INCONTINENCE

# What is the learning curve for artificial urinary sphincter surgery?

*H. Henry Lai*

**Although various male sling techniques are available, artificial urinary sphincter surgery (AUS) remains the treatment of choice for male stress urinary incontinence. A recent article has described the surgical learning curve for reoperation rates after AUS implantation, finding that there was no plateau, even with very experienced surgeons.**

Lai, H. H. *Nat. Rev. Urol.* **8**, 475–476 (2011); published online 2 August 2011; doi:10.1038/nrurol.2011.114

Despite significant innovation in the development of various male slings, including the bone anchored perineal sling,[1] transobturator sling with or without suprapubic fixation,[2,3] and adjustable male sling,[4] the artificial urinary sphincter (AUS) remains the established treatment for male stress urinary incontinence, owing to a predictable continence outcome, outstanding patient satisfaction, long-term durability and acceptable complication rates, which have been consistently demonstrated in multiple longitudinal series with large numbers of patients.[5–7]

In their study in *European Urology*, Sandhu *et al.*[8] have described the surgical learning curve for reoperation rates after AUS implantation. They found that there was a gradual decrease in reoperative rates with increasing surgeon experience, with a reoperation rate of 24.0% in surgeons with experience of with 5 prior cases, 18.1% in surgeons with 100 prior cases, and 13.2% in those with 200 prior cases. Interestingly, the surgical learning curve did not plateau, even after 200 procedures, implying that the learning curve is steep and does not level off, even for the most experienced surgeons. Finally, 97% of patients undergoing AUS implantation were operated on by surgeons who performed less than 100 AUS cases in their career.

Improvements in training of residents, fellows, and practicing urologists in AUS and other urologic prosthetic surgeries is urgently needed, with the ultimate aim of reducing this learning curve. Residents' exposure to urologic prosthetic surgery is widely variable. In many cases, chief residents have performed less than 5 AUS cases by the time they graduate, and some residency programs do not even have a faculty dedicated to incontinence treatment. It is unclear how familiar surgeons are with implanting an AUS in their own practices, let alone troubleshooting AUS malfunction or performing AUS reoperation or revision. Referring patients to high-volume implanters might reduce complication rates (this is particularly true for revision cases with a scarred urethra), but that option is not always available. Efforts to implement computer-based learning or simulation may not be useful in this case, because operative experience on live human tissue or cadavers is required to properly learn how to dissect and pass a right angle clamp behind the urethra.

With a steep learning curve and sparse exposure, it seems that national efforts are required to improve training. These efforts would need to involve program directors, faculty, professional organizations such as the Society for Urodynamics and Female Urology (SUFU), and industry bodies such as American Medical Systems (AMS), who produce medical devices and provide training programs.

AMS is involved in training residents and fellows on AUS implantation, use of penile prostheses and male sling surgery through their regional didactic courses, which run several times a year. SUFU also offers the Rodney A. Appell MD Travelling Preceptorship Program in Female Urology and Voiding Dysfunction. This program offers 5–10 residents, who currently lack a dedicated faculty in the field of female urology or voiding dysfunction in their own program, the opportunity to travel to the institutions of senior SUFU members and spend 1 week with the mentors on a one-on-one basis. While these efforts are good starting points, more must be done to address the deficit of prosthetic surgery training. The presence of a clinical proctor

**Table 1** | Limitations in the reporting of AUS-associated complications from national database

| Complication | Avoidable by increased surgical experience? | Likely to be reported in the national database? |
|---|---|---|
| Early cuff erosion | Yes (surgeon error in urethral dissection) | Usually not, unless patients undergo reimplant in the future |
| Late cuff erosion | No (usually due to traumatic foley catheter placement without deactivating the AUS) | Usually not, unless patients undergo reimplant in the future |
| Urethral atrophy | Probably not | Yes |
| Device infection | Yes | Usually not, unless patients undergo reimplant in the future |
| Early mechanical failure or leaks | Yes (surgeon error) | Yes |
| Late mechanical failure or leaks | Probably not (tear and wear) | Yes |

Abbreviation: AUS, artificial urinary sphincter.

in the operating room with prosthetic surgeons will also help to improve standards in urological surgery.

But how good is good enough? According to Sandhu and colleagues,[8] who have also published papers on the surgical learning curve in open radical prostatectomy and robotic-assisted laparoscopic prostatectomy,[9,10] even the surgeons who have the most experience in AUS in the country are not good enough—the reoperation rates fail to plateau, even after 200 AUS procedures. The reality is that very few urologists in this US will do 200 AUS cases in their entire career! Only 3 surgeons (out of 8,013, <1%) in the AMS database (a national database consisting of 65,602 distinct records collected prospectively since 1987) have performed more than 200 AUS surgeries.

It is debatable whether the surgical learning curve for AUS surgery is really more than 200 cases. The study raises the question of what the appropriate outcome metrics are for a surgical learning curve study. Although these authors have used the 5-year reoperation rates, the problem with using such a metric is that some AUS complications may not be unavoidable or might have nothing to do with experience of the surgeon. Furthermore, some AUS complications may not be reported to the company database (Table 1), for example, late cuff erosion due to traumatic foley catheter insertion without deactivating the AUS. In this case, the eroded cuff is removed, but the event might not be reported to the national database. Although the authors have implemented some data analysis safeguards to account for these issues, missing data in the database and irrelevance of surgical experience to some complications could skew the data to prevent an accurate representation of the true learning curve for AUS surgery. For stress urinary incontinence—a disease that does not kill but can have a severe negative effect on quality of life—continence rates or global response assessment scales are better measures of how well the surgeon is performing, as these are composite measures that really matter to the patient. The challenges are that these data are not readily available from a national database and the specialty has yet to standardize a way to compare efficacy across studies.

It is difficult to properly quantify the real learning curve for AUS surgery. Although, in my opinion, it is probably less than 100 cases, it is certainly more than the average number of AUS cases chief residents have been exposed to during their training. The important message from this study is that we need to boost educational efforts to ensure that surgeons get the appropriate and optimum training in prosthetic surgery.

*Division of Urologic Surgery, Department of Surgery, Washington University School of Medicine, St Louis, MO 63110, USA.*
*laih@wudosis.wustl.edu*

**Competing interests**
The author declares no competing interests.

1. Comiter, C. V. The male perineal sling: intermediate-term results. *Neurourol. Urodyn.* **24**, 648–653 (2005).
2. Rehder, P. *et al.* The 1 year outcome of the transobturator retroluminal repositioning sling in the treatment of male stress urinary incontinence. *BJU Int.* **106**, 1668–1672 (2010).
3. Cornu, J. N. *et al.* The AdVance transobturator male sling for postprostatectomy incontinence: clinical results of a prospective evaluation after a minimum follow-up of 6 months. *Eur. Urol.* **56**, 923–927 (2009).
4. Bochove-Overgaauw, D. M. & Schrier, B. P. An adjustable sling for the treatment of all degrees of male stress urinary incontinence: retrospective evaluation of efficacy and complications after a minimal follow-up of 14 months. *J. Urol.* **185**, 1363–1368 (2011).
5. Lai, H. H. *et al.* 13 years of experience with artificial urinary sphincter implantation at Baylor College of Medicine. *J. Urol.* **177**, 1021–1025 (2007).
6. Montague, D. K. The artificial urinary sphincter (AS 800): experience in 166 consecutive patients. *J. Urol.* **147**, 380–382 (1992).
7. Elliott, D. S. & Barrett, D. M. Mayo Clinic long-term analysis of the functional durability of the AMS 800 artificial urinary sphincter: a review of 323 cases. *J. Urol.* **159**, 1206–1208 (1998).
8. Sandhu, J. S., Maschino, A. C. & Vickers, A. J. The surgical learning curve for artificial urinary sphincter procedures compared to typical surgeon experience. *Eur. Urol.* doi:10.1016/j.eururo.2011.05.048.
9. Vickers, A. J. *et al.* The surgical learning curve for prostate cancer control after radical prostatectomy. *J. Natl Cancer Inst.* **99**, 1171–1177 (2007).
10. Vickers, A. J. *et al.* The surgical learning curve for laparoscopic radical prostatectomy: a retrospective cohort study. *Lancet Oncol.* **10**, 475–480 (2009).

INCONTINENCE

# Should mesh be used to correct anterior vaginal prolapse?

*Matthew D. Barber*

**A multicenter randomized trial comparing a trocar-guided mesh kit to anterior colporrhaphy for treatment of cystocele adds to evidence that transvaginal mesh for treatment of anterior vaginal prolapse improves anatomical outcomes at the expense of greater complications. Careful consideration of benefits and risks is required when considering transvaginal mesh for prolapse repair.**

Barber, M. D. *Nat. Rev. Urol.* **8**, 476–478 (2011); published online 16 August 2011; doi:10.1038/nrurol.2011.120

A woman's lifetime risk of surgery for pelvic organ prolapse is approximately 7% and over 300,000 prolapse surgeries are performed annually in the USA alone.[1] Of those who receive surgery, an estimated 13% will require a repeat operation within 5 years, and as many as 29% will undergo another surgery for genital prolapse or a related condition at some point during their life.[2] Prolapse of the anterior vaginal wall, or cystocele, is the most common form of pelvic organ prolapse and the most likely to recur after surgery.[1] Reinforcement of vaginal repairs with synthetic mesh has been widely employed in the hope of improving the effectiveness and durability of vaginal prolapse repairs. The first commercially available trocar-guided mesh delivery system or "mesh kit" was introduced in 2004 and, in spite of relatively little data, mesh kits were quickly adopted and now almost one-quarter of all prolapse repairs involve the placement of transvaginal mesh.[3] The recent study by Altman *et al.*[4] represents the largest randomized trial comparing a transvaginal mesh repair to a standard non-mesh or "native-tissue" repair to date, and confirms the findings of several smaller trials that the use of mesh for treatment of anterior vaginal prolapse results in improved anatomic outcomes at the expense of greater complications.[5]

In Altman and colleagues' study,[4] 389 women with symptomatic Stage 2 or greater anterior vaginal prolapse were enrolled from 53 hospitals by 58 surgeons from