

**Article by Jeremy Laurance originally from *The Independent*, Tuesday, October 9, 2007**

What is the highest compliment you can pay a surgeon? Tell him he is like a machine. Surgeons strive for machine-like perfection in everything they do - a millimetre's misjudgment could destroy a patient's ability to speak, to walk, to have children - or to live.

Yet surgeons are human. They have sleepless nights, troubles at home, drink a little too much - just like the rest of us. Then they have to operate, with befuddled brain shaky hands, next day.

So how do we ensure machine-like perfection in surgery? The Royal Marsden Hospital in London, Britain's premier specialist centre for the treatment of cancer, has one sort of answer. It has purchased a staggeringly sophisticated £2m robotic surgery device with three arms, each with 360 degree rotation at the wrist, plus a camera, all millimetres in diameter. These are controlled from a console and allow the surgeon to operate with no hand tremor and make only tiny incisions.

The patient on the table on the morning of my visit, his lower abdomen daubed in amber disinfectant, was being operated on for prostate cancer, now one of the commonest cancers in men in Britain.

A dozen green-gowned figures busied themselves preparing him for surgery. The robot, called the Da Vinci S, a pillar of complicated electronics standing about eight feet tall, was rolled into position between his legs, its sharply elbowed arms poised above him. Chris Ogden, the lead surgeon, and his assistant had inserted the surgical instruments through four tiny incisions in the abdomen, and these were now attached to the robot's arms in readiness for the start of the operation.

Prostate cancer presents particular challenges to the surgeon. The prostate is a gland surrounding the urethra, the tube that carries urine from the bladder to the penis. It produces the semen in which the sperm, made in the testicles, can swim. Removing it is fraught with danger because it is situated near a sheet of nerves that control potency and continence. Damage them and the patient may be left wetting himself and unable to perform sexually.

Nor is there any margin for error. A cancerous prostate gland must be removed to its outer limits to minimise the risk of the cancer returning. So the surgeon is faced with the task of removing all of the gland, and

none of the nerve sheet, by locating and dissecting the precise point where the two meet.

As the operation begins, the lights are lowered and the camera image from inside the patient's abdomen is transmitted to the screen. His internal organs and tissues are displayed in lurid reds, yellows and whites, gleaming in the powerful camera light. Ogden peers through the binocular lenses on the console, which give 10 times magnification and provide an extraordinary 3D image with a powerful sensation of depth. Using finger controls and a clutch operated with his foot, Ogden begins the delicate but brutal process of surgery.

While his team watch the screen above the patient, he deftly manoeuvres the scalpel, with a tiny cutter at its head, and slices through tissue, like a bug chomping its way through a leaf. The robot is so smart that it can operate on a beating heart - and automatically make adjustments for the pulsating muscle.

But for Ogden's patient, this is a time of maximum danger. Unexpectedly he has a multitude of adhesions inside his abdomen - sheets of tissue that have grown to obscure the view. Gingerly, so as to avoid severing a vital nerve or artery, the surgeon proceeds to slice through the tissue, cauterising any blood vessel with a little plume of smoke as he goes.

"It is very comfortable to use, it irons out hand tremor and the 3D camera is wonderful. With 10 times magnification, you can see the dissection line between the edge of the prostate and the sheet of nerves more accurately. With the wristed instruments it is much easier to do intricate reconstructions in a confined space," he says.

Only a handful of hospitals, most in London, have similar robotic devices to aid surgeons at this time. But the interest in them is growing rapidly. They are easier to master than laparoscopic (keyhole) surgery, which involves "mirror" operating in which the movements as displayed on screen are reversed. With the robot, all movements are "intuitive" and identical to those in conventional open surgery.

In three years their use in the US has leapt, and 62 per cent of prostatectomies are now done robotically. The devices are also used in gall bladder surgery, heart surgery and gynecological surgery. With a £2m price tag and £100,000-a-year running costs, this rate of growth is unlikely to be matched in the UK. But the development of the robotic device is an expression of the desire for machine-like, error-free surgery.

Its high cost can be justified where extreme dexterity is required in a tight space in which the smallest slip would spell disaster. In the US, more than one in five operations performed using the device is on the heart. Its potential is only just being explored and it could open up as yet undreamed of operations and extend once more the surgical frontier.

### **One patient's story**

At age 40, Sebastian Duncan was young to be diagnosed with prostate cancer. It was picked up by chance during a screening test, conducted because of his family history - an uncle died of it and his father developed the cancer five years ago.

An art director at an advertising company in south London, he was referred to Chris Ogden at the Royal Marsden and had the operation with the robot surgery device in June.

"Its more accurate and said to be 'nerve-sparing' - that was the clincher for me. It has been borne out by my recovering so quickly."

Speaking six weeks after the operation, he said he was "almost" back to normal, with full bodily functions. He was temporarily prescribed Cialis, an impotence drug similar to Viagra, to help restore his sexual function, and given pelvic exercises to control his bladder. "I had three nights in hospital and three weeks at home bumbling about in pyjamas. Now I have been given the all-clear - there was no spread at all. For me, that should be it."