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Research Abstracts

Kinematic Differences Between Novice and Expert Surgeons During Simulated Midurethral Sling Surgery

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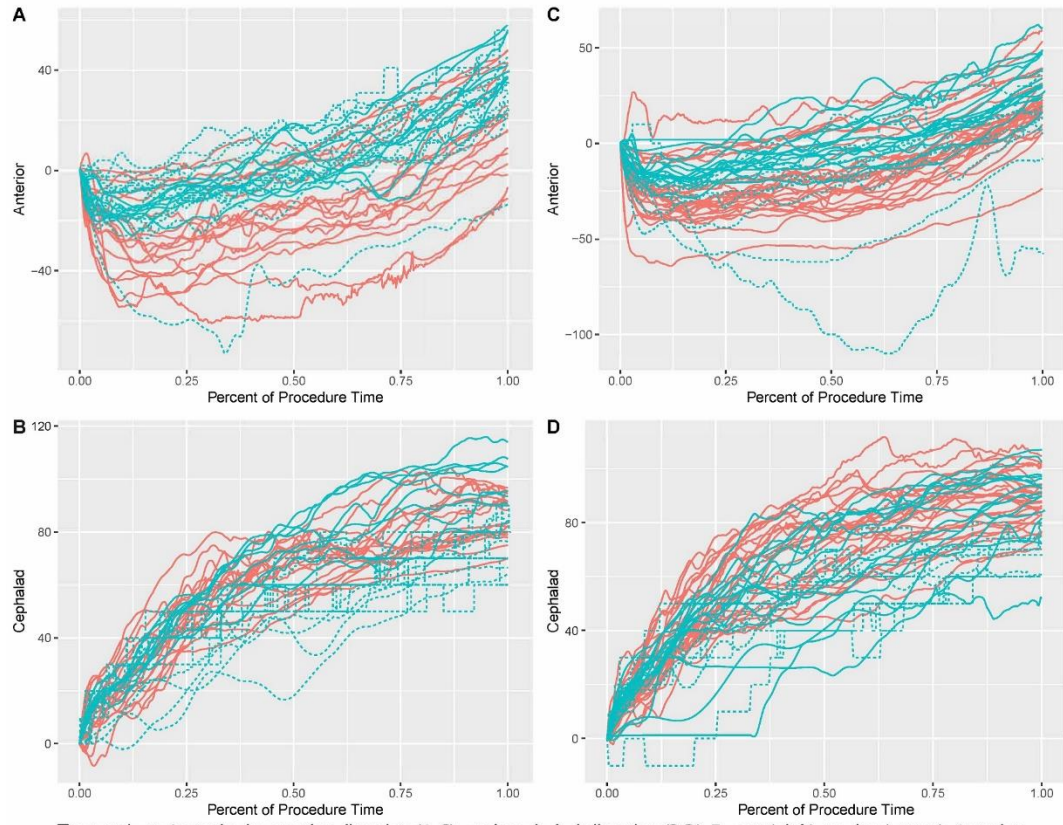
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Introduction: The Midurethral Sling surgery (MUS) involves well-documented injuries to the bladder. Our objective was to investigate trocar kinematic differences between novice and expert surgeons during a simulated MUS.

Methods: Three MUS simulation models were created from MRI segmentations of women with stress urinary incontinence. Three expert and three novice surgeons performed retropubic passage of a Gynecare TVT trocar model#810041B connected to a Gynecare TVT Introducer model#810051 on the models. Reflective markers and the OptiTrak motion capture system were used to track the motions of the trocar and the model. Multibody models (MB) and motion data were used to analyze trocar kinematics and contact with pelvic structures. We performed Chi-squared tests to test the hypothesis that errors, defined as bladder contact or passage anterior to the bone, would occur more frequently among novices compared to experts. We used mixed model analysis with random effects to test the hypothesis that novices, compared to experts, would perform passes with longer trial duration and path length.

Results: Each participant performed 15 passes. Novices made more total errors (bladder + anterior), but the result was not significant (60.0% vs 40.0%, $p = 0.091$). Experts made fewer anterior passes than novices (Right: 0% vs 63.6%, $p < 0.01$; Left: 0% vs 39.1%, $p < 0.01$). (Figure 1) There was no difference between experts and novices in bladder contact (Right: 40.7% vs 21.4%, $p = 0.305$; Left: 38.9% vs 12.5%, $p = 0.360$). Experts had longer mean trial duration (9.7 vs 8.1 seconds, $p=0.085$) and path length (277.6 vs 205.4 mm, $p=0.043$) relative to the novices.

Conclusions: Novice error passes were predominantly anterior to the suprapubic bone. This simulation model can be used for surgical education in avoiding anterior passage of the trocar or contact with the bladder.



Trocar tip trajectories in anterior direction (A,C), and cephalad direction (B,D). Expert (pink), novice (green). Anterior passages are denoted by dotted lines. Left trocar passages are in panels A and B, and right passages are in panels C and D.