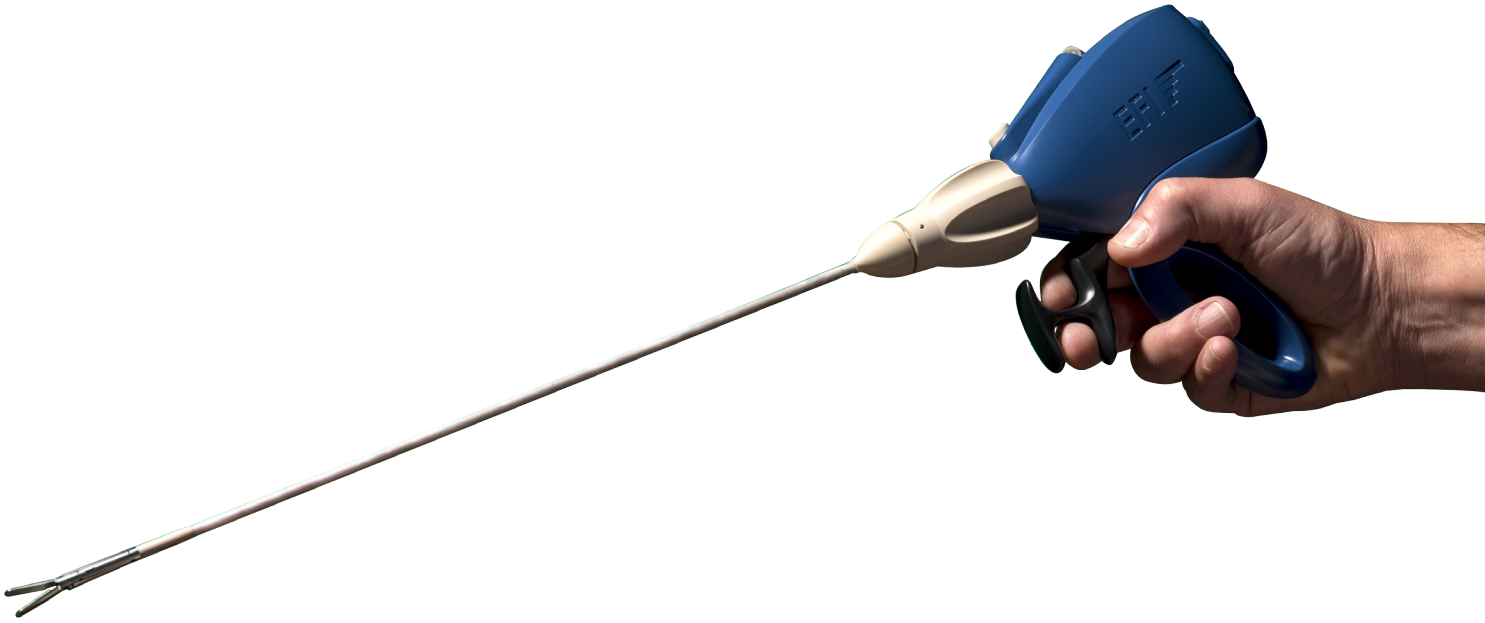
THE OPTIGRIP: A SURGICAL INSTRUMENT WITH FEELING



TNO innovation for life

Try to pick up a dove egg with a pipe wrench and the egg will probably break. Surgeons have to deal with the same problem during keyhole or laparoscopic surgery – they are unable to feel how hard they are squeezing the tissue through their instruments. This can cause complications. The OptiGrip, developed by EFI BV, restores the surgeon's feeling and thus reduces the number of complications. Patients will recover faster and go back to work more quickly, which is beneficial for both the patient and society at large. TNO is one of the co-developers of the OptiGrip.

HAPTIC FEEDBACK

Keyhole surgery is still carried out with the same standard instruments used 25 years ago. These instruments are anything but ergonomically sound and surgeons cannot feel what they are getting hold of with them. This increases the risk of complications. The OptiGrip, an innovative haptic instrument for minimally invasive operations, restores the surgeon's feeling and is provided with an ergonomic grip.

Haptic feedback is the feeling of resistance with your fingers when you grip something. This feedback is a continuous process and helps you manipulating objects. Due to mechanical friction, traditional minimally invasive instruments lack haptic feedback. With the OptiGrip, this lack of feeling in medical instruments is history. Fiber optic sensors in the gripper of the instrument measure 4,000 times per second the force used to grasp the tissue in the abdomen. This force is transmitted in real time to the haptic controller, which responds by sending a small current to the actuator in the handle of the instrument. This enables the surgeon to feel, through his fingers, the same force as the force exerted by the gripper on the tissue in the abdomen.

ONCOLOGICAL AND CARDIOVASCULAR OPERATIONS

With the OptiGrip surgeons can now operate on more vulnerable, risky tissue, such as cancerous tumors. Instead of open surgery, entailing unnecessary large incisions, more minimally invasive oncological operations will be possible in the future.

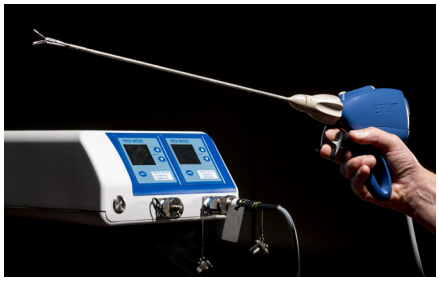
Cardiovascular surgeons, too, are enthusiastic about the OptiGrip because they can now clearly feel the difference between a vein and an artery during minimally invasive cardiovascular operations.

INCREASE OF QUALITY WITHOUT INCREASE OF COSTS

The price of the OptiGrip is expected to be one and a half times the price of a standard instrument. Nevertheless, the overall costs for Dutch healthcare will not rise because the number of complications will be reduced, patients will recover faster and go back to work more quickly.

BENEFITS

- 3 to 4 times less force needed to manipulate tissue, leading to
  - less tissue damage and
  - less complications
- More minimally invasive procedures possible, leading to
  - faster recovery
  - less pain and
  - earlier leave from the hospital
- Due to sterilizable fiber sensors the instrument
  - is reusable and
  - does not interfere with the other equipment in the operating theatre
- Operate more comfortably and more ergonomically



CO-OPERATION

In a multidisciplinary project team with knowledge of fiber optical sensors, control engineering and mechanics, TNO built the first OptiGrip pre-prototype in cooperation with EFI BV. TNO transferred the knowledge they had built up constructing the pre-prototype to EFI BV, Demcon en Technobis. They designed and realised the clinical prototypes, which are now evaluated. The OptiGrip will be launched on the market early 2017.

TNO.NL

TNO connects people and knowledge to create innovations that boost the sustainable competitive strength of industry and well-being of society. We work in collaboration with partners and focus on five transitions that we have identified together with our stakeholders, including Healthy Living: from illness and treatment to health and behavior. Innovation with purpose is what TNO stands for. We develop knowledge not for its own sake, but for practical application.

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