

Ureteral Anti-retropulsive Devices Reduce Renal Pelvic Pressures: an *Ex Vivo* Porcine Model

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Introduction and Objective: Irrigation during ureteroscopy can generate significant intrapelvic pressure within the kidney, which may lead to increased fluid absorption and pyelovenous backflow. Devices to limit retropulsion of stone fragments during lithotripsy partially occlude the lumen of the ureter between the ureteroscope and the kidney. The objective of this study was to determine the effect of such occlusive devices on intrapelvic pressures in an *ex vivo* porcine model during flexible ureteroscopy.

Methods: The kidneys, ureters, and bladder were excised *en bloc* from a female pig and used as our model. A 5 French urodynamic catheter (Cook Urological) was inserted into the renal pelvis and sutured in place in a fluid-tight manner. Pressure was transduced and recorded on a urodynamics system (Laborie Aquarius). A flexible, 8 French ureteroscope (ACMI) was inserted over a guidewire with normal saline irrigation at 300 cm H₂O. Pressure in the renal pelvis was monitored for three minutes with the ureteroscope positioned 10 cm, 20 cm and 30 cm proximal to the ureteral orifice (UO). After baseline measurements, a 7 mm Accordion (PercSys), 10 mm Accordion (PercSys), 7 mm Stone Cone (Boston Scientific), or 7 mm NTrap (Cook) was advanced next to the ureteroscope and engaged within the ureter 7-10 mm proximal to the tip of the ureteroscope. Pressures again were measured for three minutes at each of three positions (10, 20 and 30 cm from the UO). The mean pressures were analyzed with Student's t-test.

Results: The Accordion devices decreased the pelvic pressures by 14%, 32% and 13% (7 mm device) and 13%, 49%, and 22% (10 mm device) when deployed at the 10 cm, 20 cm, and 30 cm positions, respectively. The Stone Cone and NTrap devices reduced pelvic pressure by less than 5% at the three positions.

Conclusions: Ureteral anti-retropulsion devices decreased renal pelvic pressures in this porcine model. The Accordion device (7 and 10 mm) resulted in the largest pressure drops. Further study in a human cadaveric model is planned.

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