

Novel Peditrol® Irrigation Device Provides Superior Irrigation Flow and Acceptable Pressures for Flexible Ureteroscopy.

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**Introduction:** Ureteroscopy is a common urological procedure which requires good vision to accurately and efficiently deal with calculi. Techniques that improve irrigation flow greatly enhance vision. Peditrol® is a novel, hands-free irrigation device which delivers a bolus of irrigant through the ureteroscope when the foot pedal is deployed. The purpose of this study was to quantify the flow and pressures created by the Peditrol® device versus commonly used methods of irrigation.

**Methods:** The study was performed in 2 stages. Flows through a flexible 6.9 F Olympus ureteroscope and a 7.5 F semi-rigid ACMI ureteroscope were measured with the working channel empty, and with a 2.2 F nitinol basket or a laser fiber placed in the working port. Irrigation flow was pressurized by the following methods: gravity drainage at 100 cm H<sub>2</sub>O, pressurized irrigation at 300 cm H<sub>2</sub>O via a pressurized irrigation bag, fluid bolus through a 60 cc syringe, and the Peditrol® device. The second stage involved measuring pressures in an ex-vivo cadaveric porcine kidney using the same techniques to pressurize the irrigation flow. A 20 gauge angiocatheter was placed through the parenchyma into the renal pelvis under ureteroscopic vision and attached to a pressure transducer.

**Results:** With the Peditrol® device, mean flows were superior in a flexible ureteroscope ranging from 2 to 6 times that of pressurized irrigation at 300 cm H<sub>2</sub>O and similar to a handheld-syringe (0.7 to 1.1 times). The benefit was most pronounced with a 2.2 F basket or 200 µm laser fiber in the working port (3.3 & 6.3 times respectively). The Peditrol® device demonstrated intra-pelvic pressures less than 30 cmH<sub>2</sub>O when used with a 12/14 F ureteral access sheath. Without a ureteral access sheath the intra-pelvic pressure reached 92 cmH<sub>2</sub>O which was similar to the pressures reached with the semi-rigid ureteroscope under various irrigation conditions (74 – 246 cmH<sub>2</sub>O) and comparable to the handheld syringe method through the flexible ureteroscope (88 cmH<sub>2</sub>O).

**Table 1 - Mean Flows (ml/min)**

	100cm H <sub>2</sub> O (Gravity)	300cm H <sub>2</sub> O (Pressure Bag)	Peditrol®
Flexible ureteroscope	29	96	193
Flexible with 2.2 basket	4.5	23.5	148
Flexible with 200µm laser fiber	11	55.5	182

**Table 2 -Intrapelvic pressure (cm H<sub>2</sub>O)**

	100cm H <sub>2</sub> O (Gravity)	300cm H <sub>2</sub> O (Pressure Bag)	Peditrol®	60cc Syringe
Semi-Rigid	74	170	210	246
Flexible - no sheath	23	51	92	88
Flexible - sheath	1	8	29	33

**Conclusions:** The Peditrol® irrigation device generates superior irrigation flow through a flexible ureteroscope versus gravity or pressurized irrigation and flow similar to handheld syringe irrigation. This beneficial effect was most pronounced with an instrument in the working port. The intra-renal pressures created by the Peditrol® device when used with a flexible ureteroscope and ureteral access sheath are low. When a ureteral access sheath is not used the intra-renal pressure is similar or lower to pressures obtained when using a semi-rigid ureteroscope with different irrigation modalities. The Peditrol® device appears to be a useful tool to facilitate ureteroscopy and awaits further assessment in clinical studies.