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PROFESSIONAL IN FOCUS



JENNIFER CLARA TANG

THE CANADIAN TELESURGERY INITIATIVE

Dr. Mehran Anvari

M.B.B.S., Ph.S, F.R.C.S.(c), F.A.C.S.

Dr. Mehran Anvari, Associate Professor in McMaster's Department of Surgery is leading Canada's initiative to research and develop telesurgery. He is the director of the CMAS (Centre for Minimal Access Surgery) in Hamilton and also holds a clinical position at Hamilton's St. Joseph's Hospital. Anvari's long-term goal is to develop a national telesurgery network within the next 7 years (Brehl, 2002). On April 8, 2003, Dr. Anvari will be giving a lecture at the Hamilton Spectator Auditorium entitled "Dr. Robot: Telementoring and Telerobotic Surgery".



How did the concept for developing a centre for teleroboticsurgery in Canada come about?

The CMAS (Centre for Minimal Access Surgery) was developed four years ago to help surgeons train in these techniques, which allows us to perform complex operation without a need for opening patients up without making large incisions, basically keyhole surgery. This is an area which really has major advantages for a patient. We started research into the outcomes of these procedures to show its potential benefit. The result of our training at the CMAS was a large number of surgeons around the country (450). Many needed more than just a short training course, they needed to be mentored into performing these procedures safely. That required some of our faculty and experts to travel to sites to mentor.

We then started the process of telementoring where we could observe the surgery live and give instructions live without having to travel long distance. The big thing at that time was that there are times where you need more than just advice, [you need to] perform part of the surgery, the difficult parts.

That's when the concept of telerobotic surgery came about. Two and a half years ago we put in a proposal to see if we could use robots which we can't use in the OR, telerobotically as a way of providing true telepresence of an expert to a rural site. And that's how the concept grew. Initially people did not think the technology was advanced enough to do this. The first telerobotic surgery in Strasbourg to NY was a simple operation to make sure the technology was ready and available. We're now taking the next step, trying to develop telerobotic program to assist rural surgeons during some of the more complex procedures.

The September 23, 2002 edition of Canadian TIME magazine stated your plans for a Hamilton to Yellowknife telesurgery in November 2002. What is the current status of this operation?

Well we were planning to do Hamilton to Yellowknife but we realized the telecommunication lines between Hamilton and

Yellowknife were not yet advanced enough, so what we were planning to do in the first stage was [attempt a] Hamilton to North Bay [telesurgery]. Then to go to Hamilton to Chicoutimi and then Hamilton to Yellowknife as soon as we can get secure enough lines to make that possible. We're going to go ahead and do it, but not with Yellowknife as our first site.

And when were you planning to do the Hamilton to North Bay telesurgery?

We were just discussing it. Everything is set, even the patient is set. However, we need to have a very secure broadband telecommunication. Right now, we're looking potentially January. Again, until we can have safe and appropriate connection, we do not want to jeopardize the safety of the patient. That's the key. And as I said we were hoping to get it sooner, but at the latest, January.

What has to be done to ensure you have a completely safe line?

You need to have a line which is has a broad enough band capable of transmitting data up to 10 mbps per second which is significant size. You also need a band which has redundancy; that is if one line goes down, there is a second line that can step in immediately. You need a band which has quality of service, meaning that the signals traveling for the telerobotic surgery is given highest priority so that if there are other users on the line, they will not compromise the quality of the transmission.

So there's no possibility that something like a virus of a power outage will affect the surgery?

No, we have looked at those possibilities to make sure that we have this [secure] band. So that's what's taking a little bit longer, the fact that we have to make sure that this is the highest quality communication possible for this telesurgery.

Please briefly walk me through the surgical procedure. How long does it take to prepare:

For telerobotic surgery we need at least 2 weeks, something like this, at least 6 to 8 weeks. We have started preparing for it now. The surgery itself, once it becomes routine, all we will hopefully need is a couple weeks notice to ensure that the surgeons are available and everything is set. But at the moment, for the first surgery, there is a fair bit of preparation, which is to be expected.

Is the actual procedure enhanced by using a computer/robot versus human contact?

The robot actually is designed to enhance certain types of maneuvers, particularly high fidelity maneuvers where you're actually working in a fine space doing fine movements like suturing or very fine dissection. In the cases that we are using, there may be added benefit but it is now being used not just purely for enhanced accuracy, but to act as an assistant to the rural surgeon, basically providing telepresence for the expert surgeon so that we can take part in the operation from a distance. The telerobot has a different concept than the current robots which are really there to enhance the surgery. So yes, they may enhance the surgery but the primary reason we are looking at them is for [telepresence].

What about something like limited tactile feedback with regards to the use of robot?

That's one of the limitations with the current robots, the fact that you don't have a sense of tension. And what we are trying to do with the next generation of robots is include this whole issue of *haptics*, the ability for the surgeon to feel tension as he pulls. Right now that sense of tension only comes from visual clues. So you see the tissues change colour, there are visual clues but really isn't enough to allow the surgeon to have a very good feel of how hard he can pull on something. That's an issue that's being addressed. The current robots are equivalent to the original PCs, bulky, limited functionality but that's the best. Over the next years, we will come up with the "slick laptop". So there needs to be many improvements to this current robot in order for it to be user friendly. That's the road we will travel if we can show that they are useful.

How long do you think it will take until telerobotic surgery, telehealth becomes a common part of healthcare in Canada?

I would say hopefully in 5 to 10 years. As I said the importance here is to develop the robot which are cheap enough and user friendly enough to be able to be bought by various rural hospitals. SO we do have a bit of work to do before we get there but I'm sure that it is something we will develop. I'm convinced that it's the only way we can address the major shortage in our surgical care in remote parts of Canada. What we have is a vicious cycle: Surgeons that are unable to perform a large number of procedures. As a result, we cannot recruit young surgeons who have been trained to do these procedures; they don't want to go there and be stuck. After a while if you don't do a procedure you lose the touch. [Telepresence] allows surgeons to have

ongoing support from centers like McMaster and remove that sense of professional isolation. And so we not only improve the range and quality of care, we also hope to improve the chances or recruitment and retention of young surgeons to rural areas. We hope this has an impact as well.

With the integration of robots how difficult will it be to change someone who has been to trained traditionally to robotics?

Some people believe that robots make the transition between open and laparoscopy easier for the surgeon. There is no doubt, there is a transition. The robotics improves the transition from open surgery to laparoscopic surgery.

How much training would a surgeon have to undergo in your programmes?

Well depending on the type and how many procedures. Each procedure we run a training course that runs between two to five days and then followed by mentorship for 6 to 12 cases and then telementoring and potentially telementoring another telerobotic surgeon.

What are some of the other areas of surgery that robotics is used in?

Robotic surgery is used in general surgery, cardiac surgery, urology... a wide range of surgical procedures have used robots. Neurosurgery, robotics is very useful, we can do a more accurate spine movement.

Is there any type of surgery that would not be suitable for telerobotic surgery?

You can adapt a robot to do anything. A robot is not to take over, it is to enhance and help the surgeon. People can enhance and adapt the robots. Robots can simply be your assistant.

What do you think the biggest impact of the telehealth program and robotic surgery will have on Canada in the next 20 years?

I think it will change the paradigm of healthcare. Right now, the way telehealth is being used by many is as a means of providing people consultation, simple diagnosis. I think now, this will allow us to see telehealth as a means of performing a wide range of interventional procedures which would change the whole paradigm. People would then be looking at things like teleendoscopy, teleradiotherapy, a wide range of interventional teleradiology, teleangiography so you can see it opens up that whole spectrum. ■