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Surgical innovation in urology has seen a revolution over the last 20 years. With Dr. Ralph Clayman performing the first laparoscopic nephrectomy in 1991 at Washington University in St. Louis, minimally invasive surgical innovation had begun. Canadian surgical pioneers, Dr. Donald Fentie and Dr. Peter Barrett in Saskatoon, were among the first Canadian urologists to perform laparoscopic nephrectomy in the mid-1990s. Over the subsequent 10 years, laparoscopic urology exploded across Canada, with laparoscopy quickly incorporated into residency training programs and across community and academic centres. The benefits of laparoscopic urology compared to open surgery have been demonstrated in numerous studies: less intraoperative blood loss, less analgesic use, comparable operative times, better cosmesis, less hospital stay and quicker return to work.<sup>1-4</sup> We now routinely perform laparoscopic nephrectomy, and have expanded to laparoscopic partial nephrectomy, pyeloplasty, radical prostatectomy, and cystectomy. Laparoscopic prostatectomy may have a steeper learning curve, and is arguably one of the more difficult laparoscopic urologic procedures to learn.<sup>5</sup> Nonetheless, our patients across Canada have benefited from these technologic innovations.

*Then came the Robots.*

The first da Vinci (Intuitive Surgical Inc.) robotic-assisted laparoscopic prostatectomy (RALP) was performed in 2000 by Binder.<sup>6</sup> Since then, the robots have taken over radical prostatectomy surgery in the United States, and have also gradually invaded Canada. In 2007, only Edmonton, Alberta; London, Ontario; and Montreal, Quebec were performing RALP.<sup>7</sup> So far in 2014, there are over 23 active daVinci surgical robots in Canada. In this month's *CUAJ*, Tholomier and colleagues<sup>8</sup> published the largest 5-year Canadian experience to date, with over 720 RALP performed with excellent oncologic outcomes. The benefits of robotic surgery include magnified, high definition visualization, excellent range of motion and elimination of tremor, and surgeon comfort at a seated console.<sup>9</sup> Having performed a number of robotic surgeries, I can attest to these benefits. It's much more comfortable to sit at a robotic console enjoying the ergonomic and range of motion benefits, rather than twisted like a pretzel performing the surgery laparoscopically. But, there is a lack of good data demonstrating the clinical benefit of robotic prostatectomy over laparoscopic prostatectomy, and most data show that RALP is "as good as" laparoscopic prostatectomy. Ho and colleagues, in conjunction with the Canadian Agency for Drugs and Technologies in Health (CADTH), examined the clinical effectiveness and economic modelling of RALP compared with open and laparoscopic surgery.<sup>10</sup> RALP had a shorter hospital stay, fewer complications, less blood loss than open surgery (19 retrospective studies), and shorter operative time and less blood loss than laparoscopic surgery (9 retrospective studies), but the authors qualified these results with no randomized trials, retrospective studies, inconsistent findings and methods. A recent article in the *Journal of Clinical Oncology* demonstrated RALP had similar odds of overall complications, re-admission, and additional cancer therapies compared to patients undergoing open radical prostatectomy. RALP was associated with a higher probability of 30-day and 90-day genitourinary complications compared to open surgery, and overall costs were significantly higher for RALP.<sup>11</sup>

At what cost? In Canada, the initial purchase price is \$2.8 million, with annual maintenance costs of \$180 000, and cost per case of \$3500. Currently, outside of Alberta and Quebec, these costs in most provinces are covered through philanthropy. The UBC experience published last month in *CUAJ*<sup>12</sup> showed similar outcomes in hospital length of stay, transfusion rates, and positive surgical margin rates, but an additional cost of \$5629 per robotic case over open surgery. With surgical robots popping up all over Ontario and other provinces, eventually the public will be asked to cover the costs of these

robotic surgeries. Perhaps these robots should be regionalized to maximize efficiencies and thereby lower operating costs? However, every institution wants to be on the cutting edge and have their own robot. Currently in Ontario there are daVinci robots in London, Ottawa, Hamilton and at 5 sites in Toronto (St. Michael's, Toronto General Hospital, Sunnybrook/Toronto East General Hospital, and Humber). A number of high-volume community hospitals have successfully raised funds to purchase a robot in the near future. With the proliferation of robots, individual institutional volumes will be lower, driving up costs per case. Perhaps regional robotic centres of excellence in each province would be more efficient and cost effective.

Which brings us back to the question: How did we get here? The public has demanded it – patients are requesting robotic prostatectomy, because of course it must be better than laparoscopic or open surgery. Once patients are aware that there is inadequate data demonstrating superiority of RALP over laparoscopic or even open surgery, they still want the robotic surgery. Our challenge now is how to effectively incorporate this robotic technology to maximize the benefits, while still maintaining fiscal responsibility in our current severely financially-strapped healthcare environment. The Robots are here to stay – let's learn to optimize their integration.

## References

1. Burgess NA, Koo BC, Calvert RC, et al. Randomized trial of laparoscopic v open nephrectomy. *J Endourol* 2007;21:610-3. <http://dx.doi.org/10.1089/end.2006.0277>
2. Dunn MD, Portis AJ, Shalhav AL, et al. Laparoscopic versus open radical nephrectomy: A 9-year experience. *J Urol* 2000;164:1153-9. [http://dx.doi.org/10.1016/S0022-5347\(05\)67131-5](http://dx.doi.org/10.1016/S0022-5347(05)67131-5)
3. Hemal AK, Kumar A, Kumar R, et al. Laparoscopic versus open radical nephrectomy for large renal tumors: A long-term prospective comparison. *J Urol* 2007;177:862-6. <http://dx.doi.org/10.1016/j.juro.2006.10.053>
4. Simone G, Papalia R, Guaglitano S, et al. Laparoscopic versus open nephroureterectomy: Perioperative and oncologic outcomes from a randomised prospective study. *Eur Urol* 2009;56:520-6. <http://dx.doi.org/10.1016/j.eururo.2009.06.013>
5. Guillonnet B, Rozet F, Barret E, et al. Laparoscopic radical prostatectomy: Assessment after 240 procedures. *Urol Clin North Am* 2001;28:189-202. [http://dx.doi.org/10.1016/S0094-0143\(01\)80021-5](http://dx.doi.org/10.1016/S0094-0143(01)80021-5)
6. Binder J, Kramer W. Robotically assisted laparoscopic radical prostatectomy. *BJU Int* 2001;87:408-10.
7. Chin J, Luke PP, Pautler S. Initial experience with robotic-assisted laparoscopic radical prostatectomy in the Canadian health care system. *Can Urol Assoc J* 2007;1:97-101.
8. Tholomier, C, Bienz, M, Hueber PA, et al. Oncological and functional outcomes of 720 robot-assisted radical prostatectomy cases: The largest Canadian 5-year experience. *Can Urol Assoc J* 2014;8:195-201. <http://dx.doi.org/10.5489/cuaj.2016>
9. Estey, E. Robotic prostatectomy: The new standard of care or a marketing success? *Can Urol Assoc J* 2009;3:488-90.
10. Ho C, Tsakonas E, Tran K, et al. Robot-assisted surgery compared with open surgery and laparoscopic surgery: Clinical effectiveness and economic Analyses [Internet]. Ottawa: Canadian Agency for Drugs and Technologies in Health (CADTH); 2011 (Technology report no. 137).
11. Gandaglia G, Sammon JD, Chang SL, et al. Comparative effectiveness of robot-assisted and open radical prostatectomy in the postdissemination era. *J Clin Oncol* 2014;32:1419-26. <http://dx.doi.org/10.1200/JCO.2013.53.5096>
12. Gagnon LO, Goldenberg L, Lynch K, et al. Comparison of open and robotic-assisted prostatectomy: The University of British Columbia experience. *Can Urol Assoc J* 2014;8:92-7. <http://dx.doi.org/10.5489/cuaj.1707>