Arguments against investing widely in robotic prostatectomy in Canada: a wrong focus on tool box rather than surgical expertise

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The introduction of robotic-assisted minimally invasive radical prostatectomy (MIRP) in the United States is by far the most rapid adoption of an expensive new surgical device in medical history. Recent surveys reveal that robotic MIRP increased from 1% in 2001 to almost 70% of radical prostatectomies (RP), resulting recently in a 25% to 75% decline in open radical prostatectomy (ORP).[1] The pressure is on in Canada to follow this pace, assuming that our patients receive suboptimal and out-dated treatment. In my opinion, there is no evidence to support such a statement and, to the contrary, there is growing evidence that a similar frenetic adoption of this technology in Canada would lead to disastrous results and would be disadvantageous for most prostate cancer patients. Here is why.

What drove the rapid adoption of robotic MIRP in the U.S.?

The concept of robotically assisted intervention implies that the technology will allow us to go beyond the limitations of the human operator in performing more accurate and delicate tasks.[2] The main marketed features of the da Vinci robot (Intuitive Surgical, Inc., Sunnyvale, CA), the only game in town, are the magnification of vision, the flexibility of a surgical hand and the minimization of tremor. For the surgeon attracted to new tools and gadgets, the robot is a somewhat gratifying adult toy to perform the surgery more ergonomically and comfortably. Moreover, it minimizes blood loss during the intervention and, therefore, provides a sense of security. The manufacturers of this robotic system have exploited the public fascination about robots and have successfully marketed the idea that the robot will guarantee a perfect outcome irrespective of the surgeon's expertise.[3] The da Vinci website (www.davinciprostatectomy.com) conclusively states that robotic-MIRP will help the surgeon achieve "excellent results in removing prostate cancer without leaving cancer cells behind. Studies have also shown that most patients have a rapid return of sexual function and urinary continence."[4] The site also provides a list of surgeons who perform robotic surgery and a list of hospitals offering robotic-MIRP. Physicians and/or hospitals in the United States have also used advertising about robotic-MIRP to increase their market share. One such example is an advertisement from Mount Sinai Hospital published in the *New York Times* stating that robotic-MIRP makes "Prostate cancer surgery so effective, even women can feel the difference."[5] Such exuberance is certainly blurring the boundaries of hype and reality.

Is there evidence to support these advertising claims?

Robotic-MIRP is essentially a method to facilitate the conversion from ORP to laparoscopic prostatectomy (LRP). A prospective evaluation at Memorial Sloan Kettering Cancer Center of 612 LRP by Dr. Bertrand Guillonneau (one of the French innovators with experience in more than 1000 cases prior to the study) compared with 818 ORP by Dr. James Eastham and Dr. Peter Scardino showed no difference in oncological outcome or recovery of potency (55% at 18 months), but significantly less continence recovery at one year (48% LRP vs. 78% ORP, $p \leq 0.0005$) and significantly higher readmission rate (4.6% with LRP vs. 1.2% with ORP).[6] The only advantage of LRP was a lower transfusion rate (3% LRP vs. 49% ORP). Robotic-MIRP, being less invasive, should "intuitively" be less painful and facilitate a more rapid recovery after surgery. However, this statement was not confirmed in two single institutions' comparative studies. In the first study,[7] Dr. J.A. Smith compared his own cases of ORP with robotic-MIRP (after a 250-case learning curve); in the second study by Wood and colleagues,[8] ORP was compared to robotic-MIRP performed by different surgeons during the same period. Both studies showed a slightly lower blood transfusion rate with robotic-MIRP, but the length of hospital stay and the use of narcotics were essentially comparable for both techniques. Wood and colleagues also found no difference in time to normal activities or to 100% recovery, as well as recovery of continence and potency, the latter being 50% at 2 years in both groups.

When you set high expectations, patients are likely to feel less satisfied. In a study from Duke University with 400 patients, results demonstrated that ORP patients were 4.4 times (OR 4.45, CI 1.9-10.4) more likely to be satisfied than robotic-MIRP patients, who were 3 times more likely to have regrets (OR 3.0, CI 1.5-6) about their treatment.[9] Patient satisfaction is related to lack of cancer recurrence and preservation of potency and continence, which are long-term outcomes. In

a first study of 2702 men representing a 5% sample of Medicare beneficiaries between 2003 and 2005, Hu and colleagues showed that MIRP had fewer perioperative complications and shorter length of hospital stay but that MIRP patients were more likely to receive salvage therapy within 6 months of surgery (OR 3.67, CI 2.8-4.8).[10] Surgical volume reduced these rates from 40% for low-volume to 18.9% for high-volume MIRP surgeons; this is still significantly higher than the 9.1% for ORP surgeons. A recent update using SEER (Surveillance, Epidemiology and End Results) data from 2003 to 2007 and concentrating on high-volume surgeons showed no difference in additional cancer therapy between robotic-MIRP and ORP, but a significantly increased risk of incontinence and erectile dysfunction with robotic-MIRP.[11] It has been well recognized that surgical volume and a long learning curve are associated with improved outcome for ORP.[12-14] A need for surgical expertise also applies for robotic-MIRP to reach the same, but not higher, level of performance. This learning curve for robotic-MIRP has been estimated to be 100 to 250 patients.[15,16] More than a third of urologists in the United States and Canada perform less than 11 cases per year and 84% of urologists perform less than 31 cases per year.[17] Moreover, learning from 100 cases over 6 months is quite different than over 3 to 5 years, suggesting that most urologists would never get as good with robotic-MIRP as they are with ORP. A report of the first 30 cases by a reputable Canadian centre highlighted the heavy burden on operating room time and less-optimal results, with 30% incontinence at 18 months.[18] Based on these observations, it seems obvious that a widespread introduction of robotic-MIRP in Canada would lead to a significant reduction in the quality of outcome for most prostate cancer patients for many years to come.

That being said, robotic surgery is the way of the future. The current instrument does not achieve any of the improvements required to affect outcome, however. Canadian centres should be able to contribute to the development of the next generations of robotic surgical instruments that would incorporate surgical navigation (by fusion of magnetic resonance imaging with real-time per-operative 3D trans-rectal ultrasound), haptic feedback, miniaturization of instrument for microscopic surgery and the incorporation of biosensors to identify cancer extension almost at the microscopic level). Training centres should also help develop surgical simulators that could, as flight simulators do for airline pilots, train the surgeons before they even start their first real case. The future looks bright, but for the moment Canadian urologists should show wisdom and maturity in not embarking widely on this expansive technology with unproven benefit for the patients.

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