

Development and Validation of an *in vitro* Kidney Model for Measuring Intrapelvic Pressure During Ureteroscopy

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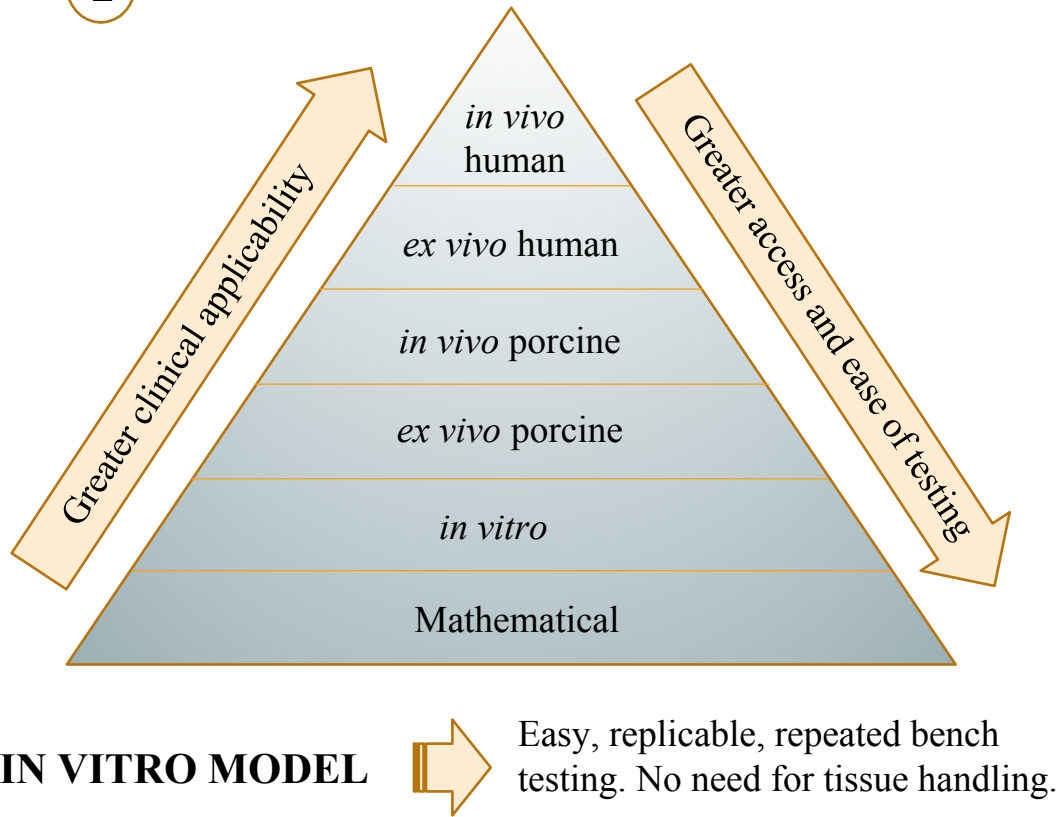
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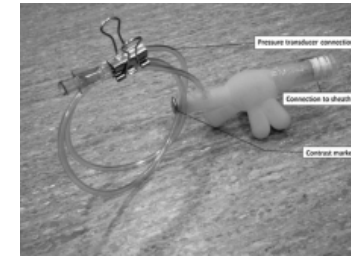
1 Why study intrapelvic pressure (IPP)?



2 How is IPP studied?



3 Past *in vitro* models used to study IPP are modest and unable to replicate *in vivo* IPP profiles



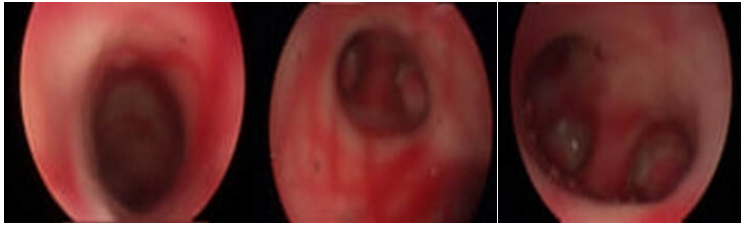
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GOAL: Create an anatomically accurate *in vitro* kidney model that can permit intrarenal navigation with URS **while replicating *in vivo* IPPs**

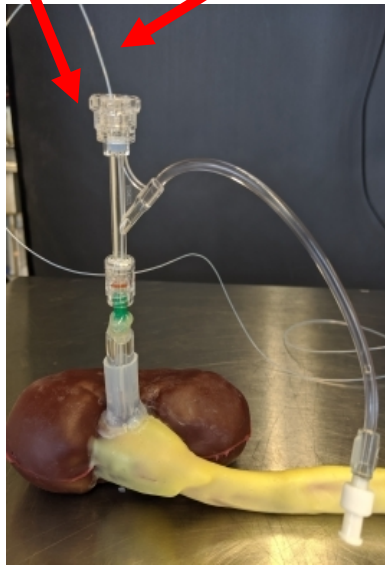
Sener TE, Cloutier J, Villa L, et al. Can We Provide Low Intrarenal Pressures with Good Irrigation Flow by Decreasing the Size of Ureteral Access Sheaths? *J Endourol.* 2016;30(1):49-55. doi:10.1089/end.2015.0387; Ng YH, Somani BK, Dennison A, Kata SG, Nabi G, Brown S. Irrigant Flow and Intrarenal Pressure During Flexible Ureteroscopy: The Effect of Different Access Sheaths, Working Channel Instruments, and Hydrostatic Pressure. *J Endourol.* 2010;24(12):1915-1920. doi:10.1089/end.2010.0188

1 Anatomically accurate synthetic kidney model acquired (Simagine Health, WA)

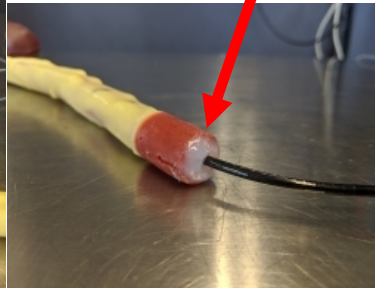


2 Model modifications to simulate and control ureteric outflow

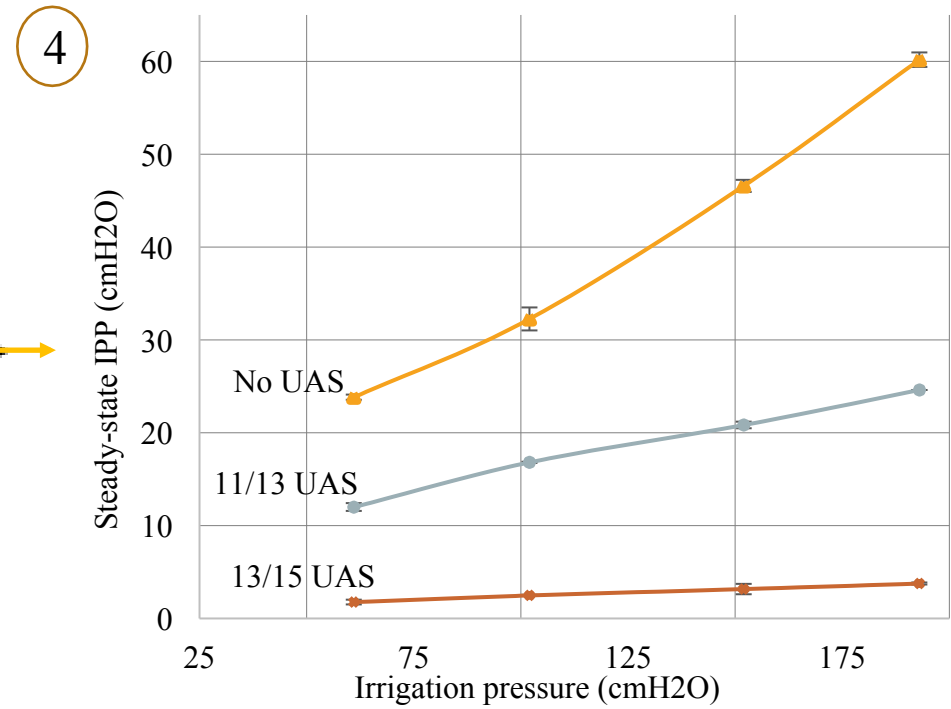
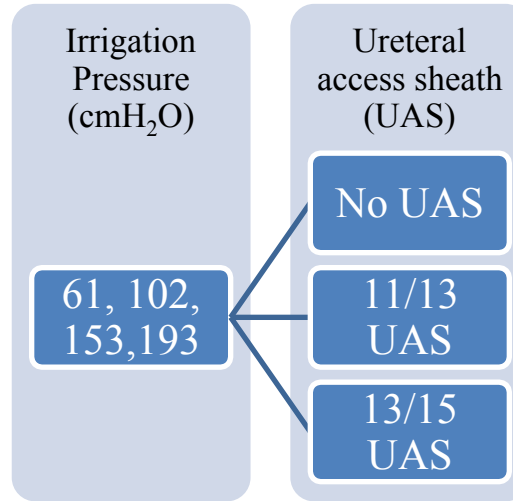
Tuohy-Borst valve
Inserted pressure sensor



Fluid-tight sealed distal ureter



3 Study outcome: steady-state IPP



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Conclusions

Our model can simulate *in vivo* and *ex vivo* IPP profiles and can be calibrated by controlling fluid outflow.



This model replicated human *in vivo* and porcine *ex vivo* IPP profiles in different irrigation and UAS conditions

Implications

This model can serve as a tool for bench testing of technologies aimed at studying and mitigating rises in IPP

