



Surgeon Declan Murphy positions a robotic device above a patient's abdomen so that a 3D telescope and surgical instruments can be installed.

## Q&A: Declan Murphy

# A robot convert

*In 2004, surgeon Declan Murphy was not convinced that using a robot to remove a cancer-riddled prostate was a significant improvement on keyhole, or laparoscopic, surgery. Eight-hundred robotic procedures later, he has not only changed his mind, but is now director of Robotic Surgery at the Peter MacCallum Cancer Centre in Melbourne, Australia.*

### How does robotic surgery compare with other surgical methods for removing a cancerous prostate?

There are some benefits to robotic radical prostatectomy over open surgery that are difficult to argue with. First, men can leave hospital much quicker: 85% of patients go home the next day. Second, the blood transfusion rates are significantly lower than for open surgery. Third, general surgical complications such as clots and infections also seem to be lower — and that is because it is minimally invasive surgery, like laparoscopic surgery.

Conventional laparoscopic prostatectomy, with a 2D view and straight instruments, is technically challenging, and this leads to longer operative times. A key paper published a few years ago (A. J. Vickers *et al. Lancet Oncol.* **10**, 475–480; 2009) showed that the learning curve for laparoscopic prostatectomy was very

long, much longer than for open surgery. The authors reported that around 750 cases were needed — which is a lifetime's work for many surgeons — before you would achieve your lowest cancer recurrence rates.

### How difficult is it to train with the robotic system?

The learning curve is much shorter than for laparoscopic prostatectomy — my colleagues and I estimated it was upwards of 80 cases. The device has some fantastic training features, such as a dual console, so it is like learning how to drive a car. There is also a touch screen that consultants can draw on so that our annotations will come up on the robot console, showing the trainee surgeon where to cut and where not to cut. However, robotic radical prostatectomy is a complex procedure that requires modular training and should only

be done by specialists. My department has an extremely strict list of requirements, and we frequently deny people access because they don't have the credentials.

### Why did you switch from laparoscopic to robotic surgery?

I was sceptical about the robot when I first had experience of it as a urology trainee at Guy's Hospital in London in 2004. I was of the opinion that you don't need a robot to do these operations, you just work harder and train harder with laparoscopic tools. But my view changed in 2007 when I undertook fellowship training in Melbourne, and I began to see data regarding outcomes of robotic surgery emerge. I realized that I would be able to achieve much better results for my patients by performing robotic prostatectomy rather than conventional laparoscopic or open surgery. You don't

ALAN MOYLE

suddenly become a fantastic surgeon just by using this device though. The surgeon's training and experience count for more than whether he or she is using the robot.

**What are the advantages of robotic surgery from the surgeon's perspective?**

It is impossible to overstate how good the view is looking into this machine. The prostate is deep down in the pelvis behind the pubic bone, so it is difficult to get good views with open surgery, especially as there is more blood loss with this type of procedure. We have got used to very good views with laparoscopic surgery, but these are 2D — it's like having one eye closed when you are trying to stitch. With the robotic device, you are seeing in 3D, with a greatly magnified view in very high definition, which is unsurpassed by other approaches.

***"You don't suddenly become a fantastic surgeon just by using this device."***

The other big advantage is the range of movement of the instruments. With laparoscopic surgery, we have straight instruments that do not have a 'wrist' on them. But suturing is a very dexterous movement. The robotic system has wristed instruments: you can turn your hand in the machine and the needle turns — a much more intuitive interface.

**Does robotic surgery mean better outcomes for patients with cancer?**

The problem with prostate cancer is that the outcomes take quite a number of years to materialize. The short-term surrogates for measuring cancer outcomes are things like positive surgical margins — when cancer cells are found right to the edge of the surgically removed tissue. If you have a positive surgical margin, you are five times more likely to need additional cancer treatment, such as radiotherapy, over the following two years. When we looked at data on 2,300 radical prostatectomies, we found a statistically significant 31% reduction in the number of patients with positive surgical margins after robotic prostatectomy.

We have also shown that there is a dramatic reduction in hospital stay after robotic surgery: from five days with open surgery down to just over one day. Furthermore, the blood transfusion rate for open surgery is 15%, whereas it's practically 0% with robotic surgery.

There are, however, two other important areas for patients undergoing radical prostatectomy where we cannot claim that robotic surgery is clearly better: urinary continence recovery and sexual function recovery. These are major quality of life outcomes that are very important to patients — and it is not possible to say with any confidence that robotic surgery



is any better than good open surgery by an experienced surgeon.

I get many patients who have had a biopsy taken or been offered open surgery and who are seeking a second opinion. I tell them that if they have come from a high-volume surgeon then, apart from the short-term outcomes of hospital stay length, blood transfusions and maybe margin rates, their longer term cancer outcomes are going to be just as good with those performing open surgery as they would be with us. But the reality is that in many regions today, Australia included, most fellowship-trained, high-volume surgeons, are using the robot and the amount of surgeons who have performed a large number of open procedures is dwindling.

**Have there been any randomized clinical trials comparing the types of surgery?**

This is the major criticism over the years — we have failed to do randomized controlled trials. One such trial comparing robotic and

**High-definition 3D images allow precise dissection.**

open radical prostatectomy that has successfully recruited all of its patients is in Brisbane,

Australia, but a report is not expected until early 2016. The Brisbane trial, however, is the exception, and in many respects the boat has sailed. Hundreds of thousands of robotic procedures have already been reported in the literature in observational retrospective series, so everyone has already read about them and made up their mind. It is now almost impossible to sell a randomized controlled clinical trial to patients, or indeed to surgeons. We all know robotic surgery is better from a technical point of view and for the other short-term outcomes, so nobody wants to have open surgery any more.

**What are the downsides of robotic surgery?**

The massive issue is the cost of the machine. It is made by a monopoly provider that has fiercely protected its patents — as it is entitled to do. The machines cost AUS\$2–3 million (US\$1.4–2.1 million), and there are also recurring costs; maintenance is about AUS\$250,000 per year and the surgical instruments we use cost AUS\$3,500 per operation. They are reusable, but only up to 10 times.

There is a practical difficulty as well. Although you have fantastic vision and magnification, there is no tactile feedback from the wristed instruments — you can't feel anything — and surgery has in the past relied heavily on sense of touch. However, the greatly superior vision more than makes up for this.

**Are the costs of robotic surgery balanced by the benefits?**

The costs of the machine can be offset by reductions in the length of hospital stay and number of blood transfusions, and there is a critical number where it becomes cost effective. In our model, that number is 140 cases. If you're amortizing a AUS\$3 million device over 7 years, including an annual maintenance contract, a really important part of diluting the cost is to have a high volume of surgery on the machine.

Radical prostatectomy numbers are decreasing; the reason is not to do with the robot cost, however, but with changes in early prostate-cancer screening, detection and patterns of care. The number of men being offered or asking for a prostate-specific antigen test has dramatically dropped, so the first reason why fewer radical prostatectomies are being done is because fewer men are being tested. Another reason for the decline is the rise in active surveillance as a management option for early prostate cancer (see page S126).

**INTERVIEW BY BIANCA NOGRADY**

This interview has been edited for length and clarity.



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