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CUFF SIZE IS CRITICAL FOR ARTIFICIAL URINARY SPHINCTER PERFORMANCE IN A HUMAN CADAVERIC MODEL

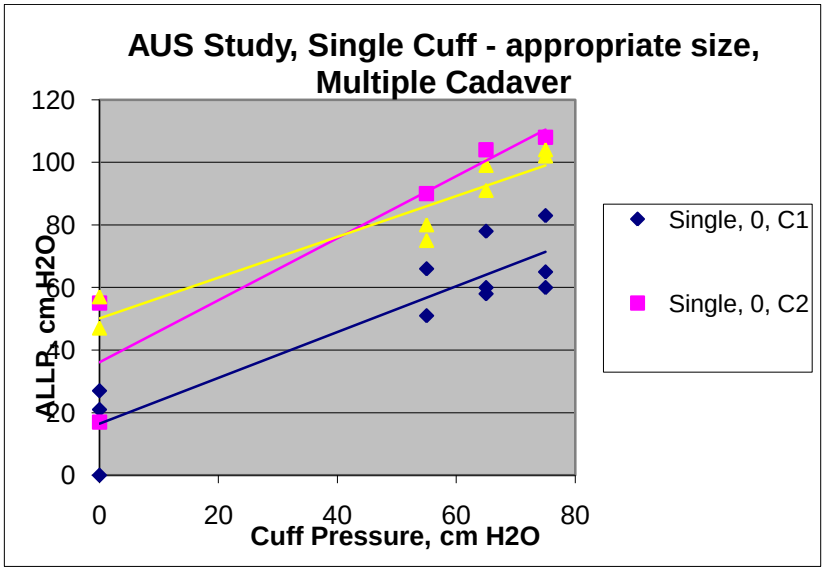
Hypothesis / aims of study
Little has been reported on the interplay between artificial urinary sphincter (AUS) cuff size, pressure regulating balloon (PRB) pressure, and use of multiple cuffs. We sought to determine trends in Valsalva leak point pressure (VLPP) observed with different AUS cuff sizes, pressures and number of cuffs in a cadaveric model.

Study design, materials and methods
A fresh human cadaver model was used to investigate the effect of AUS cuff size, PRB pressure and number of cuffs on VLPP. Native VLPP's of three pelvic sections were measured in response to manual valsalva pressure, measured with a manometer, on the filled bladder. In each specimen, AUS cuffs corresponding to the measured size of the bulbar urethra, 0.5 cm below and 0.5 cm above measured size were implanted sequentially and the VLPP recorded. Each implanted cuff was then connected sequentially to pressure equivalent to PRB's of 51 – 60 , 61 – 70 and 71 – 80 cm H2O and VLPP measurements repeated. Further, in each specimen, the effect of double cuff placement on VLPP was also studied.

Results
In all specimens, native VLPPs (no cuff) were less than 31 cm H2O and VLPP's with single cuff placement without pressurization were higher than native. For single cuffs sized to the measured circumference of the bulbar urethra, VLPP increased with increasing PRB pressure, with the largest increase in VLPP (20 – 30 cm H2O) observed between the empty cuff and lowest pressure PRB cases. In this group, higher VLPP's were observed from the use of higher pressure PRB's and this effect appeared to plateau over the range of cuff pressures studied (see table).
For empty single cuffs sized to be 0.5 cm less than measured urethral circumference, no leaks were observed under applied Valsalva pressures of greater than 140 cm H2O. Single cuffs sized to be 0.5 cm bigger than measured size had lower VLPP than accurately sized AUS cuffs; they also demonstrated an increase in VLPP's as PRB pressures were increased, although to a lesser degree than accurately sized cuffs. Double cuffs allowed a greater increase in VLPP at a given PRB pressure than single cuffs.

Interpretation of results
AUS cuff size and pressure has considerable impact on VLPP's in a cadaver model. Cuffs sized to the actual urethral circumference appear to provide the largest range of VLPP variation. Cuffs oversized by 0.5 cm also allow VLPP variation with cuff pressure but over a smaller range. Cuff sizes 0.5 cm smaller than actual measurement increase VLPP's significantly even when empty. Undersizing urethral cuffs may produce undesirable VLPP values even with an empty cuff. Accurately sized single or double cuffs likely produce desirable VLPP performance over a range of cuff pressurizations.

Concluding message
While increasing PRB pressure, placement of multiple cuffs, and different cuff sizes all affect VLPP in our human cadaveric model, the placement of an appropriately sized single cuff resulted in the best performance as measured by increase in VLPP over native and unpressurized cuffs.



Specify source of funding or grant	**American Medical Systems**
Is this a clinical trial?	**No**
What were the subjects in the study?	**NONE**