Spanish group patents an automatic suture system for colon cancer operations

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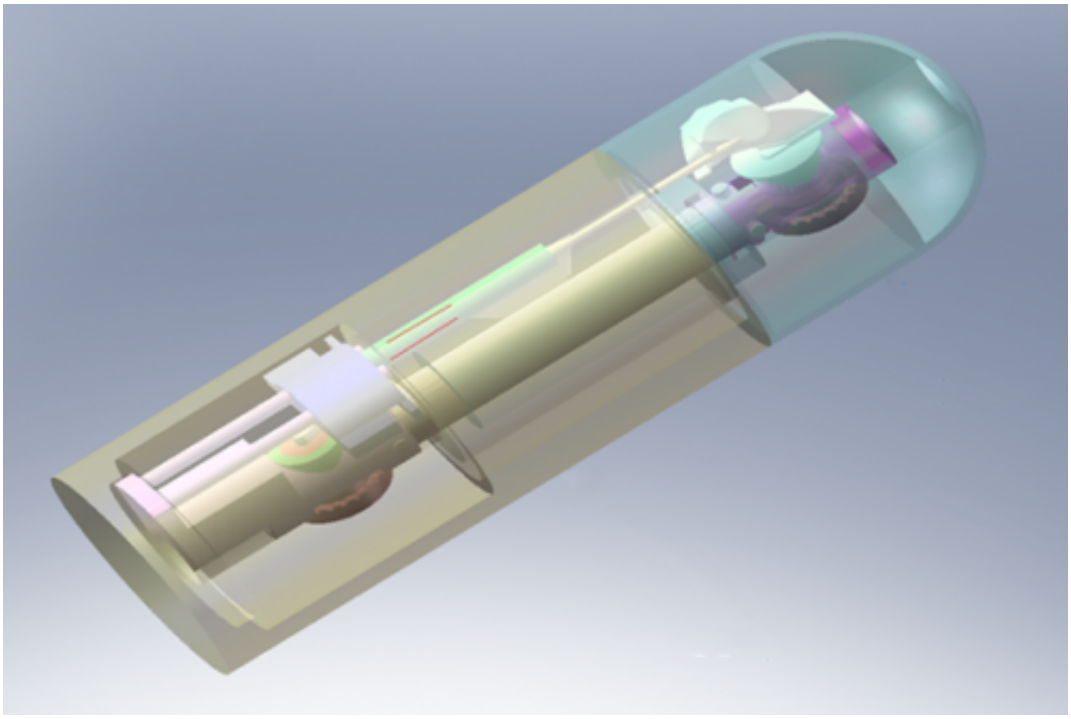

Insewing allows for the use of absorbable suture that disappears within weeks. Credit: Innotex

The Spanish research centre Innotex has developed a device that enables automatic suturing of the large intestine after being sectioned during cancer colon surgery. The novelty of the system, called Insewing, is that it allows the use of absorbable suture material instead of metallic staples which are currently used and could cause intestinal stiffness and

obstruction.

Two American companies have shown interest in a development of the Innotex group, based in the Innovation and Technology Centre at the Polytechnic University of Catalonia (CIT UPC). "This is a device that enables automatic suturing of the large intestine after being sectioned during cancer colon surgery and it is done with conventional absorbable suture material," as explained to SINC by José Antonio Tornero, promoter of research at Innotex and project co-ordinator.

According to Tornero, Innotex has requested the Spanish patent for its system, named Insewing, and is in the process of extending it to other countries. They hope to obtain funding for this by reaching an agreement with the American companies in the medical equipment sector, whose identity is still confidential.

"The Insewing system can be applied in a surgical procedure, known as anastomosis, which is defined as the joining of two ends of tubular tissue. It can be large or small intestine, oesophagus etc., but our device is developed for the large intestine. It will have application in a great number of colon cancer operations in which it is necessary to cut a section of the intestine at the location of the tumour and then join the two sectioned ends," the Project Manager adds.

Options

One of the two options, when performing this operation, is for the surgeon to sew the ends of the sectioned intestine by hand. "Manual suturing is very reliable. It is done with an absorbable suture material that disappears after a few weeks and the intestine is well joined together and fully elastic. However, as Tornero explains, "hand sewing is very difficult".

In addition, it has to be done by an experienced surgeon and it is very time-consuming, more than the time being dedicated to the rest of the intervention steps. It is known that the risk increases proportionate to the time a patient remains anesthetised and therefore the joining is done by manual procedure in very few cases.

In fact, approximately 90% of these sutures are not done by hand, but by using a device that puts two rows of metallic staples to join the sectioned intestine. "Stapling is faster, but causes a section of the intestine to become stiff due to the metallic staples". This results in a narrowing of the intestine and may cause intestinal obstructions in a fairly high percentage.

Automatic suturing with absorbable material

Tornero and his team set out to develop a device that enables automatic suturing of the large intestine with absorbable material, which is used in surgery, made from a copolymer which is called polyglycolic acid. This suture is the same type used by surgeons to sew by hand and it disappears in a few weeks without trace.

"Our objective is to combine the advantages of hand sewing with the speed of the stapler so that the intestine is elastic and looks untouched and there is no stiff section," Tornero adds.

The idea for Insewing was developed almost 10 years ago by Francesc Soler Giralt, a laboratory technician at UPC, and now retired. According to Tornero, there was interest from some companies, but they were unwilling to provide funding until there was a prototype. The project has been dormant all this time, despite there being an initial patent for proof of concept at UPC.

However, the project was revived in 2010 thanks to the submission to

qualify for funding from the European project ECHORD, within the seventh framework programme for small robotic projects.

In this project, Innotex has participated with the Institute for Organisation and Control of Industrial Systems at UPC, led by Raúl Suarez, which has developed the electronic and control elements, and with the Vall d'Hebron Hospital, which has provided advice and review from a medical point of view.

Experimentation with a pig's intestine

Thanks to funding provided by ECHORD, of 300,000 euros, Innotex and its partners have been able to develop the full prototype and carried out the first tests on a dead pig's intestine.

"It's a very human-like tissue in viscosity, consistency and thickness and the tests have been very satisfactory. Manuel López Cano, the surgeon at Vall d'Hebron who supervised the tests, made a very positive assessment," Tornero says.

The sealing requirements are very high. "The suture has to be completely sealed from the inside outwards because any leaks could cause a risk of infection and very serious immediate problems," he adds.

The co-ordinator points out that there is still some way to go before it can come onto the market, "about four or five years". After testing on dead tissue, tests will be carried out in vivo with laboratory pigs and then with humans.

According to Tornero, Innotex employs 60 people and integrates all the textile research excellence at UPC.

The second most common cancer in women and the third in men

Colon cancer is the second most common cancer in women, after breast cancer, and the third in men, after lung and prostate cancer. According to the OMC, it is closely related to age and more prevalent in Europe and the United States. In these areas there are 1.5 million cases a year.

Approximately half of the cases of colon cancer end up requiring an intervention of anastomosis, which is currently carried out by manual sewing or with staples and to which the device developed by Innotex can be applied.

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