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THE TIME FACTOR IN THE ASSESSMENT OF PROLAPSE AND LEVATOR BALLOONING

Hypothesis / aims of study

The assessment of female pelvic organ prolapse (FPOP) is usually undertaken by asking a recumbent patient to perform a Valsalva maneuver. It is likely that variations in maximum intra-abdominal pressures influence findings, but this factor is usually impossible to control for. Other confounders may be levator co-activation (1) and the duration of the Valsalva maneuver. Neither pressure nor duration have to date been investigated in the context of prolapse assessment. In addition, the development of pelvic organ prolapse may not be synchronous with the development of hiatal distension ('ballooning'), a factor that is commonly associated wirth FPOP. It is not clear whether increased hiatal dimensions are cause or effect of increased pelvic organ descent. In this study we aimed to a) determine the time course of organ descent and hiatal distension during maximal Valsalva, and b) define whether it is organ descent or hiatal ballooning that occurs first.

Study design, materials and methods

In a retrospective study we selected 50 datasets of consecutive patients seen between January and March 2009. The entry criterion was significant prolapse on Valsalva on ultrasound imaging (cystocele to 10 mm below the symphysis pubis, uterus or enterocele to the symphysis pubis, or descent of the rectal ampulla to 15 mm below the symphysis) as described previously(2). The archived 4D translabial ultrasound datasets of those 50 women were then analysed. We selected 10 individual volumes for each patient, from rest to maximal Valsalva, spaced evenly regardless of temporal resolution of the individual cine loop of volumes. In each selected volume we measured both descent of the dominant prolapsing organ and hiatal area as previously described(3), see Figure 1. The resulting datapoints were then converted to a percentage of maximal descent/ hiatal distension for all ten time points and plotted against the time line (see Figure 2).

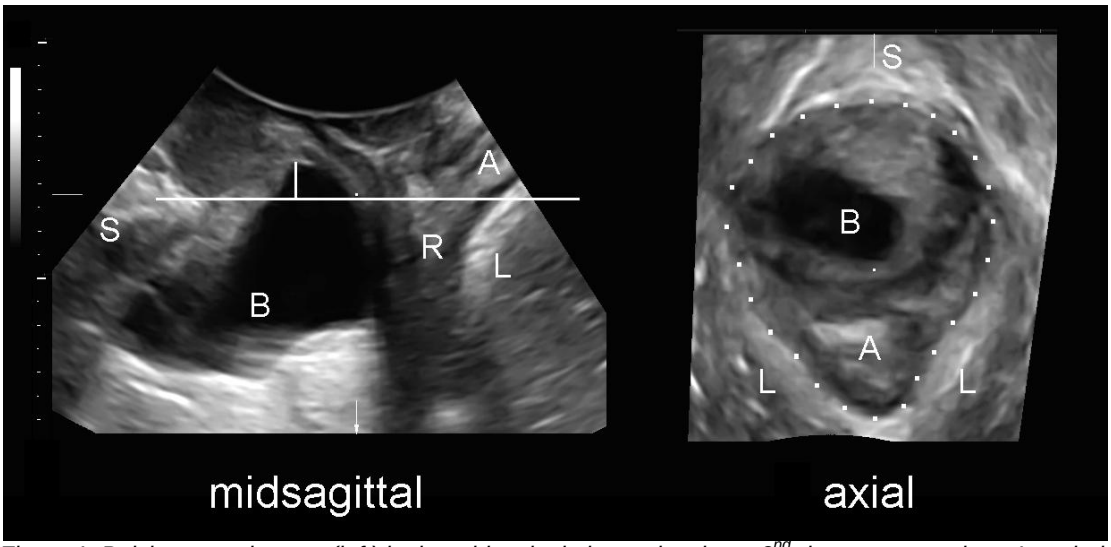

Figure 1: Pelvic organ descent (left) in the midsagittal plane, showing a 2nd degree cystocele to 1 cm below the symphysis pubis (horizontal line is the line of reference, the vertical line illustrates maximum bladder descent). The right image shows hiatal distension as imaged in the axial plane, with mild ballooning to 26 cm2. S= symphysis, B= bladder, R= rectal ampulla, A=anal canal, L= levator ani. The dotted line on the right outlines the levator hiatus.

Results

Interobserver reliability data (n=32) was obtained for organ descent (ICC 0.96, CI 0.91-0.98) and for hiatal area (ICC 0.93, CI 0.86- 0.96), indicating excellent repeatability. The mean age was 59 (range, 37-79). Patients presented with stress incontinence (n=36), urge incontinence (n=30), frequency (n=8), nocturia (n=21), symptoms of voiding dysfunction such as hesitancy, poor stream, stop- start voiding (n=15) and symptoms of prolapse (vaginal lump or dragging sensation (n=35). 48 had delivered vaginally, 23 had had a hysterectomy, and 13 had had an anti- incontinence or prolapse procedure. On clinical assessment, 100% had a significant (ICS POP-Q Grade 2 or higher) prolapse. This was a cystocele in 36 cases, a uterine prolapse in 4, an enterocele in 4 and a rectocele in 32 patients. Ten volumes per patient had been registered during the course of a Valsalva maneuver that lasted on average 9.4 seconds (range, 5 to 18). The dominant prolapse observed on ultrasound was a cystocele in 31 patients, a uterine prolapse in one, an enterocele in 4 and a rectocele in 14. The leading edge of prolapse reached a maximum of 25.5 mm below the symphysis pubis on average (range, 8.2 to 44.5 mm below). The mean maximum area on Valsalva was 33.7 (range, 17.2 to 55.0) cm2. There was a significant correlation between maximum area on valsalva and maximum organ descent (r=0.328, P= 0.017). Percentages of maximum reached in a given volume are presented in Figure 2a, showing that it took patients on average about 6 volumes, i.e., 5-6 seconds, to reach 80% of maximum pelvic organ descent.

Figure 2b illustrates the volumes by which maximum descent or distension had been reached. Time to maximum organ descent was 8.9 (SD 3.0) seconds whereas time to maximum distension of the levator hiatus was 8.2 (SD 2.8), P= 0.031 on paired t-test.

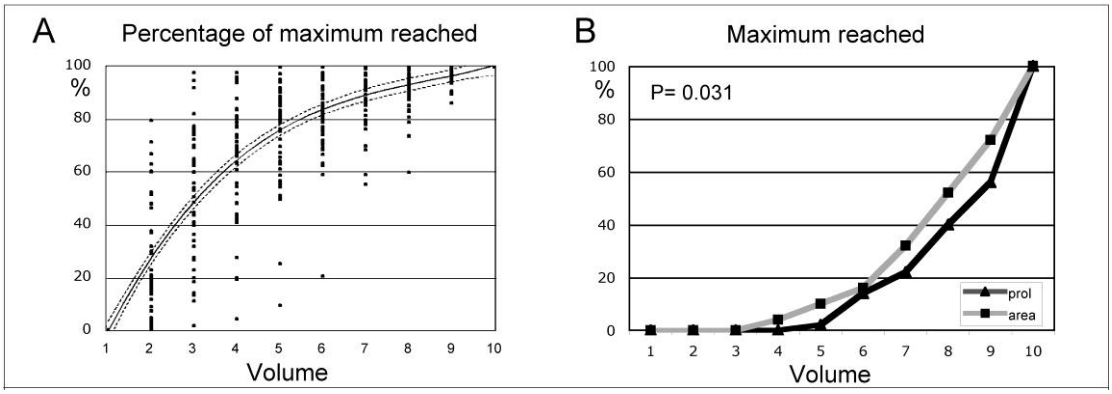

Figure 2a: Percentage of maximum organ descent reached in volumes 1-10. The line is a fitted line plot with 95% confidence intervals. Figure 2b shows the number of volumes by which maximum distension ('area') and organ descent ('prol') had been reached. For example, maximum distension was first reached twice in volume 4 and 3 times in volume 5, whereas maximum organ descent was first reached, and in one patient only, in Volume 5.

Interpretation of results

In order to reach maximum organ descent, a Valsalva had to last on average 9 seconds in the assessments analysed for this study. 80% of final organ descent and distension was reached after about 6 seconds. This implies that duration of Valsalva is a substantial factor in any assessment for FPOP, and it is one that is generally ignored. We propose that a Valsalva has to be sustained for more than 5 seconds on average in order to achieve near-maximal pelvic organ descent. Maximum distension was reached significantly earlier (P= 0.031) than maximum pelvic organ descent. This finding supports the hypothesis that hiatal distension is not just the result of organ descent but a potential aetiological factor.

Concluding message

In order to obtain an adequate assessment of pelvic organ prolapse, a maximum Valsalva should last at least 6, and optimally ten seconds. Hiatal distension seems to precede pelvic organ descent.

References

1. Ultrasound Obstet Gynecol 2007; 30: 346-350
2. Ultrasound Obstet Gynecol 2007; 29: 688-691
3. Ultrasound Obstet Gynaecol 2005; 25: 580-585

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Was this study approved by an ethics committee?	**Yes**
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Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**No**