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An Introduction to a New Technology for Measuring Urethral Pressures: 3-D High Resolution Manometry

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Abstract

Introduction and Hypothesis: To introduce a 3-dimensional (3-D) high resolution manometry (HRM) system to the field of Urogynecology. We sought to demonstrate how to obtain and interpret dynamic urethral pressures with this measurement system and use it to evaluate a pre- and postoperative female subject.

Methods: The 3-D HRM catheter is approximately 12-French. 11cm of its length has pressure sensors with 8 circumferentially distributed pressure sensitive segments that collect and transmit individual pressure measurements to construct a 3-D pressure map. In this video, we demonstrate the output display of the 3-D HRM measurement system.

Results: Pressure output maps are shown in one woman with stress urinary incontinence and one woman with a history of stress urinary incontinence who underwent successful midurethral sling surgery. We also show a summary of 3-D pressure measurement patterns of 44 subjects who underwent pressure measurements to qualitatively evaluate the 3-D pressure profile of the urethra in an effort to better understand pelvic floor and urethral sphincter physiology.

Conclusions: Advanced HRM technology to measure urethral pressures under cough and strain conditions without withdrawal techniques provide new insights into the continence mechanism in continent and incontinent women and after continence surgeries.

Keywords

High resolution manometry; 3-dimensional urethral pressure profile; maximum urethral closure pressures; stress urinary incontinence; midurethral sling; urodynamics

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Conflict of interest statement for each author

The authors declare that they have no conflict of interest.

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This video and associated text were presented at AUGS/IUGA in Washington, DC July 2014.

Aim of video/introduction:

The objective of this video is to introduce a 3-dimensional (3-D) high resolution manometry (HRM) system to the field of urogynecology. We sought to demonstrate how to obtain and interpret dynamic urethral pressures with this measurement system and use it to evaluate pre- and postoperative female subjects as well as the directionality of the forces on the urethra.

Method:

The 2-dimensional (2-D) HRM catheter is approximately 8-French and has circumferential pressure sensors along 26.5cm of its length. The miniaturized solid state sensors are 4mm long with 2mm of active sensing area separated by 3mm of flexible molding giving a 7.5mm on center spacing between each of the 36 sensors. Each individual sensor has 16 pressure sensitive segments circumferentially distributed around it. Computer processing of the signal comes from the pressure sensing elements and calculates average circumferential pressures.

The 3-D HRM catheter is approximately 12-French. 11cm of its length has pressure sensors with 8 circumferentially distributed pressure sensitive segments that collect and transmit individual pressure measurements to construct a 3-D pressure map. In this video we introduce the equipment and explain the output display of the 3-D HRM measurement system in two example studies: one in a subject with primary stress incontinence prior to midurethral sling (MUS) surgery and one in a continent subject after MUS.

In this video, we present the pre- and postoperative maximum urethral closure pressures (MUCPs) of 21 female subjects with stress urinary incontinence, who underwent MUS surgery. We also show 44 subjects who underwent pressure measurements to qualitatively evaluate the 3-D pressure profile of the urethra in an effort to better understand pelvic floor and urethral sphincter physiology.

Conclusion:

Advanced 2-D and 3-D HRM technology to measure urethral pressures under cough and strain conditions without withdrawal techniques provides new insights into the continence mechanism in continent and incontinent women and after continence surgeries.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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