SINGAPORE Health

SEP
OCT
2017

THE FLAGSHIP PUBLICATION
OF THE SINGHEALTH DUKE-NUS
ACADEMIC MEDICAL CENTRE
MCI (P) 153/04/2017

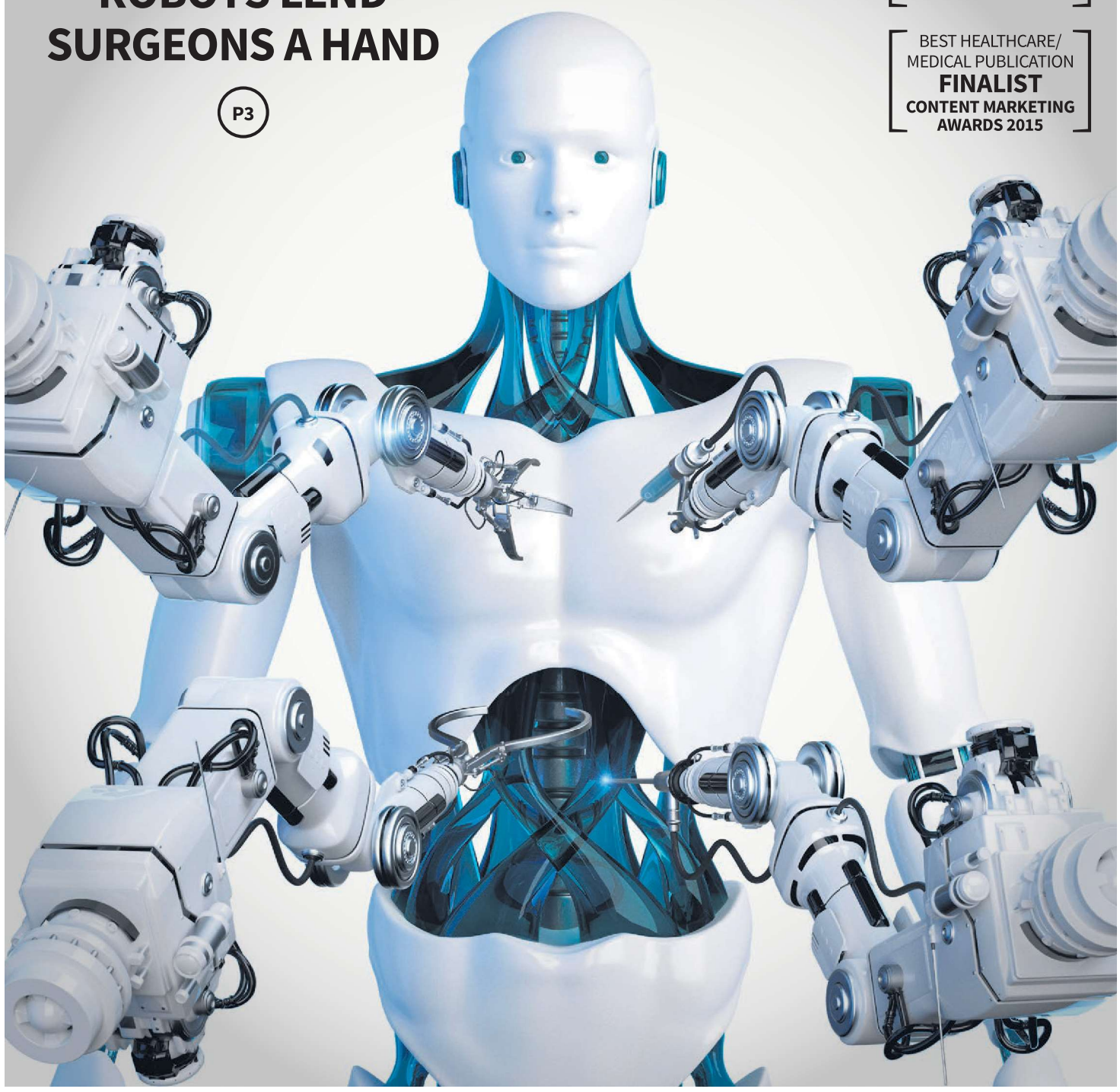
WWW.SGH.COM.SG | WWW.SINGHEALTH.COM.SG

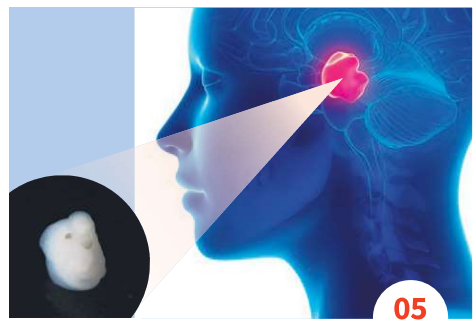
ROBOTS LEND SURGEONS A HAND

P3

AWARD OF EXCELLENCE
APEX AWARDS 2015

BEST HEALTHCARE/ MEDICAL PUBLICATION
FINALIST
CONTENT MARKETING AWARDS 2015





Robots set to rule

The ability to operate on the pancreas and liver more easily with robotic-assisted systems has wider implications on treatments for this complex anatomical area.

By Esther Au Yong

PHOTOS: WONG WEI LIANG

During surgery, Associate Professors Lee Ser Yee (left) and Brian Goh (right) sit at one of the consoles (behind them), manipulating the robotic system's controls to perform the procedure via the robotic arms (top left). The arms, with their highly dexterous wristed instruments, are inserted into the patient, who lies on the operating table a little distance away (in foreground).

WHEN SURGEONS NEED to remove growths in the body or tail of the pancreas, they often have to take out the spleen as well. This is because the web of blood vessels linking the two organs makes conventional surgery difficult, complicated and risky.

Cutting out the spleen can be a problem for children and younger adults as the organ is an important part of their immune system. Removing it makes younger people more prone to infections.

So unless a tumour is large or cancerous, surgeons will try to save the spleen whenever possible despite the worry of complications developing during surgery, which is mostly done by the traditional open method, and less often by conventional laparoscopy.

A minimally invasive or keyhole technique, laparoscopy has become the most common type of surgery for many simple procedures today such as surgical removal of the gall bladder or appendix. Because of the small incisions involved, patients often suffer less bleeding and pain, make a quicker recovery and have a shorter hospital stay. But because of the complexities involved in surgery of the pancreas, open surgery is often chosen.

For patients to benefit from keyhole procedures, surgeons at Singapore General Hospital (SGH) have adopted the newer robotic-assisted laparoscopic technique to get around the constraints of the other two methods, said Associate Professor Brian Goh, Senior Consultant and Director of Robotic Surgery, Department of Hepato-pancreato-biliary and Transplant Surgery, SGH.

"Today, robotic surgery is not a replacement but serves as an extension of conventional laparoscopy, allowing surgeons to perform even highly complex procedures such as the Whipples procedure [the complex removal of the head of the pancreas, the duodenum, part of the common bile duct, gallbladder, and sometimes part of the stomach] via the minimally invasive approach," said Prof Goh.

"We have found robotic surgery to be feasible, effective and safe," he said, adding that the hospital's experience not only bodes well for pancreatic surgery but also for liver surgery and other procedures involving the abdominal area.

As with surgery on the pancreas and spleen, operating on other organs in this part of the body such as the liver and bile duct is considered one of the most complex and riskiest in the field of surgery, he said, noting that even at the medical centres renowned for such surgeries, the risk of complications developing and death is high.

For that reason, many hepatopancreatobiliary procedures are still being done by open surgery. Even in cases where keyhole surgery is thought to be appropriate, a large percentage had to have open incisions made midway to deal with complications (open conversions).

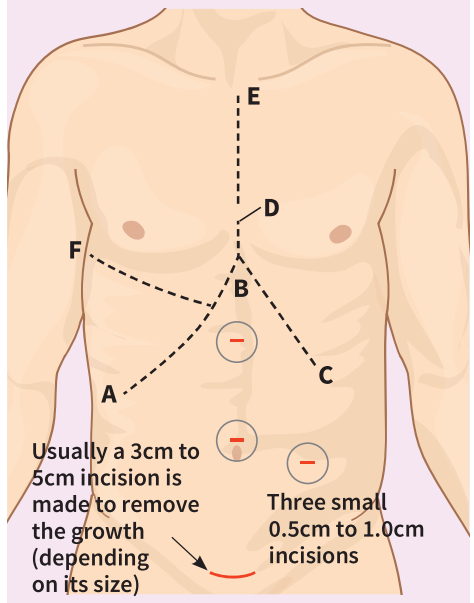
> **TODAY, ROBOTIC SURGERY IS NOT A REPLACEMENT BUT SERVES AS AN EXTENSION OF CONVENTIONAL LAPAROSCOPY, ALLOWING SURGEONS TO PERFORM EVEN HIGHLY COMPLEX PROCEDURES VIA THE MINIMALLY INVASIVE APPROACH.**
>
> ASSOCIATE PROFESSOR BRIAN GOH, SENIOR CONSULTANT AND DIRECTOR OF ROBOTIC SURGERY, DEPARTMENT OF HEPATOR-PANCREATO-BILIARY AND TRANSPLANT SURGERY, SGH.

It is due not so much to a lack of expertise but the complexities of the anatomy of the area. At the renowned Memorial Sloan Kettering Cancer Center in New York, for instance, such surgeries had a more than 30 per cent rate of complications, and a similar percentage of keyhole procedures led to open conversions, said Associate Professor Lee Ser Yee, Senior Consultant,

Open, laparoscopic and robotic-assisted surgery

The so-called Mercedes incision is one of the techniques used in open pancreas surgery. Surgeons get a clear view of the organs, but such large cuts mean more pain, a longer recovery period, possible complications and heavy scarring.

--- Mercedes incision
— Keyhole laparoscopic surgery



In conventional keyhole laparoscopic or robotic-assisted surgery, small holes are made for endoscopes – equipped with tiny surgical instruments and cameras – to be inserted. Conventional laparoscopy is commonly used for minor abdominal surgeries like gall bladder removal, but without the dexterity and flexibility of robotic joints, certain complicated procedures on other abdominal organs like the pancreas and liver may be technically too complex and difficult. Robotic surgery is favoured for selected bile duct and pancreatic surgery because the flexible joints allow surgeons to perform anastomosis (the joining of organs and blood vessels) more easily.

> Continued on page 4

> *Continued from page 3*

Robots set to rule

Department of Hepato-pancreato-biliary and Transplant Surgery, SGH. Prof Lee had trained at the Center.

Robotic-assisted surgery has several advantages over conventional laparoscopy. The surgeon gets a clear magnified view of the surgical site with the robotic system's 3D high-definition vision camera, and the robotic arms are highly dexterous, with tiny wristed instruments that can bend and rotate 360 degrees to perform surgery. The robotic arms also never get tired, unlike human ones, and so are highly stable.

During robotic surgery, the main surgeon sits at the robotic console to manipulate the system's controls to perform the procedure. The system translates the surgeon's movements into the robotic arms to which tiny operating tools and cameras are attached for performing the surgical procedure.

Conventional laparoscopes also use cameras and tiny surgical instruments to help surgeons operate, but these scopes are less sophisticated in that they are rigid and, so, less dexterous.

Robotic surgery has been in use for some 20 years but in hepatopancreatobiliary procedures, it is still in its infancy, especially in this part of the world. SGH, which performs some of the highest number of hepatopancreatobiliary surgeries in South-east Asia, has done 62 complex robotic procedures since 2013: 24 liver, 25 pancreatic and 13 complex biliary robotic surgeries. These pale in comparison with the 200 to 220 liver, 80 to 90 pancreatic and 800 to 900 gall bladder surgeries SGH does each year.

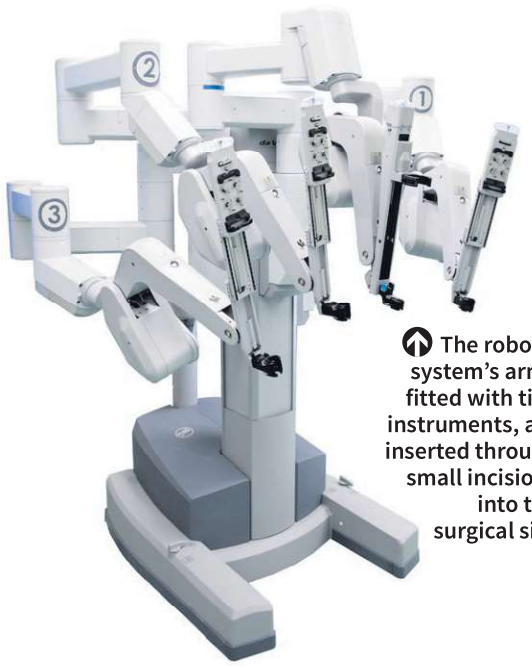
As robotic-assisted surgery offers the same advantages and fewer shortcomings than conventional laparoscopy, it is not unreasonable to think of it being the surgery of choice for most procedures in the future.

It wasn't so long ago that conventional laparoscopy was seen as a new technique, with few surgeons trained in it, said Prof Lee. But now, newer surgeons are being trained in laparoscopy, and this is the future, he said.

"In cholecystectomies [gallbladder removal], for example, most of us are now so comfortable with laparoscopy that it's probably easier and faster for us to do than open surgery. We were exposed to this technique early in our training."

The high cost of robotic surgical systems has been a big reason for the sluggish acceptance of robotic-assisted surgery. Most hospitals in Singapore have only one machine, which is shared by all departments. It is no different at SGH, said Prof Lee, adding that its robotic hepato-pancreato-biliary programme only started in 2013, even though the robotic system has already been available at SGH since 2003 – the first in Singapore.

With more robotic systems entering the market as the current dominant patents expire, the cost of such machines is expected to drop. Likewise, opportunities to learn robotic-assisted skills will increase greatly. Hopefully, in time, this will translate to better and more affordable patient care.



The robotic system's arms, fitted with tiny instruments, are inserted through small incisions into the surgical site.

Robotic pancreatectomy not for everyone

Despite its advantages for patients, laparoscopy – whether conventional keyhole or robotic-assisted – may not be for everyone undergoing a hepatopancreatobiliary procedure. Key considerations are:

- **Size and location of the tumour** If the tumour is too big and/or its location not suitable, keyhole surgery may not be appropriate.
- **Health and fitness of the patient** Those with heart conditions may not be able to tolerate the longer anaesthesia time necessary in laparoscopy, or the gas that is pumped into the abdomen to make it easier for surgeons to look inside and operate.