86.2-98.8%).

Gevolgtrekking

Die getalle in ons studie was te min om te bepaal wat die sensitiwiteit en positiewe voorspellingswaarde van UDS and manuele prolaps reduksie is om verborge druklek te demonstreer. Die belowende data om pasiënte te identifiseer met genitale prolaps sonder verborge druklek (‘n kompliment van die hipotese). UDS kan pre-operatief gedoen word in pasiënte wat prolapse herstel chirurgie benodig, om pasiënte met urodinamiese druklek te identifiseer. Manuele reduksie van die prolaps tydens maksimum blaas kapasiteit kan dan volg, om ‘n subgroep van pasiente sonder verborge druklek, uit te ken. Verdere navorsing, met groter getalle word benodig om die werklike voorspellende waarde van die reduksie toets te ondersoek.

Sleutelwoorde

Druklek, genitale prolaps, urodinamiese studies

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Abbreviations

ACOG	American College of Obstetricians and Gynaecologists
BMI	Body mass index
Gh	Genital hiatus
MUI	Mixed urinary incontinence
NPV	Negative predictive value
OSUI	Occult stress urinary incontinence
Pb	Perineal body
POP	Pelvic organ prolapse
POP-Q	Pelvic organ prolapse quantification system
PPV	Positive predictive value
SUI	Stress urinary incontinence
Tvl	Total vaginal length
TVT-O	Tension-free vaginal tape - obturator
TVT-R	Tension-free vaginal tape - retropubic
UDS	Urodynamic studies
UI	Urinary incontinence
UUI	Urge urinary incontinence

Chapter 1
Introduction & literature review

Introduction

Pelvic organ prolapse (POP) is a common condition affecting millions of women worldwide, and a major cause of gynaecological surgery [1]. Although not life threatening, it can have a severe impact on quality of life.
Women with POP may present with a wide range of lower urinary tract symptoms, which may or may not be related to the prolapse. The prolapse may mechanically obstruct the urethra, leading to bladder outlet obstruction, impede voiding and mask urinary incontinence.

Women who demonstrated pre-operative stress urinary incontinence (SUI) during POP reduction were more likely to report post-operative SUI as shown in a study by Liang et al [1].

Occult stress urinary incontinence (OSUI) is a controversial subject without significant exposure in the literature. The controversy surrounds the performance of a prophylactic incontinence procedure based on the assumption that patients have a high prevalence of stress urinary incontinence after prolapse repair.

Haessler et al [2] stated in their article 'Re-evaluating occult incontinence', that until we have adequate solid evidence on the predictive values of our screening test, we cannot counsel patients regarding our ability to prevent post-operative SUI or protect them from unnecessary procedures.

Various methods of prolapse reduction have been used in the past in order to screen for OSUI, including pessaries, speculums and gauze packs. In our unit it is routine practice to screen for OSUI by manual reduction of the prolapse at time of urodynamic studies (UDS), prior to POP repair surgery.

This study attempts to determine the predictive value of UDS, together with manual prolapse reduction at pre-operative assessment, as a screening test for identifying patients with OSUI, likely to develop post-operative SUI.

Background (Literature review)

Introduction

Urogenital prolapse is a common condition in women worldwide. Globally up to half of all parous women have some degree of prolapse and 10-20% are symptomatic [3]. Olsen et al assessed 149554 women, aged 20 and older, receiving POP surgery during 1995 in the USA. The lifetime risk of undergoing a single operation for prolapse or incontinence by age 80 was found to be 11.1% [4]. In a re-evaluation of the original article commonly quoted by Olsen et al the reoperation rate was reported to be 12% vs. the previously quoted one third of women requiring repeat surgery [5]. This is however still quite common.

Continent women with severe urogenital prolapse may become incontinent after reduction of the prolapse either at time of examination (as in OSUI) or after prolapse surgery.
According to the literature, 36-80% of women with advanced POP are at risk of developing SUI after surgery [6, 7].

The question remains whether a prophylactic SUI procedure should be done at time of prolapse repair in women with severe POP. In a study by Klutke and Ramos [7] the prophylactic Burch colposuspension increased the incidence of detrusor instability; hence they suggested pre-operative testing to identify women who may not require an anti-incontinence procedure.

Defining urogenital prolapse

The International Continence Society (ICS) defines POP as the descent of one or more of the anterior vaginal wall, posterior vaginal wall, the uterus(cervix), or the apex of the vagina (vaginal vault or cuff scar after hysterectomy). The presence of any such sign should be correlated with relevant POP symptoms. Most commonly, this correlation would occur when the prolapsed organ is at or below the level of the hymen. [8]

The Pelvic Organ Prolapse Quantification System (POP-Q) is a standardised system for describing, quantifying and staging pelvic support in women. It is the most common system used by gynaecologists and urogynaecologists and has been approved by the American Urogynecological Society (AUGS) and the Society of Gynaecologic Surgeons for description of pelvic organ prolapse [9]. There are 6 points measured at the vagina with respect to the hymen. Points above the hymen are negative numbers and points below are positive numbers. All measurements except total vaginal length (tvl) are measured at maximum valsalva. Point Aa is a fixed point on the anterior wall, 3cm proximal to the hymen and Ap a fixed point on the posterior wall, 3cm proximal to the hymen. Point C is the most distal edge of the cervix or vaginal cuff and point D the posterior fornix (not applicable if post-hysterectomy). Points Ba and Bp are the most distal positions of the remaining anterior (Ba)

and posterior (Bp) vaginal walls. The genital hiatus (gh) is measured from the middle of the external urethral meatus to the posterior midline hymen and the perineal body (pb) is measured from the posterior margin of gh to the middle of the anal opening.

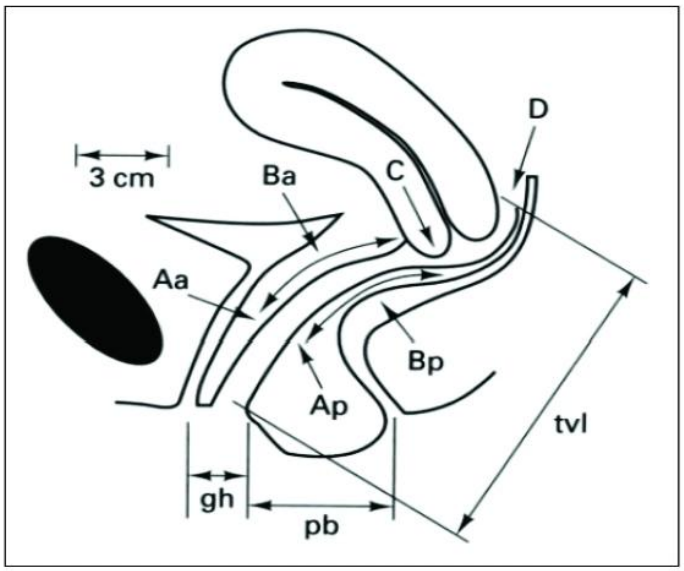


Figure 1.1: Points and landmarks for POP–Q system examination.

Urinary incontinence

Urinary continence in women results from a complex interaction between the bladder and the urethra. During bladder filling there is no or minimal changes in intravesical pressure. Simultaneously, urethral pressure remains greater than intravesical pressure, and even increases slightly during bladder filling [10].
Urinary incontinence (UI) is the complaint of any involuntary loss of urine [8]. Different types of UI are identified, of which SUI is the most common. SUI is the involuntary loss of urine on effort, physical exertion, sneezing or coughing [8]. Urge (urinary) incontinence (UUI) is the complaint of involuntary loss of urine associated with urgency. Mixed (urinary) incontinence is the complaint of involuntary loss of urine associated with urgency and also with effort, physical exertion, sneezing or coughing.

Urodynamic assessment can be used to distinguish between the subtypes of urinary incontinence. Urodynamic studies involve uroflowmetry, measurement of postvoid residual volume and filling and voiding cystometry. Cystometry is divided into two phases, firstly filling cystometry and secondly pressure flow studies of voiding. Filling cystometry is the

method by which the pressure/ volume relationship of the bladder is measured during bladder filling [11].

OSUI (also called masked, hidden or latent SUI) is SUI only observed after the reduction of a coexisting prolapse. This would not have been apparent due to the protective role of the prolapse, maintaining continence because of outflow tract obstruction of the lower urinary tract. It can be explained by the mechanical prevention of SUI due to the position of the prolapse [12]. Women with severe POP may also have clinical SUI, but more often they are continent subjectively because of urethral kinking or compression. These women with severe prolapse requiring surgical correction may present post-operatively with new symptoms of SUI.

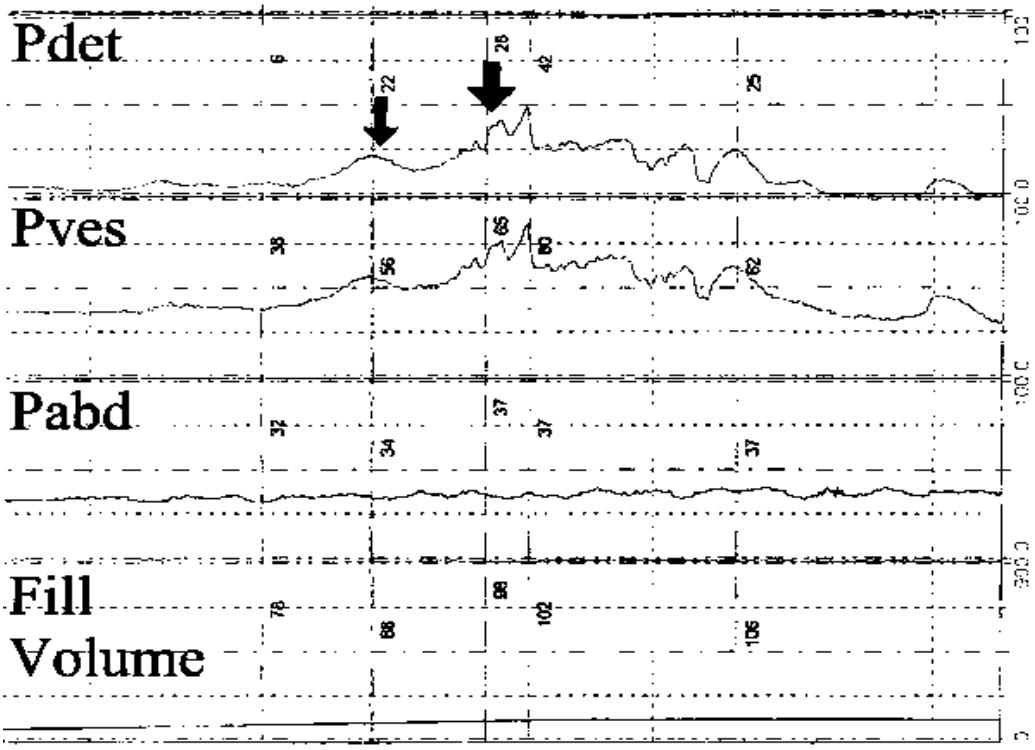


Figure 1.2: Example of overactive detrusor on urodynamic studies

The use of urodynamic studies prior to prolapse surgery

A literature review by Roovers et al [13] found that the diagnostic value of UDS in patients with POP was not yet established. In about 25 – 30% of patients who developed de novo UI after surgery for POP, the presence of SUI was not confirmed by UDS. Barrier tests (methods of reducing the prolapse, for example a pessary test) performed during UDS could identify patients with OSUI, however it was not known which barrier test was the preferred method. Most literature related to UDS reported on patients with known urinary incontinence. The author concluded that there was a definite need for randomised trials comparing the outcome of surgical treatment after a diagnostic work-up with and without urodynamic studies.

A recent study by Srikrishna, Robinson and Cardozo, published in 2011 [14] looked at the predictive value of the ring pessary test at time of UDS, in identifying patients likely to develop SUI post-operatively. They found that the pessary test had poor sensitivity (67%), but high specificity (93%) in predicting post-operative SUI. The positive predictive value was low (40%) with an excellent negative predictive value (98%).

Does occult stress urinary incontinence at time of UDS predict post-operative stress incontinence?

Women with pre-operative OSUI are more likely to develop post-operative SUI after prolapse correcting surgery. According to a study by Liang et al [1] 64.7% of women with OSUI developed post-operative SUI when no concomitant continence procedure was done. The study included 79 patients with severe POP without symptoms of SUI. All underwent pessary testing. Eleven of the 17 patients (64.7%) with positive pessary tests who did not undergo TVT had SUI following hysterectomy. The 30 women who had no OSUI pre-operatively remained continent after surgery. Of the 32 women with pre-operative OSUI who received combination SUI surgery and hysterectomy, 3 developed post-operative SUI.

A retrospective German study by Jundt et al (March 2010) studied 233 women who had prolapse surgery, without complaints of SUI pre-operatively [15]. No anti-incontinence procedures were done at time of surgery. Only 53 had a full urogynaecologic work-up, including prolapse reduction, pre-operatively and amongst this group 35.8% were diagnosed with OSUI. The incidence of SUI after surgery in this study was low (7.7%). However, 15.8% of patients with OSUI prior to surgery developed post-operative SUI. The authors concluded that the group with OSUI, showing a higher risk of post-operative SUI, could benefit from a 1-step approach, combining prolapse repair surgery with an anti-incontinence procedure.

As part of the CARE trial (**C**olpopexy **a**nd urinary **r**eduction **e**fforts), assessing the role of UDS, the results of reduction testing in stress continent women were described [16]. The aim was to estimate whether OSUI predicted post-operative SUI. 322 women without symptoms of SUI, with stages 2 – 4 prolapse, underwent standard UDS with 5 different prolapse reduction methods. These were pessary, manual reduction, forceps, swab and speculum. OSUI was diagnosed in 19% of subjects. Overall, in the CARE study, the authors found that women who demonstrated pre-operative OSUI were more likely to develop leaking post-operatively in both the control group and the group that received a Burch procedure. In the control group (no Burch), post-operative SUI occurred in 58% of subjects who leaked during pre-operative reduction, compared to 38% with negative testing. Prolapse reduction was not perfect however, as a significant percentage of patients who did not leak pre-operatively during reduction testing, had post-operative incontinence. They felt that reduction testing could help identify a population at risk of post-operative SUI. Individualised treatment strategies could then be made to further reduce the risk of post-operative incontinence.

A Swedish study published in April 2012 [17] also reported on OSUI as a predictor of post-operative SUI. 137 women were included in this study and four different reduction tests were used – manual, pessary test with 100ml and 300ml bladder volumes respectively and pessary left in situ for a minimum of 1 week. Similar findings to the CARE trial were reported, showing 20% increased risk of post-operative SUI in those patients with a positive compared to a negative reduction test.

In an Indian study by Reena et al [18] the prevalence of OSUI in 78 women presenting with POP, was found to be 67.9%. Of the 53 women who had a positive stress test with pre-operative pessary reduction, 34 (64.2%) had SUI post-operatively. Only prolapse repair surgery, without concomitant an anti-incontinence procedure was performed on all women. The 25 women (32.1%) who had a negative reduction test continued to remain continent post-operatively.

Prophylactic anti-incontinence procedures: Is there a place?

Taking into account the problem of underlying OSUI, it has been suggested that in patients with POP and OSUI a prophylactic anti-incontinence procedure should be done at the time of surgical correction of the prolapse. Performing UDS, with reduction of the POP, as part of the pre-operative work-up, may be valuable if diagnosing SUI or OSUI results in the optimal treatment strategy. This would be either a combination of an anti-incontinence procedure and prolapse surgery, or prolapse surgery alone and re-evaluation of SUI afterwards.
In a literature review by Roovers et al [13] in 2007, retrieving evidence on patients with genital prolapse and OSUI, conflicting data about the reduction in post-operative SUI was

found. A study by Liang [1] showed a reduction in post-operative SUI of 56% (91% in the POP repair only group vs. 35% in the combined surgery group), whereas another study by de Tayra et al [19] showed a reduction of only 12% (100% vs. 88%) if prolapse and incontinence surgery were combined. In both studies the risk of an overactive bladder was markedly increased following combination surgery. In the study by Liang et al. 32 patients received 1-step surgery, of which 16% developed OAB symptoms post-operatively. In the de Tayrac study, 11 patients received 1-step surgery, of which 3 (27%) developed post-operative OAB symptoms. The numbers of these two studies are small and randomisation was not performed.

In a 2012 study published in European Urology by Serati et al. [34] the authors reported a high prevalence of de novo OAB symptoms in the immediate post-operative period (30% at 3 months), but at 10yr follow-up this declined to 18.9%. Sixty-three women were included in this prospective observational study and after 10yrs 5 were lost to follow-up. They also commented that discrepancies in previous studies were most likely related to different definitions and questionnaires used in collection of OAB symptoms, and different concomitant surgical procedures. Six studies evaluating the effect of a combined procedure in patients with OSUI, showed the one-step approach to be effective with respect to the presence of post-operative SUI [6, 7, 20, 21, 22, 23]. In all these studies the continence rate following surgery was over 90%. However, as these patients were asymptomatic prior to surgery, their acceptance of overactive bladder symptoms may be less, compared to patients who had complaints of SUI pre-operatively.

Another study by Roovers et al. in 2007 found that UDS could not predict the presence of SUI or UUI after surgery. [24]

A Cochrane review on surgical management of POP [25], published in 2010, concluded that the addition of a continence procedure at time of prolapse repair in patients who are continent subjectively pre-operatively remained to be assessed. The authors felt that most previously published series were too small to draw any significant conclusions and long-term follow-up was lacking.

Park, McDermott et al [26] looked at the incidence of post-operative SUI after simultaneous prolapse repair and continence surgery (one-step approach), in patients identified pre-operatively with OSUI. 152 women were included, 70 with a negative reduction test and 82 with positive reduction testing prior to surgery. 18.6% of patients diagnosed with OSUI pre-operatively required second surgeries for de novo SUI. Patients were followed up at 6, 12 and 24 months after surgery. Based on the results of the reduction tests, single surgery was performed for the majority of patients (88%). Rates of second surgeries for post-operative SUI (18.6%) and the incidence of bladder outlet obstruction following mid-urethral sling (7.3%) was comparable to those reported by others. The results of the study provided evidence that the strategy of simultaneous treatment of prolapse and SUI works well for most, but not all patients.

A retrospective study by a German group, published in May 2012 [27], looked at long-term follow-up of patients with pre-operative OSUI, who only received prolapse surgery. 23% (113) were diagnosed with OSUI pre-operatively- of these, 25 (22.1%) had one-step surgery and were excluded. Of the 88 remaining patients, 31 were lost to follow-up. 57 patients with pre-operative OSUI were followed up on average of 5.7 years. 16/57 patients (28%) developed SUI. Only 3/57 (5.3%) subsequently required TVT surgery, therefore the authors concluded that 54 out of 57 would have received anti-incontinence procedures based on pre-operative findings unnecessarily (94.7%).

The OPUS trial (Outcomes following vaginal prolapse repair and mid-urethral sling trial) [28] started recruitment in May 2007. This was a multicentre trial, including 337 women without symptoms of SUI and with anterior prolapse (stage 2 or higher). Women were randomised to receive either a midurethral sling or sham incisions during prolapse surgery. They were then followed up at 3, 6 and 12 months post-operatively. The odds of SUI after the surgery in the sling group was significantly reduced compared to the sham group. Placing the midurethral sling during prolapse surgery resulted in a lower rate of SUI at 3 and 6 months, but patients had an increased rate of adverse events, including incomplete bladder emptying at 6 weeks, bladder perforation and urinary tract infection. The rates of serious or unexpected adverse events did not significantly differ at the end of the trial. Women with a positive prolapse reduction test (swab inserted into vagina at 300ml bladder volume) appeared to receive more benefit from a sling at 3 months, although this difference was not significant at 12 months.

Ongoing trials

The CUPIDO trials [29] are two multi-centre randomised controlled trials based in the Netherlands, in which women with SUI or OSUI are randomised to prolapse surgery in combination with anti-incontinence surgery or prolapse surgery alone. Women with evident SUI will be part of the CUPIDO 1 trial and women with OSUI, the CUPIDO 2 trial. The primary outcome measure is absence of SUI twelve months post-operatively.

Summary

The development of de novo SUI in a previously continent patient, who received surgical treatment for POP, could be a very distressing problem, for the patient as well as the doctor. The management and diagnosis of OSUI in patients with severe POP remains an unresolved subject. There is currently no standardised method of reduction and no consensus on the optimal screening test. The addition of an anti-incontinence procedure at the time of prolapse repair is also a large area of debate. Most of the literature reviewed suggested further study in this field in order to adequately counsel patients pre-operatively and optimise the treatment strategy.

Chapter 2

Hypothesis and methods

Summary of study methods

This is a retrospective descriptive study, analysing data from urodynamic studies performed on patients who received prolapse surgery. Patients with pre-operative SUI and OSUI were identified and follow-up data assessed to determine whether they had symptoms of post-operative stress urinary incontinence.

Aim of the study

To describe the outcome of a group of patients who had pre-operative UDS and manual prolapse reduction.

Hypothesis

1. By performing UDS, and manual prolapse reduction, in patients requiring prolapse surgery, we can identify a group of patients with OSUI.
2. Patients with OSUI are more likely to develop post-operative SUI compared to those with negative reduction testing.

Study design

This is a retrospective descriptive study of women who underwent prolapse surgery for symptomatic POP.

Setting

Tygerberg Hospital Urogynaecology Unit.

Selection process and sampling procedure

Theatre lists for the department of Urogynaecology for the period 1 January 2006 to 31 December 2011 were obtained from the departmental secretary. All patients who had prolapse surgery during this period were identified and files requested from the Urogynaecology clinic, where separate folders are kept for Urogynaecology patients. In cases where these separate files could not be located, the general patient file was

requested from the main records department of the hospital and data extracted if copies from the clinic notes were found inside.

Patients who did not have urodynamic studies pre-operatively, or where the results of the urodynamic studies were incomplete or lost, were excluded from the study.

Materials and methods

Women who had prolapse surgery during the period 1 January 2006 to 31 December 2011 were identified from past Urogynaecology theatre lists. The patient files were collected and data retrieved. Exclusion criteria were absence of pre-operative urodynamic study results, absence of follow-up data and missing files.

Demographics included race, age, parity, body mass index, number of vaginal deliveries, previous surgeries (to include specifically caesarean section, hysterectomy, prolapse surgery and incontinence procedures), urinary incontinence and POP symptoms and medical history. Physical examination included abdominal and gynaecological examination, pelvic organ prolapse quantification (POP-Q), evidence of demonstrable stress urinary incontinence, pelvic floor strength and neurological examination to include S1-4.

Pre-operative multichannel urodynamic studies were performed in accordance with the International Continence Society guidelines [8] with a filling and voiding phase, but no midurethral pressure measurements. The Dantec urodynamic system was used, with the patient in the sitting position. UDS data included the presence of SUI with empty bladder and maximal bladder capacity, valsalva abdominal leak point pressure, evidence of detrussor instability, maximum urine flow and maximum detrussor pressure, maximum bladder capacity (to a maximum of 500ml) and SUI on standing with the bladder filled at maximum capacity. Prolapse reduction was performed manually, with the patient in a standing position at maximum bladder capacity. The cough test was used to determine if stress urinary incontinence was evident. The manual reduction was performed in a careful manner to avoid the occlusion of the urethra.

Patients demonstrating SUI when standing or during UDS (frank SUI) or SUI with prolapse reduction (OSUI) had a concomitant anti-incontinence procedure at time of surgery, unless the patient chose prolapse surgery only, with later surgery for SUI post-operatively if so indicated.

Patients were routinely followed up at 6 weeks post-operatively, and another visit was offered if a problem presented at the time or occurred at a later stage. Follow-up data included symptoms of SUI, clinical evidence of SUI and residual prolapse.

All information was extracted from the data sheet routinely used in the Urogynaecology clinic. Only data relevant to the study was extracted from the document. (Addendum 3)

Data management

All data was captured on a data sheet, and then entered into Microsoft Excel, thereafter data cleaning and editing was done. The data was then analysed by a statistician at the University of Stellenbosch Department of Statistical analysis.

Sample size

The sample size justification was calculated based on the primary objective of the study, which was to determine the outcome of patients, based on the methodology previously described. It was expected that the proportion of patients without incontinence after anti-incontinence surgery would be approximately 90%. With 97 patients a 95% CI will achieve 6% precision in estimating the true population proportion.

Statistical analysis

MS Excel was used to capture the data and STATISTICA version 9 (StatSoft Inc. (2009) STATISTICA (data analysis software system), www.statsoft.com.) used to analyse the data.

The primary analysis objective was to determine the proportion of patients experiencing no incontinence post-surgery, given the methodology currently followed. As such the absolute and relative frequencies together with appropriate 95% confidence intervals were calculated and presented.

In addition, secondary analyses were conducted to determine possible associations with the final outcome of incontinence. Univariate logistic regression analyses were applied to determine possible associations.

For all other analyses the following general analysis rules were applied:

Summary statistics were used to describe the variables. Distributions of variables were presented with histograms and or frequency tables. Medians or means were used as the measures of central location for ordinal and continuous responses and standard deviations and quartiles as indicators of spread.

95% Confidence intervals for binominal proportions were calculated using exact methods.

A p-value of $p < 0.05$ represents statistical significance in hypothesis testing and 95% confidence intervals were used to describe the estimation of unknown parameters.

Ethical aspects

The protocol for this study was presented for assessment and approval to the Ethics Committee of the University of Stellenbosch. (Protocol number: N11/08/249) Permission was also obtained from Tygerberg Hospital to access patient records. (Addendum 1 and 2)

Patient data was and will remain to be treated anonymously. Confidentiality was strictly upheld. No names or personal folder numbers were entered onto the data sheet. Only the principle investigator had access to the data with the patient's identification and all data stored at all times in a secure place.

Chapter 3
Results of study

Patient population

One hundred and ninety nine patients booked for prolapse surgery were identified from theatre lists. 32 cases were excluded due to Urogynaecology clinic data not found. A further 36 were excluded as a result of no or incomplete urodynamic study data. 3 patients did not follow up post-operatively. The final group consisted of 131 women.

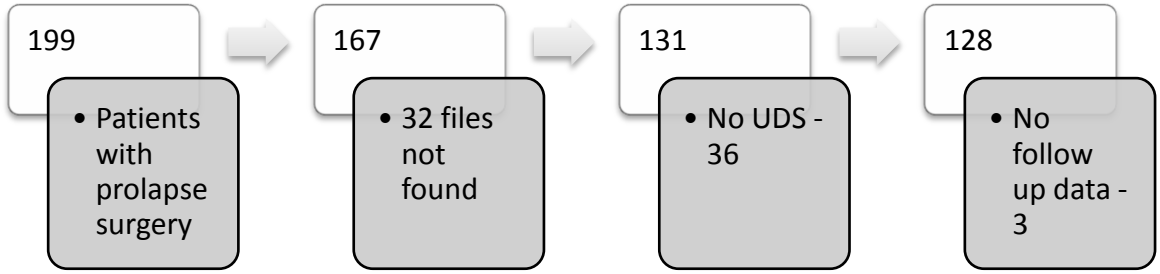


Figure 3.1: Schematic representation of patient selection

Patient demographics

The mean age of the patients was 57 (range 33 to 79 years) and parity 3.6 (range 0 to 7). The mean body mass index (BMI) was 32 (range 19 to 53, standard deviation 6.2). (Figure 3.2, Figure 3.3). Fifty four of the patients (41%) had previous hysterectomies, of which 36 were abdominal and 18 vaginal.

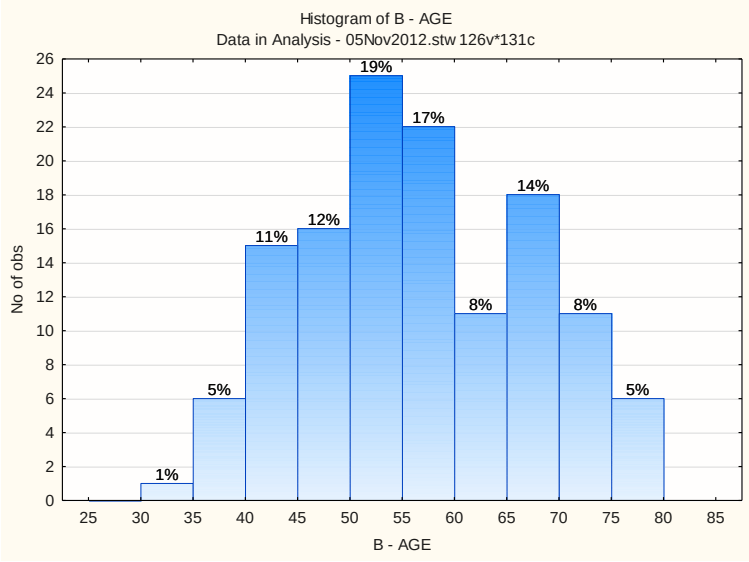


Fig 3.2: Histogram of age

Reported urinary incontinence before surgery

Thirty-nine women (29.8%) had no complaint of urinary incontinence prior to surgery. Eighty-one women gave a history of SUI pre-operatively – of these 29 (22.1%) had exclusively SUI symptoms. Sixty-three patients complained of UUI and of these 11 (8.4%) had exclusively UUI symptoms. Fifty-two patients (39.7%) had mixed UI (MUI) symptoms. (See table 3.3).

Findings at pelvic examination

Twenty-four (18.3%) women had demonstrable SUI on clinical examination. Thirty-one of the patients had an empty bladder during clinical examination and SUI could therefore not be ruled out. Eight women had no anterior compartment prolapse (6.1%) and 16(12.3%) grade 1 prolapse. The majority of patients had grade 2 (49(37.7%)) or grade 3 (49(37.7%)) anterior compartment prolapse and 8(6.1%) grade 4 prolapse. With regards to mid-compartment prolapse 29(22.5%) had no uterine/ vault prolapse, 42(32.6%) had grade 1, 30(23.2%) grade 2, 24(18.6%) grade 3 and 4(3.1%) grade 4 prolapse. Forty-seven (36.2%) had no posterior compartment prolapse, 35(26.9%) grade 1 and 34(26.2%) grade 2 prolapse. 11(8.5%) had grade 3 and 3(2.3%) grade 4 posterior compartment prolapse. (See Table 3.3)

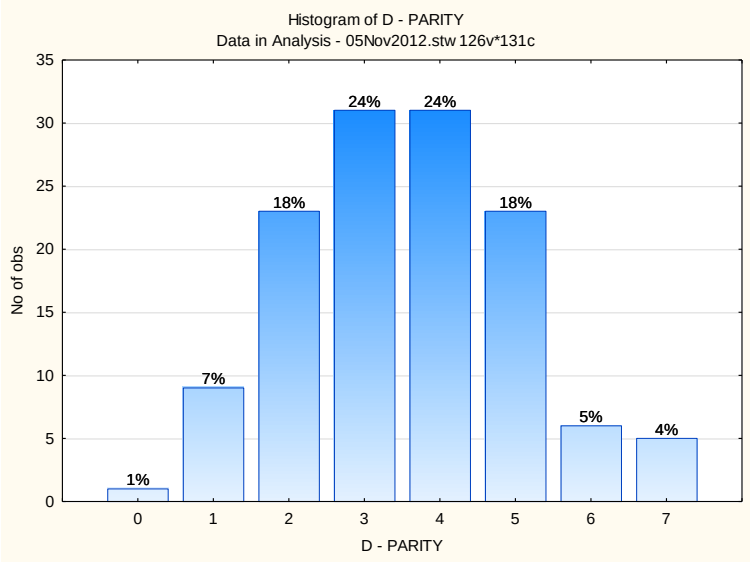


Fig 3.3: Histogram of parity

Urodynamic study results

Out of the 131 women studied, 40 (30.5%) had evidence of SUI determined by either urodynamics and /or cough test in standing position at maximum bladder capacity. Ninety-one women (69.5%) had no evidence of UI on UDS. Of these women with no initial urodynamic SUI, 20 (15.3%) had evidence of OSUI (SUI on reduction of prolapse) and 71 remained continent.

Of the 29 women with pre-operative SUI history, 10 (34.5%) had frank SUI on UDS, and 14 (48.3%) had SUI once reduction of the prolapse was performed during UDS. Of the 11 women with pre-operative UUI history, 4 (36.4%) had detrussor overactivity on UDS. Of the 52 women with a history consistent with MUI, 12 (23.1%) demonstrated mixed incontinence on UDS. In the group with no history of SUI, 11 (22%) had SUI with reduction of the prolapse during UDS. None of this group had urodynamic evidence of frank SUI.

Of all tested women, 43(32.8%) had evidence of overactive detrusor on UDS. Of these, only 27 (62.8%) had a pre-operative history of UUI. (Table 3.3)

When comparing the different types of UI history (MUI, SUI and UUI), there was no significant difference in urodynamic confirmation of UI between the groups ($p = 0.22$), although the history of MUI appeared to be less likely to be confirmed at UDS (23.1%). When adding prolapse reduction at time of UDS, there was still no significant difference in detection of the different types of incontinence ($p = 0.154$), but SUI appeared to be confirmed at a higher rate. However, less than 50% of cases with a history of UI could be demonstrated at time of UDS, with or without prolapse reduction.

The operative procedures performed on the patients in the study, are described in table 3.4 and figure 3.5.

	UDS		
	Yes	No	
SUI history	10 34.50%	19	29
MUI history	12 23%	40	52
UUI history	4 36%	7	11

p= 0.22 Chi squared for trend

Table 3.1: History of urinary incontinence - Urodynamic study results

	UDS + Prolapse reduction		
	Yes	No	
SUI history	14 48.30%	15	29
MUI history	14 26.9%	38	52
UUI history	4 36%	7	11

p= 0.15 Chi squared for trend

Table 3.2: History of urinary incontinence- Urodynamic study results (with prolapse reduction)

Post-operative results

Of the 131 women, 3 did not return for post-operative follow-up. Of the 40 women with SUI at the time of UDS, 36 had 1-step surgery (combination of anti-incontinence procedure and prolapse repair) and 4 had prolapse surgery alone. Thirty-nine of the 40 women attended follow up. Three of the 36 who received combination surgery complained of UI symptoms. One had UUI symptoms and two complained of SUI. SUI could be demonstrated in the one patient. Both patients with SUI found their symptoms to not be bothersome and required

no further surgery. Of the 4 patients who decided to have prolapse surgery only, 3 had persistent symptoms of UI with 1 complaining of mixed UI, 1 of SUI and 1 of UUI.

Of the 20 women with OSUI on UDS, 16 had 1-step (combined) surgery and 4 prolapse surgeries only. Of the 16 who had a concomitant continence procedure, 15 had no post-operative leaking and 1 complained of SUI, but this could not be elicited on examination. All of the 4 who had prolapse surgery alone complained of post-operative UI. One patient complained of UUI and 3 of SUI, 2 of which could be demonstrated.

In the group with no SUI on UDS and manual reduction of POP, 69 of the 71 women had follow-up data. Eight reported leaking, of which 3 had history of UUI, 1 mixed UI, 1 uncertain and 3 of SUI. Only 1 had demonstrable SUI on examination and this patient also required continence surgery at a later stage. (Figure 3.4)

During the time period of the study 4 patients required repeat surgery: 1 for an anti-incontinence procedure as stated above and 3 for prolapse repair surgery.

Number	131
Medical history	
Age	57 (10.7)
Parity	3.6 (1.5)
BMI	32 (6.2)
Reported urinary incontinence before surgery	
None	39 (29.8)
SUI	29 (22.1)
UUI	11 (8.4)
Mixed	52 (39.7)
Findings at pelvic examination	
Uterine prolapse	
Grade 0	29 (22.5)
Grade 1	42 (32.6)
Grade 2	30 (23.2)
Grade 3	24 (18.6)
Grade 4	4 (3.1)
Anterior compartment prolapse	
Grade 0	8 (6.15)
Grade 1	16 (12.3)
Grade2	49 (37.7)
Grade 3	49 (37.7)
Grade 4	8 (6.15)
Posterior compartment prolapse	
Grade 0	47 (36.15)
Grade 1	35 (26.9)
Grade 2	34 (26.15)
Grade 3	11 (8.5)
Grade 4	3 (2.3)
Urodynamic investigation	
Detrussor overactivity	43 (32.8)
Urodynamic stress incontinence	40 (30.5)
Stress incontinence on reduction	20 (15.3)
Max bladder capacity (ml)	396.2 (105.2)
Max detrusor pressure(cm H2O)	60.2 (35.0)
Max urine flow (ml/s)	18.7 (11.0)

Values are means (standard deviation) or numbers (percentage)

Table 3.3: Patient characteristics

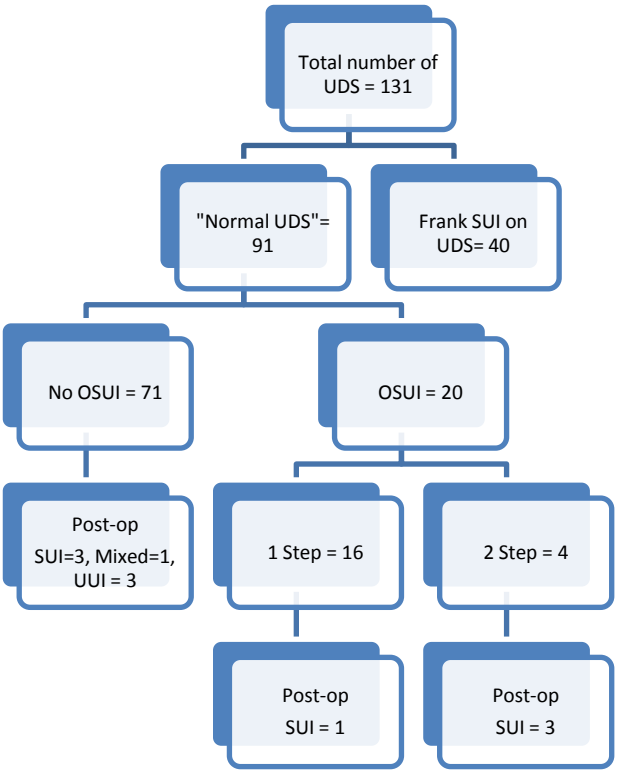


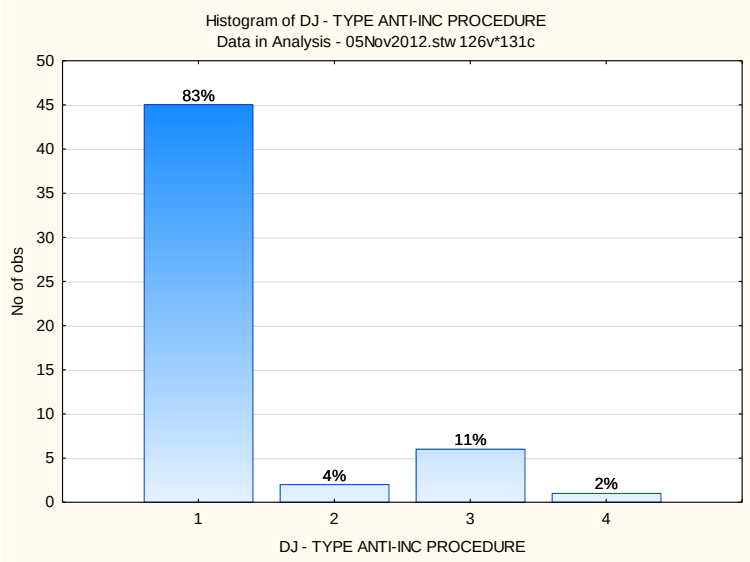
Fig 3.4: Results of urodynamic studies with prolapse reduction

Urodynamic studies and manual reduction of prolapse as a screening test

The sensitivity of UDS was 42.9% and the specificity 98.51% [95% CI, 0.920-0.999]. The positive predictive value (PPV) was 75% [95% CI, 0.194-0.993], with a high negative predictive value (NPV) of 94.37% [95% CI, 0.862-0.988] The group of patients with OSUI, who received prolapse surgery alone, was small (only 4 patients) and 95% confidence intervals for binominal proportions were calculated using exact methods. Wide confidence intervals were noted for sensitivity and PPV.

Number (all surgery)	**131**
Prolapse surgery	
Anterior repair	29(22.1)
Anterior + posterior repair	12(9.2)
Posterior repair	7(5.3)
Ant/ post repair + Sacrospinous ligament fixation (SSLF)	5(3.8)
Vaginal hysterectomy (VH)	3(2.3)
VH + ant/ post repair	24(18.3)
VH + ant/ post repair + SSLF	9(6.9)
Sacrocolpopexy	10(7.6)
Apogee / Perigee	6(4.6)
Ant/ post prolift	19(14.5)
Colpocleisis	1(0.8)
Elevate	3(2.3)
Hysterosacropexy	1(0.8)
Paravaginal repair	1(0.8)
Total abdominal hysterectomy	1(0.8)
Anti-incontinence procedures	**54**
TVT-O	45(83.3)
TVT-R	2(3.7)
Needleless	6(11.1)
Burch colposuspension	1(1.9)

Table 3.4: Procedures Performed



1. TVT-O
2. TVT-R
3. Needleless
4. Burch colposuspension

Fig 3.5: Histogram of type of incontinence procedure performed

Chapter 4
Discussion

The association of urogenital prolapse and urinary symptoms is not well understood. Prolapse stage is not strongly or consistently associated with incontinence severity [30]. In the patient who has no pre-operative urinary symptoms, the development of de novo SUI after prolapse surgery can be very distressing.

OSUI is a still a relatively controversial topic in Urogynaecology. It has been proposed that reduction stress testing can be done prior to prolapse repair surgery, identifying patients with OSUI, at risk of developing post-operative SUI. A benefit of identifying patients with OSUI is the improvement in pre-operative counselling. This would assist the patient in decision-making with regard to the performance of an additional anti-incontinence procedure.

The results of this study show that if patients have no SUI on UDS and manual reduction testing, it is highly likely that they will remain continent following prolapse repair surgery. The group of women identified with OSUI were however small, especially the group who had no concomitant prophylactic anti-incontinence surgery (only 4). We can therefore not verify the hypothesis. The group of women who did not demonstrate OSUI pre-operatively were larger in number (71) and of the 69 that followed up, only 4 had SUI symptoms (3 SUI and 1 MUI). This could be seen as a complement to the hypothesis.

To our knowledge, this is the first South African study looking at predictive values and sensitivities of UDS and prolapse reduction in predicting post-operative SUI. During the time period studied, the number of patients identified with OSUI, were however small, and we cannot make any comment on the sensitivity and PPV of manual reduction as a screening test.

The incidence of SUI history after combined SUI and POP surgery, in patients identified with OSUI pre-operatively was 6.2% (1 out of 16 patients). The SUI could however not be elicited on UDS and the patient did not find the SUI symptoms bothersome. No repeat surgery was required.

In our study OSUI was present in only 15.3% of women with prolapse severe enough to warrant surgical repair. This is similar to the CARE trial, where 19% of subjects were diagnosed with OSUI pre-operatively.

The incidence of post-operative SUI after combined SUI and POP surgery is reported to be between 0% and 7% [7, 32, 33]. Our study showed similar results (6.2%).

The CARE trial [16] was the only randomised controlled trial randomising continent women to either having sacrocolpopexy alone or in conjunction with a prophylactic Burch colposuspension. The trial was prematurely stopped due to the clear benefit shown in the Burch group with regards to post-operative SUI. This study showed that OSUI was associated with an increased risk of post-operative SUI. They did not, however, comment on the specificity and negative predictive values of any of the reduction tests.

Only one prospective longitudinal study (by Srikirishna, Robinson and Cordozo) was identified looking at the specificity and predictive values of the pessary test [14]. In total, 112 women with POP were recruited from surgical lists. All underwent pre-operative videocystourethroscopy. In the women with no urodynamic SUI, a vaginal ring pessary was inserted at maximum bladder capacity and the patient asked to cough in a standing position. If UI was detected after cough they were labelled as having OSUI. They identified 48 women with no SUI on UDS, of which 43 did not demonstrate any incontinence after reduction test and 5 with OSUI. Results showed the test to have poor sensitivity (67%) but high specificity (93%) in predicting post-operative SUI. PPV was low (40%), but a very high NPP was found (98%). Our study identified 91 patients with no SUI on UDS, 71 of whom remained continent after manual reduction testing and 20 with OSUI. Of the 20 with OSUI, 16 received an additional prophylactic procedure at time of prolapse surgery and only 4 had no combined surgery. Looking at the outcome of our data we found a similar trend. (Our study also found a high specificity (98.5%, CI 0.920-0.999) and NPP (94.37%, CI 0.862-0.988), but larger numbers may still be required). Due to the small numbers, we cannot however comment on the sensitivity of manual reduction to predict post-operative SUI.

The addition of a prophylactic continence procedure is not without risk. An increase of detrusor overactivity following combination of surgical procedures has been shown in various studies [1, 7]. In our study none of the patients who demonstrated OSUI pre-operatively and received combination surgery, had UUI post-operatively. In the group with frank UI, who received combination surgery, 1 patient (1 out of 35) complained of post-operative UUI.

To date in the literature, it has been difficult to determine how many cases of post-operative SUI are prevented with prophylactic procedures and how many may have been unnecessarily performed. The need for a reliable screening test for predicting post-operative SUI is assuming increasing importance.

Study limitations

Design

This was a retrospective study, with disadvantages compared to prospective studies. Some key statistics cannot be measured and major biases can impact recall of former exposure to risk variables [31]. Those conducting retrospective studies cannot control exposure or outcome assessment, but instead need to rely on others for accurate note-keeping.
Retrospective studies can also need very large sample sizes for rare outcomes.

Size

The initial number of patients eligible for inclusion was large (131) even after exclusion of women where information on UDS could not be found. The final number of patients with OSUI was however small (20) and of these, only 4 did not have an additional prophylactic continence procedure. This affected the width of the CI of the sensitivity and PPV of our study, with less precise results.

Lack of available data

Of the original 199 patients identified from theatre lists, Urogynaecology records could not be found in 32 and a further 36 patients had either no information on urodynamic studies or incomplete UDS. This reduced the final sample size to 131 women.

Long term follow-up data

With regard to follow up data, 3 patients did not attend follow up visits after surgery. We also do not have formal long-term follow-up data available. Patients attended a 6 week post-operative follow-up and thereafter most patients did not return to the clinic. However patients were informed to return for follow-up should they experience any problems.

Heterogeneity

The study group for surgeries performed for the correction of POP was heterogenous. We looked at POP surgery as a whole. In our clinical setting the surgical procedure offered was tailored to the individual needs of the patient. This heterogenous group included abdominal and vaginal POP surgical procedures. Vaginal and abdominal POP surgeries are associated with different post-operative SUI statistics. Anterior repair vs. anterior intravaginal mesh vs. posterior POP surgical procedures can also present with different post-operative SUI statistics [35].

Conclusion

The numbers in our study are too small to determine sensitivity and positive predictive value of UDS and manual prolapse reduction for the detection of OSUI. However, our data shows promise in identifying POP patients without OSUI, which is a complement of the hypothesis.

UDS can be performed pre-operatively in women undergoing prolapse surgery, to identify patients with urodynamic stress incontinence. Manual reduction of the prolapse at maximum bladder capacity can be done to identify a subgroup of patients without OSUI. The decision whether or not to combine prolapse repair with a prophylactic continence procedure can then be tailored to the individual patient.

Future research is needed on the true predictive value of different reduction methods for the diagnosis of OSUI with larger numbers.

Further research

Further randomised controlled trials are also needed to randomise the performance of an anti-incontinence procedure at time of prolapse repair. Based on the current findings, a total of 132 patients would have to be randomised to either combined surgery or POP repair alone in order to have a 95% CI and 80% power (Statcalc).

A reliable screening test would help aide the clinician in counselling the patient on what to expect following prolapse surgery and help develop an individualised treatment strategy.

Chapter 5
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Addendum 1

UNIVERSITEIT•STELLENBOSCH•UNIVERSITY

01 November 2011 **MAILED**

Dr K Jense van Rensburg
C/O Dr JA Van Rensburg
Department of Obstetrics and Gynaecology
2nd Floor, Clinical Building
Room 2126

Dear Dr Jense van Rensburg

Pre-operative Urodynamic Studies: What is the value in predicting post operative stress urinary incontinence in women undergoing prolapse surgery.

ETHICS REFERENCE NO: N11/08/249

RE : APPROVED

It is a pleasure to inform you that a review panel of the Health Research Ethics Committee has approved the above-mentioned project on 27 October 2011, including the ethical aspects involved, for a period of one year from this date.

This project is therefore now registered and you can proceed with the work. Please quote the above-mentioned project number in ALL future correspondence. You may start with the project. Notwithstanding this approval, the Committee can request that work on this project be halted temporarily in anticipation of more information that they might deem necessary.

Please note a template of the progress report is obtainable on www.sun.ac.za/rda and should be submitted to the Committee before the year has expired. The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly and subjected to an external audit.

Translations of the consent document in the languages applicable to the study participants should be submitted.

Federal Wide Assurance Number: 00001372
Institutional Review Board (IRB) Number: IRB0005239

The Health Research Ethics Committee complies with the SA National Health Act No.61 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 Part 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

Please note that for research at primary or secondary healthcare facility permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Contact persons are Ms Claudette Abrahams at Western Cape Department of Health (healthres@pgwc.gov.za Tel: +27 21 483 9907) and Dr Helene Visser at City Health (Helene.Visser@capetown.gov.za Tel: +27 21 400 3981). Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

Verbind tot Optimale Gesondheid · Committed to Optimal Health
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Approval Date: 27 October 2011 Expiry Date: 27 October 2012

Yours faithfully

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Addendum 2

Western Cape Government
Health

Tygerberg Hospital and
Mitchells Plain & Tygerberg Oral Health Centres

REFERENCE: Research Projects
ENQUIRIES: Dr M A Mukosi

ETHICS NO: N11/08/249

A Retrospective Study:

Pre-operative Urodynamic Studies:
What is the value in predicting post-operative stress urinary incontinence in women undergoing prolapsed surgery?

Dear Dr K Janse van Rensburg

PERMISSION TO ACCESS PATIENT RECORDS

Permission is hereby granted for you to access patient records for this research.

DR D ERASMUS
CHIEF DIRECTOR: TYGERBERG HOSPITAL
Date: 13.05.2012

Administration Building, Francie van Zijl Avenue, Parow, 7500
Tel: +27 21 938-5966 Fax: +27 21 938 6698

Private Bag X3, Tygerberg, 7505
www.capegateway.gov.za

Addendum 3

CASE NR:	

AGE:	

PARITY:	

STRESS INCONTINENCE: Y / N	
Associated with:	
1	Coughing
2	Sneezing
3	Laughing
4	Climbing stairs
5	Jogging
6	Standing up
7	Other
How often?	
1	Daily
2	Weekly
3	Monthly
4	< Monthly

BOTHERSOME?	Y / N

URGENCY:	Y / N

URGE INCONTINENCE: Y / N	
How often?	
1	Daily
2	Weekly
3	Monthly
4	< Monthly

SUMMARY OF SYMPTOMS	
1	Mostly SI
2	Equal
3	Mostly UI

ENURESIS	Y / N

VOIDING FREQUENCY:	
Times/day	
Times/night	

SENSATION OF FILLING	Y / N

SUPRAPUBIC PAIN	Y / N

VOIDING DYSFUNCTION:	
Initiation:	
0	Normal
1	Delay
Stream:	
0	Normal
1	Reduced
Emptying:	
0	Complete
1	Incomplete
Retention:	Y / N
Post-mic dribble:	Y / N

UTI: When last?	
1	Current
2	Last week
3	Last month
4	Last year
5	More than year ago

UTI: Recurrent? Y / N	
How often?	
1	1/WEEK
2	1/MONTH
3	1/YEAR

DYSURIA:	Y / N

HAEMATURIA:	Y / N

SURGICAL HISTORY:	
0	None
1	C/S
2	Abdominal hysterectomy
3	Vaginal hysterectomy

PROLAPSE:	Y / N
Symptoms:	
1	Bulge
2	Dragging
3	Back pain
4	Urinary retention
5	Constipation
6	Pelvic pain
7	Digitalisation

SEXUALLY ACTIVE:	Y / N
Dyspareunia?	Y / N
Coital UI?	Y / N

DEPRESSION:	Y / N

OBSTETRIC HISTORY:	
NVD	
Ventouse	
Forceps	
LSCS	

PERINEAL DAMAGE:	Y / N

MEDICAL HISTORY:	
0	Nil of note
1	Hypertension
2	Diabetes
3	Asthma / COAD
4	Epilepsy
5	TB
6	HIV
7	GERD
8	IBS

PREV PROLAPSE / BLADDER SURGERY:	
0	None
1	Burch
2	Suburethral sling
3	Ant repair
4	Post repair
5	Sacrocolpopexy
6	Vaginal mesh
7	Sacrospinous lig fixation
8	Paravaginal repair
9	Unknown
10	Other

IF (2) SUBURETHRAL SLING: TYPE?	
1	TVT- Retropubic
2	TVT-O
3	Needleless

IF (6) VAGINAL MESH: TYPE?	
1	Prolift
2	Apogee / Perigee

IF (8) PARAVAGINAL REPAIR:	
1	With mesh
2	Without mesh

SMOKER:	Y / N

MEDICATION:	
1	Anti-depressants
2	Diuretics
3	Anti-cholinergics
4	Cardiac medication
5	Anti-hypertensives
6	Other

2.	No
3.	Empty bladder

ANTERIOR COMPARTMENT PROLAPSE: (Grade)	

MIDDLE:	

POSTERIOR:	

Examination:

BMI:	

HGT:	

BIMANUAL EXAMINATION:	
0	Normal
1	Bulky
2	Adnexal mass
3	Nodular

URINALYSIS:	
0	Normal
1	Leucocytes
2	Nitrates
3	Prot
4	Glu
5	More than 2 above

PELVIC FLOOR STRENGHT(1 – 5)	

URINE MCS: Infx	Y / N

ABDOMEN:	
0	Normal
1	Mass palpable

Urodynamic studies:

CNS Intact S2,3,4:	Y / N

PELVIC ORGAN PROLAPSE	Y / N

INTROITUS – Gaping?	Y / N

DEMONSTRABLE SUI:	
Supine, empty bladder	Y / N
With reduction POP	Y / N

PERINEAL BODY – Normal:	Y / N

BLADDER NECK – Mobile:	Y / N

RESIDUAL VOLUME (ml):	

DEMONSTRABLE STRESS INCONTINENCE:	
1.	Yes

BLADDER CAPACITY (ml):	

DETRUSSOR INSTABILITY	Y / N

VALSALVA: ABDOMINAL LEAK POINT PRESSURE	
With Leak	Y / N
If yes: (cm H2O)	

MAX FLOW (ml/sec)	

MAX DETRUSSOR PRESSURE (cm H2O)	

SUI	
Standing:	Y / N
Standing with reduction of prolapse:	Y / N

VOIDING DIARY	
Total in:	
Total out:	

FREQUENCY:	Y / N

NOCTURIA	Y / N

POP-Q Measurements (cm)	
Aa	
Ba	
C	
D	
Ap	
Bp	
GH	

Pb	
TVL	

DECISION MADE:	
1	Prolapse surgery only
2	+ Anti-incontinence procedure
3	2-step approach

IF (2) ANTI-INCONTINENCE PROCEDURE: TYPE?	
1	TVT-O
2	Retropubic TVT
3	Needleless
4	Burch

Did patient follow up?	Y / N

OUTCOME AT 6 WEEK FOLLOW-UP:	
LEAKING:	Y / N
If yes: Is it bothersome?	Y / N
PROLAPSE:	Y / N
If yes: Is it bothersome?	Y / N
REOPERATION: If yes:	Y / N
1	Prolapse surgery
2	Anti-incontinence procedure