

Warping of the levator hiatus: how significant is it?

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Abstract

OBJECTIVES: The levator hiatus is the largest potential hernial portal in the human body. Excessive distensibility is associated with female pelvic organ prolapse (POP). Distension occurs not just laterally but also caudally, resulting in perineal descent and hiatal deformation or 'warping'. The aim of this study was to quantify the warping effect in symptomatic women, to validate the depth of the rendered volume used for the 'simplified method' of measuring hiatal dimensions and to determine predictors for the degree of warping.

METHODS: This was a retrospective study utilizing records of patients referred to a tertiary urogynecological service between November 2012 and March 2013. Patients underwent a standardized interview, clinical assessment using the POP quantification system of the International Continence Society and four-dimensional translabial ultrasound. The craniocaudal difference in the location of minimal distances in mid-sagittal and coronal planes was determined by offline analysis of ultrasound volumes, and provided a numerical measure of warping. We tested potential predictors, such as demographic factors, signs and symptoms of prolapse, levator avulsion and levator distensibility, for an association with warping.

RESULTS: Full datasets were available for 190 women. The mean craniocaudal difference in location of minimal distances in mid-sagittal and coronal planes was -1.26 mm (range, -6.7 to 4.6 mm; $P < 0.001$). This measure of warping was associated with hiatal area on Valsalva maneuver ($r = -0.284$; $P < 0.0001$) and signs of significant prolapse on clinical and ultrasound examination (both $P < 0.0001$).

CONCLUSIONS: The plane of minimal dimensions of the levator ani hiatus is non-Euclidean, i.e. warped, and the degree of warping is associated with hiatal distension, or 'ballooning', and with POP. However, the degree of warping is minor, the largest difference we found in the location of the plane of minimal dimensions being 6.7 mm. Hence, our results support the determination of hiatal area in a rendered volume of 1-2 cm in depth.