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Israel's Business Arena

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Keeping it inside

Virtual Ports thinks there's no point in removing instruments from a patient's body during surgery if they can be conveniently hung on a peg inside the abdominal wall.

Gali Weinreb——5 Feb 07 10:28

If you have an incision made in your abdominal wall, it will be extremely painful, but if something is already inside your stomach, it can make incisions freely without you feeling anything. It could kill you, but it won't hurt you since there no nerves inside the stomach.

This is the key principle behind, among other things, the performing of laparoscopic surgery, in which surgical devices are inserted into the abdominal wall through small holes, instead of cutting open the entire stomach. A length of tubing is inserted into each hole and a surgical device which looks like a long knitting needle is passed through it into the stomach. The surgeon moves the needle around, viewing the stomach through a minute camera which is introduced into the stomach in the same way.

The extent of the pain experienced by the patient depends largely on the number of holes that have been made in his or her abdomen. The accepted rule is one hole with a tube for each surgical device: one for the incising tool, one for the connecting instrument, one for the clamp, and one for the camera. As a result, there is a limit on the number of devices that can be used, since each hole entails further pain to the patient and a higher risk of infection, as well as a waste of another disposable tube which costs $200.

"Not all the devices need to be constantly manipulated by the surgeon," says Virtual Ports Ltd. CEO Udi Gordin. "So why can't we insert one device at the start of the procedure, anchor it on the abdominal wall, thus freeing its hole for the insertion of another instrument?"

While most laparoscopic instruments today require manipulation from the outside, Virtual Ports' method enables the insertion of a new class of instruments, which until now were not worth incising a hole for and wasting a tube on. This is how Virtual Ports' first product, EndoClear, works. At present, cameras need to be removed four or five times to have their lenses cleaned, but each such removal wastes time and increases the chance of infection, and can also result in the surgeon losing his location inside the patient's stomach. The picture that the surgeon sees through the camera is two-dimensional and not always clear, and every time that the camera is removed, the surgeon has to re-establish its location within the cavity. "Surgeons hate this," says Gordin.

Virtual Ports' device consists of a wet and a dry pad. These two pads are wrapped around a peg and inserted into the stomach, where they are spread over the abdominal wall and held in place on the internal tissue by the peg. Each time the camera needs cleaning of fog, blood or fatty tissue that has stuck to the lens, it is cleaned first by the wet pad and then the dry one and returned to its position within seconds. The surgeon can follow the movement of the camera, so that he can keep track of his location.

Globes: A number of companies are trying to develop self-cleaning cameras.

Gordin: "There are a number of solutions now being developed that automatically clean lenses using liquid or gas, but this is less effective than direct contact with the lens using a wet and a dry pad, which is the only solution that can clear, fat, blood, and also fog. We did a lot of testing to look at all the best methods using all the various medical detergents. We also tested all the pads and cleaning materials at SuperPharm."

How can you insert two pads in the stomach cavity and make sure that they are spread over the internal wall, so that one stays dry and the other wet?

"We've been working on this development for some time. It was very important to us that the device be entirely mechanical, without electronic or vacuum elements that could make its functioning complicated. First we tested a regular peg with a spring in the middle like a laundry peg. We found that physically, it was not possible to give the peg sufficient grip with this method, since the entire device has to be small enough to fit into a laparoscopy tube of five millimeters in diameter. So we designed a peg in which the arms are wrapped in a spring sleeve. When the spring is compressed, it releases the arms which open, and when it is released, it presses the arms shut from the outside. This creates a miniature peg just a few millimeters in diameter, but with tremendous force.

"The pads are wrapped around the peg. When the peg is opened, the pads are released. They contain wire threads that enable them to open to the right shape and maintain it. The back of the dry pad is insulated so that it won't get wet when it lies on the internal wall of the stomach. At the end of the pad is another spring than closes it once the procedure is complete."

A steady grip

Virtual Ports was co-founded in 2006 in the Meytav Technological Enterprises Innovation Center Ltd. incubator by Dr. Adrian Paz and Gordin. Paz is head of the Urologic Laparoscopic Unit in the Urology Department at Barzilai Medical Center, and the initiator of a number of companies among them Endogun Medical Systems Ltd., Bioprotect Ltd. and Ultrasurge Technologies Ltd. Gordin is an economics graduate who worked in Intel as a software engineer and a marketing representative in its Networking division.

“I was responsible for processes from development to integration," recalls Gordin. "While I was there I was exposed to good and orderly project management, and I learned how products are defined, how one chooses which product to develop and what makes a product a hit with the market.” After Intel, Gordin managed a start-up called Ocean Bricks, which develops marine infrastructure solutions, following which he joined Virtual Ports. The company has raised $400,000 in investment to date, and it plans to raise a further $2 million in the coming months.

Virtual Ports has conducted trials on animals to date, and it now wishes to begin clinical trials for US Food and Drug Administration (FDA) approval. “We’ll stick to the materials that we used to create the product when we file our application with the FDA,” says Gordin. “The approval track should be straightforward since this is a mechanical device with a nominal risk of breakdown. We believe that we’ll get FDA approval in a matter of months.”

Gordin says that the company has been approached by several strategic investors. “It’s a dilemma. A lot of companies collapsed when their first investor stopped providing finance for his own reasons, and then the market says ‘if they didn’t invest there must be a problem.’”

Virtual Ports is also developing its second product, “EndoGrab,” a clamp that allows a surgeon to move and clear tissue. This device is based on two pegs identical to that described previously, one of which is anchored to the internal abdominal wall, and the other is attached to the organ that’s in the way. These are then connected to pin the organ in its new position. At present, a second person has to constantly hold the organ in place using a special laparoscopic instrument which is inserted through a hole of its own. “Aside from the fact that it’s pointless paying someone extra to stand there holding an instrument all the time, doctors hate having someone standing next to them during surgery who gets in their way,” says Goldin. Like the EndoClear, the EndoGrab also works on the same principle: one less hole, and one less tube.

Published by Globes [online], Israel business news - www.globes.co.il - on February 4, 2007