

How Do We Improve Techniques in Robotic Surgery?

“There is no excuse today for the surgeon to learn on the patient.”

William J. Mayo, 1927

The foundations of surgeon controlled, robot assisted surgery were laid with the establishment of the first radical prostatectomy program in the United States approximately a decade ago.¹ Subsequent years have seen a revolution in the treatment of urological cancer, a revolution that expanded rapidly beyond the boundaries of the discipline of urology. The robot is a staggeringly sophisticated tool, much as a Gulfstream® jet is a mode of transportation.² However, a Gulfstream is only as good as its pilot. How do you learn to pilot the robot without putting the patient at risk?

In this issue of *The Journal* Lee et al (page 1191) suggest a best practices model for robotic surgery training and credentialing, including a structured curriculum involving preclinical and clinical components. Credentialing should require the demonstration of proficiency and safety in executing basic robotic skills, rather than a basis on a set number of completed cases.

Written by distinguished urological educators, this article makes for fascinating reading. In the proposed scenario preclinical training involves tutorials on basic robotic use, inanimate dry lab practice, the use of virtual reality simulators and cadaveric training. This is to be followed by clinical training that involves procedure specific direct robotic console time.

The approach that Lee et al propose is sensible and innovative. Open surgery has never been taught this way, nor has laparoscopy, but surgical education has to keep pace with the times and tradition should not stifle innovation. In a landmark step the American Board of Surgery voted to require simulation for certification of laparoscopic skills. Challenges faced in robot assisted surgery differ from those in mastering laparoscopic surgery. Remote access, the development of visual cues with 3-dimensional depth perception and the absence of tactile feedback make robotic surgery challenging. Learning by doing is simply not good enough and puts the patient at risk.

That said, there are limits to what can be learned with preclinical approaches. Flight simulators are essential for training pilots, but a flight simulator alone could scarcely have prepared Chesley Sullenberger for landing Flight 1549 in the Hudson. Ten years of flying fighter jets, 30 years as a captain, thousands of flight hours logged and indefinable personal characteristics probably had something to do with it also. Gawande points out the value of a structured approach in a reference to a Harvard Business School study addressing the successful implementation of minimally invasive cardiac surgery in New England hospitals.³ Successful surgeons formed close-knit teams, videotaped the procedures, batched them, and prepared mentally over and over again. In establishing the first surgeon controlled robotic radical prostatectomy program we used the same principles, although purely by happenstance since the Harvard work had not yet been published. Robotic drills, cadaveric dissections and virtual reality simulators are great preparation. However, they are no substitute for practice, practice and practice. Neither do they emphasize the importance of the surgical team.

The very nature of robotic surgery is its reproducibility. This lends itself to the incorporation of randomized trials in examining technical modifications. Also in this issue of *The Journal* Sutherland et al (page 1262) describe a randomized trial comparing continence results in patients treated with robotic assisted radical prostatectomy who underwent posterior reconstruction of the rhabdosphincter to those who did not. They found no difference in continence results as measured subjectively (Expanded Prostate Cancer Index Composite questionnaire) or objectively. While there are differences in methodology, the results of Sutherland et al substantiate those of 2 previous randomized trials.^{4,5} In all these studies the conclusion was that the return of continence was no quicker with reconstruction of the periurethral sphincter.

The results of Sutherland and Joshi⁴ et al and of our studies⁵ were qualitatively different from those of studies using historical controls. When our study was published there was strong evidence that periurethral reconstruction was associated with an ear-

lier return of continence in open, laparoscopic or robot assisted radical prostatectomy.^{6–8} What was common in these studies was the use of historical controls. The authors fell into the fallacy post facto, ergo ipso facto. In fact, the first randomized trial was conducted to substantiate these historical observations, not to refute them. The conclusions from the first randomized trial were surprising and were not easily accepted. However, 2 other randomized trials resulted in the same conclusion.^{4,5}

It is not always feasible to perform randomized trials, nor is it always necessary. If the effect modifier is greater than 90%, observational cohort studies may fare just as well.⁹ However, the work of Joshi⁴ and Sutherland et al and our studies collectively underscore that randomized trials should be

performed when possible, and that the internal reproducibility of robotic surgery may lend itself to such analysis. In 2011 technical modifications should be supported with high level evidence, not empirical observations.

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