

AB063. 82. Development of a porcine urethral model to characterize the effect of catheter balloon injury on the paediatric urethra

Stefanie Croghan¹, Rachel Cahalane², Ivan Cassidy³, Niall Davis⁴, Rory Mooney³, Hugh Flood¹

¹Department of Urology, University Hospital Limerick, Dooradoyle, Limerick, Ireland; ²School of Engineering, Bernal Institute, Health Research Institute, University of Limerick, Castletroy, Limerick, Ireland; ³Class Medical Ltd., Unit 1D Annacotty Business Park, Co. Limerick, Ireland; ⁴The Austin Hospital, Melbourne, Australia

Background: There is a lack of data on urethral injuries due to misplaced urinary catheters in paediatric patients. Our aim was to characterise the mechanical and histological features of juvenile porcine urethras after catheter-induced urethral trauma. We also propose the porcine model as being mechanically representative of a paediatric urethra. An understanding of paediatric urethral properties and their responses to catheter trauma is a vital foundation in preventing iatrogenic catheter-related injuries.

Methods: Juvenile porcine urethras of varying ages (n=23, age: 2–7 months) were obtained from an abattoir to evaluate their mechanical and histological properties. The 7-month porcine model is representative of an adult urethra and

corresponding testing was performed in adult embalmed cadavers (n=7) and a Thiel cadaver to correlate human relevance with this porcine model. Paediatric porcine urethras were mounted onto an experimental apparatus designed to measure pressure and diameter changes in response to catheter induced trauma. Eight-, 10- and 12-Fr silicone urinary catheters were inserted into the 2-, 3- and 7-month porcine urethral models respectively and the anchoring balloon was intentionally inflated in the bulbar urethra with the relevant recommended inflation volume.

Results: Catheter balloon inflation pressures for 8-, 10- and 12-Fr urinary catheters were 198, 160, 284, 421 and 450 kPa in 2-, 3-, 7-month Thiel cadaver and embalmed cadaver respectively. On histological analysis, tearing and rupture of pediatric porcine urethra were observed following catheter balloon inflation with disruption of complete collagen, elastin and muscle fibres.

Conclusions: Seven-month-old porcine urethra models approximate the mechanical properties of the cadaveric urethras. Conversely, 2- and 3-month porcine urethras provide significantly less “resistance to expansion” compared to the 7-month model. Therefore, young porcine models can represent the mechanical properties of pediatric urethral tissue in the context of catheter associated urethral trauma.

Keywords: Animal model; catheter; paediatric; translational research; urology

doi: 10.21037/map.2019.AB063

Cite this abstract as: Croghan S, Cahalane R, Cassidy I, Davis N, Mooney R, Flood H. Development of a porcine urethral model to characterize the effect of catheter balloon injury on the paediatric urethra. *Mesentery Peritoneum* 2019;3:AB063.