Does Obesity Change The Perception of Pelvic Organ Prolapse?

Talia Friedman (taliafried.md@gmail.com)
Sydney Medical School Nepean, the University of Sydney https://orcid.org/0000-0003-2788-8065
Hans Peter Dietz
Sydney Medical School Nepean, the University of Sydney https://orcid.org/0000-0002-2211-6149

Research Article

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Abstract

Introduction and hypothesis: There is a complex relationship between obesity and pelvic organ prolapse. The objective of our study was to evaluate whether body mass index (BMI) changes the relationship between signs and symptoms of prolapse.

Methods This was a retrospective observational study based on datasets of women seen in a tertiary urogynecological centre with symptoms of pelvic floor and lower urinary tract dysfunction between April 2012 and October 2015. Patients underwent a strucrured interview, clinical examination (based on the POP-Q) and 4D transperineal ultrasound (TPUS). Offline assessment of sonographic organ descent was undertaken later, blinded to all patient data.

Results: Weight and BMI affect the relationship between symptoms and signs of prolapse. This effect is statistically highly significant. The more obese a patient is, the less likely she is to notice a given degree of objective prolapse, regardless of whether it is diagnosed clinically or on imaging.

Conclusions In this retrospective study, we found a highly significant effect of weight and BMI on prolapse perception in the sense that obesity seems to mask prolapse while a low BMI increases the likelihood of a given degree of prolapse being noticed by the patient.

Key Message

Weight and BMI affect the relationship between symptoms and signs of prolapse. The more obese a patient is, the less likely she is to notice a given degree of objective prolapse.

Introduction

Studies have shown a clear association between BMI and pelvic organ prolapse (POP) .Aa recent meta-analysis has found that overweight and obese women are more likely to have pelvic organ prolapse compared with women with body mass index in the normal range[1]. This is found to be true mainly for posterior compartment prolapse [2]. The associations between obesity and prolapse were found to be the strongest for objectively measured prolapse[1].

However, correlations between symptoms and clinical findings of prolapse are only poor to moderate even when using objective imaging methods such as ultrasound or magnetic resonance imaging[3,4]. Whitcomb et al published research in which they aimed to determine the prevalence and bother from pelvic floor disorders by obesity severity, hypothesizing that both would increase with higher degrees of obesity. They did find that the prevalence of pelvic floor disorders increased with higher degrees of obesity, however, the degree of bother did not vary by degree of obesity[5].

It is conceivable that higher grades of obesity reduce the likelihood of individuals noticing a lump, either simply because of the impossibility of direct observation, or because of the lack to distinguish between a skin fold and an actual prolapse. We therefore undertook a study to investigate associations between weight and BMI and their influence on the relationship between signs and symptoms of prolapse described subjectively by our patients. Our null hypothesis was 'There is no effect of weight or BMI on the association between symptoms and signs of pelvic organ prolapse'.

Methods

This was a retrospective observational study based on archived datasets of women seen in a tertiary urogynaecological centre with symptoms of pelvic floor and lower urinary tract dysfunction between 5 April 2012 and 1st October 2015.

All patients underwent a physician-directed standardized interview which included several questions on symptoms of prolapse such as the perception of a vaginal lump by visualisation, palpation or vaginal sensation and a vaginal dragging sensation. A clinical examination was performed including the Pelvic Organ Prolapse Quantification system (POP-Q)[6], and a translabial 4D ultrasound examination, using Voluson 730 expert systems with RAB 8 – 4 MHz transducers (GE Kretz Ultrasound, Zipf, Austria)[7].

Prolapse assessments, clinically and by pelvic floor or translabial ultrasound (TLUS), were undertaken as previously described with the subject supine and after voiding. If a residual urine volume of over 100 ml was diagnosed the patient was catheterised prior to assessment. Ultrasound volume data sets (that is, series of up to 36 single volumes) were acquired at rest, on Valsalva maneuver and pelvic floor muscle contraction (PFMC). At least three Valsalva maneuvers > = 6 seconds in duration were performed and volumes acquired on maximum Valsalva maneuver were used for analysis.

Offline assessment of organ descent was undertaken at a later date using 4D View 10.0 software (GE Medical Ultrasound, Ryde NSW, Australia), blinded to all clinical data. All assessors had passed a test-retest series, reaching intraclass correlation (ICC) scores of at least 0.7.

'Clinically significant prolapse' was defined as ICS POPQ Stage 2 or higher in the anterior and posterior compartment, and Stage 1 or higher centrally [8]. The definition of 'significant prolapse' on TLUS was determined relative to a horizontal reference line placed through the inferior symphyseal margin [9] and based on previously published cut-offs (> = 10 mm below the symphysis pubis (SP) for a cystocoele and > = 15mm below the SP for the rectal ampulla) and to the level of SP or lower for enterocele.[10] Significant uterine descent was defined as descent of the uterus to 15mm above the SP or lower[11]. Measurements are given in mm, with negative figures signifying descent below this line.

Statistical analysis was performed with IBM v 24 SPSS software. Multivariate analysis controlling for potential confounders such as age, BMI, previous incontinence or prolapse surgery and hysterectomy was performed using binary logistic regression. A P value of < 0.05 was considered statistically significant. Receiver Operating Characteristic (ROC) statistics were used to assess the association between symptoms and signs of prolapse (by clinical examination and translabial ultrasound) adjusted for weight and BMI. Results were expressed as Area Under the Curve (AUC, 95% Confidence Interval). As performances were found to be similar, logistics regressions were compared using a likelihood ratio test (LRT).

This study was approved by the local Human Research Ethics Committee (NBMLHD HREC 13–70).

Results

1551 patients were seen during the inclusion period. 46 had to be excluded because of missing data, which left 1505 for statistical analysis. The mean age was 56 (range, 17–89) years. The mean BMI was 29 cm/kg^2 (range, 15–64), mean height was 163 (range, 139–185) cm and the mean weight was 77 (range, 39–180) kg. Prolapse symptoms were reported by 824 patients (55%). At least one vaginal delivery was reported by 1387 women. Twenty-six percent (n = 404) gave a history of Forceps delivery. 475 women had undergone a hysterectomy, 425 women had had some form of prolapse or incontinence surgery in the past. 1131 patients (73%) reported stress urinary incontinence and 1130 (73%) urge urinary incontinence.

Clinically significant POP was detected in 1181 (75.9%) patients, a cystocele (POPQ stage ≥ 2) was detected in 877, uterine prolapse (POPQ stage ≥ 1) was detected in 265, and posterior compartment descent (POPQ stage ≥ 2) in 833 cases. Mean Ba was − 1 (range, -3 to 8), mean Bp was − 1 (range, -3 to 9) and mean C was − 4 (range, -11 to 8). On TLUS, significant cystocele, uterine prolapse and rectocele were identified in 616, 300, and 625 cases, respectively. Mean bladder and rectal ampullary position were − 7 (SD 17.9, range, -59 to 44) mm and − 10 (SD 14.4, range, -48 to 40) mm below the pubic symphysis, respectively. Mean uterine descent was to 9 (SD 19.9, range − 51 to 59) mm above the symphysis pubis.

Analysis of the association between symptoms of prolapse on the one hand and height, weight, BMI and prolapse on POPQ on the other hand showed a significant negative association of weight and BMI with symptoms of prolapse. As expected, prolapse on POPQ was strongly associated with symptoms of prolapse (OR 6.36), and this association became stronger when controlling for weight or height (OR 6.63 and 6.46 respectively), see Table 3. Similar results were obtained when using imaging data, see Table 4.

Receiver operator curve characteristics were obtained for models predicting symptoms of prolapse using clinical and sonographic evidence of objective prolapse, weight and BMI. The AUC values for all models were similar and statistically highly significant (0.694–0.703, all $P < 0.001$). As the OR and CI and AUCs were almost identical, the results of logistic regressions were compared using a likelihood ratio test (LRT). The 'Ba' model with the inclusion of BMI was significantly superior at predicting symptoms of prolapse, compared to the model with Ba alone (LRT p-value < 0.0001). Similarly, the 'Cystocele on ultrasound' model with the inclusion of BMI was significantly superior at predicting symptoms of prolapse, compared to the model with Cystocele on ultrasound alone
(LRT p-value < 0.0001).

Discussion

This study has shown that the association between objective pelvic organ prolapse as diagnosed on clinical POPQ examination and imaging on the one hand and symptoms of prolapse on the other hand maybe influenced by obesity. The higher the BMI, the less likely were our patients to notice a given degree of objective prolapse. This finding may have significant implications for the clinical care of obese patients.

There have been a number of studies focusing on the link between obesity and pelvic floor dysfunction. Ramalingam found that obesity is associated with a high prevalence of pelvic floor disorders. He argues that overweight and obese patients present with a spectrum of urinary, bowel and sexual dysfunction problems along with uterovaginal prolapse.[12] They found that urinary incontinence, anal incontinence and sexual dysfunction are more common among obese patients.[12] Kudish et al found that being overweight or obese was strongly associated with the progression of POP [13] after studying the relationship between change in weight and pelvic organ prolapse progression/regression in women over a 5-year period. In addition there have been a number of other studies confirming that BMI is a risk factor for primary POP[14–16]. The higher the BMI is, the risk for primary POP is increased. [17] These findings are reflected in a systematic review and meta-analysis. [1] There are, however, dissenting voices: Subak et al. concluded that BMI had no impact on POP-Q data points [18], and Young et al showed that the association between BMI and prolapse was limited to posterior compartment prolapse.[19]

The effect of weight reduction is controversial. While there seems to be a clear positive effect on symptoms of urinary incontinence, [18,20] this may not apply to prolapse symptoms.[13] Weight loss does not appear to be significantly associated with regression of POP, and suggested that damage to the pelvic floor related to weight gain might be irreversible.[13] Our study suggests a different explanation for the observation that weight loss does not improve prolapse symptoms. It is conceivable that successful weight loss may increase the likelihood of the patient noticing a given degree of prolapse.

Strengths and weaknesses

The strengths of the study include the large population of more than fifteen hundred women seen for symptoms of pelvic floor and lower urinary tract dysfunction. POP and pelvic floor functional anatomy were assessed both clinically and on imaging, using amply validated techniques such as the POPQ system and translabial 4D ultrasound. While assessment bias may be impossible to avoid on clinical examination, imaging analysis was performed blinded against all clinical data, thereby avoiding assessment bias. Imaging is rarely affected by obesity[10], but clinical examination may be hampered by higher degrees of obesity. This could have caused us to underestimate prolapse severity in obese patients, but such bias would have influenced our findings in the opposite direction of what was in fact observed.

The retrospective design of this study is a major limitation, inevitably implying selection bias. On the other hand this resulted in a sample that was greatly enriched compared to the general population, with a high proportion of women (55%) suffering from symptoms of prolapse. Finally, the study population mainly consisted of Caucasians who were symptomatic of pelvic floor dysfunction; hence, results may not be extrapolated to other ethnic backgrounds and to the general population. This is particularly pertinent in view of emerging data on ethnic differences as regards prolapse presentation. [21,22] Similar studies in other ethnic groups and in unselected cohorts are recommended.

Conclusion

Obesity seems to affect the relationship between symptoms and signs of prolapse. This effect is statistically highly significant. The more obese a patient is, the less likely she is to notice a given degree of objective prolapse, regardless of the diagnosis mode- clinically or on imaging. Conversely, the thinner a patient is, the more likely she is to be bothered by a given degree of prolapse. This explains some of the variation in prolapse presentation and may have implications for weight loss programmers.

Declarations

Contributions:

TF: Data acquisition, manuscript writing, data entry, data analysis, final approval

HPD: responsible for study conception and design, drafting the article and revising it critically for important intellectual content.

Conflict of interest:

HP Dietz has received lecture fees and travel support from GE Medical and Mindray. T Friedman has no conflict of interest to declare.

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Tweetable Abstract:

Obesity affects prolapse perception: The more obese a patient is, the less likely she is to notice a given degree of prolapse

Abbreviations

POP pelvic organ prolapse

TPUS trans perineal ultrasound

BMI body mass index

POP-Q Pelvic Organ Prolapse Quantification system

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Tables

Table I: Demographic data (n=1551)

	***Mean (SD, range); §Median (IQR, range); ▯n (%)**
***Age (years)**	56 (13.5,17-89)
▯ Menopausal	1006 (65)
***BMI (kg/m2)**	29 (6.5,15-64)
***Height (cm)**	163 (7.4,139-185)
***Weight (kg)**	77 (17.67, 39-180)
§Parity	2 (2,0-9)
§Vaginal parity*	2 (2,0-9)
▯ At least one vaginal delivery	1387 (89)
▯ Prev. hysterectomy	475 (30)
▯ Prev incontinence/ prolapse surgery	425 (27)
▯ Stress urinary incontinence	1131 (73)
▯ Urge urinary incontinence	1130 (73)
▯ Prolapse Symptoms	824 (53)

Table II : Prevalence of clinically significant prolapse (n=1551)

	n (%)
Any prolapse on clinical examination (POP-Q)	1181(76)
cystocele	877 (57)
uterine prolapse*	265 (25)
Posterior compartment descent	833 (54)
Any prolapse on translabial ultrasound (TLUS)	1130 (73)
cystocele	616 (40)
uterine prolapse*	300 (28)
Posterior compartment descent	625 (40)

***** out of 1076 women with uterus in situ

Table III: Associations with symptoms of prolapse

	OR	95% CI	P value	OR adjusted	95% CI	P value
Height	1.001	0.99-1.015	**0.889**			
Weight	0.99	0.98-0.996	**0.001**			
BMI	0.97	0.96-0.99	**0.001**			
Significant prolapse on POPQ	6.36	4.84-8.36	**<0.001**			
Adjusted for height				**6.18**	**4.70-8.15**	**<0.001**
Adjusted for weight				**6.63**	**5.02-8.76**	**<0.001**
Adjusted for BMI				**6.46**	**4.88-8.55**	**<0.001**

OD= Odds ratios for symptoms of prolapse. OR adjusted- the association between signs and symptoms adjusted for height, weight and BMI respectively. Analyzed by multivariate binary logistic regression.

Table IV: Associations between imaging and symptoms of prolapse

	OR	95% CI	P value	OR adjusted	95% CI	P value
Significant prolapse on imaging	4.75	3.79-5.94	**<0.001**			
Adjusted for height				**4.66**	**3.70-5.86**	**<0.001**
Adjusted for weight				**4.76**	**3.79-5.99**	**<0.001**
Adjusted for BMI				**4.70**	**3.72-5.93**	**<0.001**

OD= Odds ratios for symptoms of prolapse. OR adjusted- the association between signs and symptoms adjusted for height, weight and BMI respectively. Analyzed by multivariate binary logistic regression.