Ultrasound assessment of pelvic organ prolapse: the relationship between prolapse severity and symptoms

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ABSTRACT

Objective At present little information is available to help define whether a certain degree of pelvic organ prolapse is clinically relevant. We performed a retrospective study to define cut-offs for significant pelvic organ descent on the basis of prolapse symptoms.

Methods At a tertiary urogynaecological center, 735 women with symptoms of lower urinary tract dysfunction and prolapse were seen for interview, clinical examination, multi-channel urodynamics and ultrasound imaging, while supine and after voiding, for prolapse quantification. Women with multi-compartment prolapse, i.e. those in whom no compartment was clearly dominant were excluded. Receiver–operator statistics were used to test pelvic organ descent as a predictor of prolapse symptoms.

Results Mean age was 55.1 years, mean parity 2.8 (range, 0–12). Symptoms of prolapse were reported by 188 women (25.6%). Seventy-four showed a symptomatic multi-compartment prolapse and were included, 56 symptomatic women had cystoceles and 48 had rectoceles. Symptomatic cystoceles descended on average to 23.8 mm below the symphysis pubis and symptomatic rectoceles to 21.4 mm below the symphysis pubis. Descent was strongly associated with symptoms of prolapse (both, \( P < 0.001 \)). Receiver–operating characteristics (ROC) statistics suggested a cut-off of 10 mm below the symphysis pubis for cystocele, and 15 mm below the symphysis pubis for rectocele. ROC curves were similar for both compartments (area under the curve, 0.857 and 0.821, respectively).

Conclusions Descent of the bladder to \( \geq 10 \) mm and of the rectum to \( \geq 15 \) mm below the symphysis pubis are strongly associated with symptoms, and these values are proposed as cut-offs for the diagnosis of significant prolapse on the basis of ROC statistics. Copyright © 2007 ISUOG. Published by John Wiley & Sons, Ltd.

INTRODUCTION

It has recently become clear that pelvic organ support in asymptomatic women varies markedly, with a significant minority of asymptomatic nulliparous showing first- or even second-degree pelvic organ ‘prolapse’. This has been shown on imaging\(^5\) and on clinical assessment\(^2\). In parous women, symptoms of prolapse are common, but very variable for a given degree of pelvic organ descent. Clearly, a large proportion of the general population have ‘prolapse’ on clinical examination, and most of them are asymptomatic in that they do not perceive a vaginal lump\(^3,4\).

The available literature on this subject suffers from the fact that some authors consider urinary or bowel symptoms to be symptoms of prolapse\(^5\). From our own data it is clear that a clinical cystocele may be caused by at least two anatomically distinct entities, which were first identified in the 1960s\(^6\) on radiological imaging, and which can also be distinguished on transabdominal ultrasound\(^7\). Not surprisingly, cystocele may be associated with widely differing functional alterations\(^8\). As regards the posterior compartment, the situation is even more complex, with a clinical rectocele potentially due to at least four different anatomical entities\(^9\) that have varying functional implications\(^10\). In addition, an association between a given symptom – e.g. fecal incontinence – and a clinical finding such as organ descent, may be due to a common etiology (e.g. traumatic childbirth), rather than a causal association\(^4\).

Studies correlating clinical findings with bladder or bowel symptoms have generally yielded poor associations\(^5,11\). Most symptoms of bladder or bowel dysfunction traditionally regarded as symptoms of prolapse in fact do not predict pelvic organ prolapse\(^12\). The term ‘prolapse symptoms’ should therefore be limited to the sensation of a vaginal lump or bulge, and correlations between this sensation and clinical findings are somewhat better\(^12\). Several authors have shown that women
who complain of a vaginal bulge are more likely to be found to suffer from prolapse on clinical examination (see the article by Barber\(^4\) for an overview), but the statistical properties of the relationship between symptoms and single compartment prolapse do not seem to have been investigated in detail.

As a result, little information exists that would help clinicians decide whether a certain degree of prolapse is relevant or not, or whether the symptoms reported by the patient are sufficiently explained by clinical findings or the results of imaging studies. This is an important issue given the fact that prolapse is generally considered a relative indication for surgical treatment. Cut-offs to define significant prolapse may also be useful whenever analysis requires a dichotomous variable. We therefore performed a retrospective study in order to mathematically define appropriate cut-offs for significant pelvic organ descent on the basis of the likelihood of symptoms.

**METHODS**

In a retrospective study we reviewed the records of 735 women who had been seen for symptoms of lower urinary tract dysfunction and prolapse at a tertiary urogynecological center. The assessment included an interview, clinical examination, multi-channel urodynamics and imaging. Two-dimensional (2D) and three-dimensional/four-dimensional (3D/4D) capable ultrasound systems (Philips ATL HDI 1000 (Philips, Sydney, Australia) and Medison SA 8000 (Medison/Excelray, Sydney, Australia) were used to determine pelvic organ descent on maximal Valsalva maneuver (best of at least three attempts) as previously published\(^7\). Figures 1 and 2 show examples of prolapse quantification on translabial ultrasonography, with the inferior margin of the symphysis pubis used as a line of reference. In all cases, translabial ultrasonography was carried out either by the first author, or by personnel trained by him for at least 50 consecutive examinations, with the patient supine and after voiding. The method has been shown to correlate well with clinical prolapse assessment\(^13\) using the prolapse quantification system of the International Continence Society\(^14\). Repeatability of measures also has been assessed and was found to be good to excellent, with intraclass correlation coefficients (ICC) of 0.89 for the anterior compartment, 0.73 for the central compartment and 0.64 for the posterior compartment\(^1\).

In order to define the association between a given degree of organ descent resulting in symptoms of prolapse (feeling of a vaginal lump or bulge, or a dragging sensation), we excluded all those women in whom there was prolapse of several compartments, without one compartment being clearly dominant over the others in terms of descent (> 10 mm difference between measurements of descent).

This retrospective study was approved by the local Human Research Ethics Committee. Statistical analysis was performed after normality testing (histogram analysis and/or Kolmogorov–Smirnov testing), using Minitab V. 13 (Minitab Inc., State College, PA, USA) and SPSS V 12 (SPSS, Inc., Chicago, IL, USA). We used Student’s t-test and obtained receiver–operating characteristics (ROC) curves. \(P \leq 0.05\) was considered statistically significant.

**RESULTS**

The mean age of the 735 women included in this study was 55.1 (range, 17.9–90.9) years and mean parity was 2.8 (range, 0–12). They suffered from stress incontinence (78.9%), urge incontinence (74.1%), frequency (38.1%), nocturia (49.1%) and symptoms of voiding dysfunction (29.8%). Information on prolapse symptoms was missing in six patients; 188 reported such symptoms (25.6%). Seventy-four women showed a symptomatic multi-compartment prolapse and were excluded from the analysis.

The 114 women with symptomatic single compartment prolapse included 56 cystoceles and 48 rectoceles. Symptomatic cystoceles descended on average to 23.8 mm below the symphysis pubis (range, 14 mm above to 53.4 mm below), while symptomatic rectoceles descended to 21.4 mm below the symphysis pubis (range, 10 mm above to 43 mm below). Descent was highly significantly associated with symptoms of prolapse...
DISCUSSION

Female pelvic organ prolapse is a common condition, with over 225 000 women operated on for prolapse in the US in 1997\(^{15}\), but there are no generally accepted guidelines to inform treatment decisions. A number of symptoms traditionally regarded as being due to (and used to justify surgery for) prolapse, such as frequency, nocturia, or constipation, clearly are not generally associated with prolapse\(^{12,16}\).

Current assessment criteria result in the labeling of approximately one quarter of the young nulliparous female population as suffering from prolapse. This implies that the condition may in fact be over-diagnosed – one is tempted to call it an early example of ‘disease mongering’.

The prevalence of mild prolapse in young nulliparous women\(^{1}\) and in general parous populations\(^{3}\), and the fact that bladder neck descent is a heritable trait\(^{17}\) means that first-degree descent of pelvic organs should probably be regarded as normal. This is important as prolapse is seen as a relative indication for pelvic reconstructive surgery. Surgery is generally undertaken when there are significant symptoms of prolapse, and when anatomical correction can be expected to relieve symptoms\(^{11}\). While other symptoms such as those of voiding dysfunction\(^{8}\) and obstructed defection\(^{10}\) may be associated with certain forms of prolapse, it is only the sensation of a vaginal lump or bulge that clearly correlates with clinical prolapse\(^{11,12}\), and it has been claimed that it is this symptom that discriminates between a normal anatomic variation and a disease state\(^{11}\).

In general, correlations between symptoms of prolapse (the feeling of a vaginal lump, or vaginal fullness) and clinical findings are only moderate\(^{4,5,12}\). This may be partly due to suboptimal clinical assessment techniques, in particular a lack of awareness of potential confounders such as levator co-activation on Valsalva maneuver\(^{7,18}\). For this reason we have undertaken a retrospective analysis of a cohort of women assessed for prolapse by translabial ultrasonography. In order to distinguish between anterior and posterior compartment prolapse we omitted all women in whom there was symptomatic multi-compartment prolapse. Similar to the findings in studies using clinical prolapse assessment\(^{11}\), numbers for isolated prolapse, –23.8 mm vs. –1.3 mm, \(P < 0.001\); rectocele, –21.4 mm vs. –1.5 mm, \(P < 0.001\). Numbers for isolated uterine prolapse or isolated enterocele were too low for meaningful analysis (\(n = 10\)).

When the data were analyzed with the help of ROC curves (Figures 3 and 4), a compromise between avoiding false negatives and optimizing true positives suggested a cut-off of –10, i.e. 10 mm below the symphysis pubis, for cystoceles, and –15 mm for rectoceles. ROC curves were similar for both anterior and posterior compartments, although the relationship between descent and symptoms was stronger for the anterior compartment (area under the curve 0.857 and 0.821, respectively).
uterine prolapse were too low for analysis, which is why this study is limited to bladder and rectal descent.

From our data it appears that anterior and posterior compartment descent is unlikely to be symptomatic if the organ in question remains above the inferoposterior margin of the symphysis. A cut-off of 10 mm below the symphysis pubis seems to be at the midpoint of the ROC curve for the anterior compartment, while a cut-off of 15 mm below the symphysis pubis may be more appropriate for the posterior compartment. Those cut-offs may become useful whenever there is a need to dichotomize prolapse for research purposes, and to judge the likelihood of symptoms arising from a given degree of anterior or posterior compartment descent. However, our study also clearly demonstrates that many women with larger cysto- or rectoceles were asymptomatic, and it is recognized that the role of potential confounders, such as congenitally increased pelvic organ mobility,17, hormone status, stool quality and pelvic floor resting tone and activation, will require further investigation. It is likely that the limited correlations between prolapse symptoms and clinical or imaging findings4,11,19 are at least partly due to those confounders.

As regards the difference in cut-offs obtained for anterior and posterior compartments, this effect has not been observed in studies using clinical assessment.11 It is very likely an artifact of the ultrasound method used to quantify prolapse, owing to the fact that our line of reference is not parallel to the hymen on Valsalva manoeuvre. Clinical prolapse assessment disregards the fact that the posterior fourchette may descend significantly relative to the bony pelvis, regardless of whether there is any vaginal prolapse, owing to perineal hypermobility. As a consequence, one may see quite significant rectal descent on ultrasonography without clinical prolapse. This phenomenon may also be responsible for the lower correlation between posterior compartment prolapse and symptoms observed in this study.

One could argue that any degree of prolapse is irrelevant if it does not cause symptoms. However, at the very least this study defines the likelihood of symptoms of prolapse for a given degree of bladder or rectal descent. As some women describe symptoms of prolapse without there being any clinical correlate, our findings allow for a ‘plausibility check’: symptoms of prolapse described in someone with a cystocele that descends to 2 cm below the symphysis pubis are entirely plausible, as about three-quarters of women with this degree of prolapse in our population would share such symptoms. Clearly, our data also confirm that there is no obvious threshold that would distinguish symptomatic from asymptomatic prolapse.11

Finally, our findings have implications for the surgical repair of prolapse. A mild degree of residual descent after reconstructive surgery is probably quite acceptable since it is unlikely to result in recurrent symptoms.

In conclusion, descent of the bladder to ≥ 10 mm below the symphysis pubis on translabial ultrasound imaging, and descent of the rectum to ≥ 15 mm below this line, are strongly associated with symptoms and are proposed as cut-offs for the ultrasonic diagnosis of significant prolapse on the basis of ROC characteristics.

REFERENCES