Reducing Iatrogenic Urethral Trauma

EACH year millions of urethral catheters are inserted in the United States alone with up to 25% of hospitalized patients undergoing routine urethral catheterization.[1,2] Of these patients approximately 0.3% will experience iatrogenic urethral trauma,[3] which can result in penile/perineal pain, urinary retention, urethral bleeding or urinary tract infection. Furthermore, it deserves mention that traumatic injury to the urethra during these catheterizations will predispose patients to urethral stricture formation and the possible need for subsequent reconstruction.[4] Despite the potential for such increased morbidity, mechanisms to prevent catheter related injuries continue to receive little attention.

In this issue of The Journal Davis et al (page 1138) investigated the threshold of inflation pressure for urethral rupture from a catheter balloon and also evaluated a novel catheter syringe that prevents urethral injuries at the time of catheterization.[5] Using porcine models and human cadavers the investigators determined that urethral rupture occurs at an internal urethral diametric strain of greater than 40% and/or a maximum inflation pressure of greater than 150 kPa. Surprisingly, contemporary catheters and catheter syringes have been unchanged for decades and are able to generate far greater inflation pressures (greater than 700 kPa).[5,6] This study suggests that modifications to lower the catheter syringe flow rate and threshold inflation may significantly decrease inadvertent urethral injury.

While inadvertent filling of the catheter balloon in the urethra may cause an iatrogenic injury, trauma may also occur during catheter removal if the balloon is not fully decompressed. Wu et al recently objectified the extraction forces required during traumatic catheter removal and further compared intraurethral catheter balloon pressures to intravesical balloon pressures.[7] The study successfully demonstrated that increased forces were exponentially required to traumatically remove catheters with increasing balloon volumes. Instillation of larger catheter balloon volumes in the bladder is quite possibly a future step toward decreasing iatrogenic urethral injury due to traumatic removal.

Although alterations of catheter mechanics will likely result in an incremental decrease in iatrogenic trauma, education about the proper catheterization technique is probably the first and most dramatic step toward successful avoidance of injury. This is not an easy task as, unlike any other medical procedure, most levels of health care providers from nursing/medical students to physicians routinely place urinary catheters.[8] It is no secret that the majority of catheterizations performed today are done by nursing staff in hospitals around the country. Nurses should be targeted for educational programs in contemporary practice since historical data revealed that up to 40% of nurses in academic settings may not know the proper technique of urethral catheterization.[9]

Kashefi et al were among the first to report the importance of nursing education in preventing iatrogenic urethral injury.[1] During 2 separate 6-month periods they prospectively tracked and compared rates of iatrogenic urethral trauma caused by catheterization before and after the initiation of a nursing education program. Not surprisingly a significant 4.9-fold decrease in injuries was noted in the post-education period, highlighting the education gap that concerningly exists for the health care person most likely to a place a urethral catheter.

At many academic centers when nurses have difficulty with catheter placement, the first person asked to help is the intern. In an alarming assessment of intern preparedness regarding urethral catheterization at 1 institution Thomas et al reported that a dramatic majority of interns (76%) believed that their practical training was nonexistent or inadequate.[8] In this large retrospective series most of the injuries resulted from interns performing urethral catheterizations within the first 6 months of training. Clearly adequate instruction of medical students and resident physicians on the proper technique of urethral catheterization is also compulsory to further prevent any iatrogenic injury.

Despite extensive efforts to educate nursing staff, medical students and residents, urethral injuries will likely continue to occur since training such a

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wide variety of health care professionals and assessing competence pose significant practical challenges. Maybe the old adage, "If it ain't broke, don't fix it," no longer applies to the current design of contemporary urethral catheters. In addition to educational initiatives, we as urologists must be willing to advocate for urethral catheter design modifications to further decrease the risk of injury due to operator error.

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