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REDUCTION IN EYELET SIZE IN INTERMITTENT URINARY CATHETERS RESULTS IN LESS UROTHELIAL MICROTRAUMA IN THE BLADDER.

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Aim:

Suction of the mucosa into the eyelet of intermittent urinary catheters (IC) has been reported to occur during emptying of the bladder in an ex-vivo study. A link between these mucosal suctions and bladder trauma is theorized due to existing works in the literature with other catheter types, but the phenomenon is insufficiently investigated for current, and future, IC technology.

Methods:

Conventional eyelet catheters (CECs) were characterized in an ex-vivo model configured to replicate the intra-abdominal conditions of the bladder, along with catheters utilizing Multi-Hole-Zone Technology (MHZCs). Porcine tissue was slowly moved towards the eyelets of both the CECs and MHZCs resulting in a mucosal suction for each catheter. During mucosal suction, the pressure dynamics inside the catheter was recorded and the event was observed visually using a cystoscope. Hereafter, the bladder samples were examined for trauma using histological sections of the tissue.

Results:

Large negative pressure spikes were recorded for the CECs along with significant trauma to the bladder mucosa. The MHZCs had significantly lower pressure spikes than the CECs, and the mucosal trauma was limited to thinning of the bladder mucosa. For CECs, a globular mass of bladder tissue ingress into the catheter lumen was observed leaving distinct marks on the tissue. The tissue ingress was not observed for the MHZCs.

Conclusion & Discussion:

Histology showed severe perforations of the urothelium barrier for the CECs which may result in easier access for bacteria into the tissue, increasing the risk of urinary tract infections. Samples subjected to the MHZCs retained the urothelial barrier and therefore the natural defense of the bladder against infections remained. A catheter utilizing the micro-hole zone technology would result in lower negative pressure spikes, less urothelial trauma, and possibly a lower risk of urinary tract infection for patients.