

# LESS Surgery: The beginning of a new era in laparoscopy

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Laparo-Endoscopic Single-Site (LESS) surgery is one of the most promising advanced minimally invasive surgical techniques of the future. This was the concordant answer to the question "LESS: A New Horizon in Surgery?" at the symposium of the same name held as part of this year's Annual Congress of the European Association of Urology in Stockholm.

Leading experts met to give a general review and future prospects on LESS surgery. With LESS surgery, standard laparoscopic access to the abdomen can be achieved for the first time through only one small incision, thus offering patients benefits like reduced morbidity and better cosmetic results.

Established in general surgery and gynaecology, LESS surgery has been pioneered in urology, where it has already been employed in a variety of indications. "Many surgeries have been performed so far like radical, partial or live donor nephrectomies, pyeloplasties, as well as very complex procedures such as radical cystectomy and radical prostatectomy," stated Prof. Stolzenburg, MD, FRCS, from the University Hospital of Leipzig, Germany, who, together with Prof. Gill, chaired the symposium. While developments are progressing at a rapid pace, technical optimisations, comprehensive data capture and studies are still needed.

## LESS Surgery – A new era of MIS

"The concept of scarless surgery has been a long-standing dream and it is close to realisation with LESS surgery," were the introductory words spoken by Prof. Stolzenburg.



Fig. 1: Chair of the symposium: Professor Jens-Uwe Stolzenburg

Surgery has been marked by continuous progress with constant focus on the reduction of operative trauma and an improvement in cosmesis for the patient. With the LESS technique, laparoscopic procedures can now be performed through one small incision in the abdominal wall.

LESS surgery was officially recommended and adopted by LESSCAR, a consortium set up with 28 leading surgeons from the associated disciplines to establish criteria for single-port surgery. "LESS surgery involves a single umbilical or extra-umbilical skin incision through which surgical tools are inserted to create a stable platform for performing major surgery," explained Prof. I.S. Gill, MD, MCh, University of Southern California (formerly Cleveland Clinic), USA, initiator of the consortium. Thanks to the new procedure, patients can expect reduced morbidity and definitely improved cosmetic results. When the surgeon selects the umbilical access, the residual scar can even be hidden and is virtually invisible.



Fig. 2: Olympus TriPort

The key to the evolution of LESS surgery lies in completely newly designed ports like the TriPort or QuadPort from Olympus. The TriPort allows simultaneous access for three instruments through a small, 1 to 2.5 cm incision in the abdomen. This new way of access can now circumvent the conventional placement of multiple trocars in different positions to achieve triangulation.

## Limited space requires technical solutions

The availability of multichannel single-port devices constitutes the basis for LESS surgery. Nevertheless,

these new procedures "require further special instrumentation," Dr. E.N. Liatsikos, MD, PhD, of University of Patras, Greece, declared in his talk. The new means of access and the parallel insertion of instruments into the abdomen limit the working space for the surgeon considerably.

Using conventional hand instruments with an axial orientation imposes several constraints on the surgeon, including proximal clashing of handles, impaired vision and the impossibility to triangulate. According to Liatsikos, "instruments have to be developed to replace space and triangulation." Flexible or pre-bent instruments offer a solution: Through minimal movement of the extracorporeal parts, surgeons can manoeuvre the intra-abdominal parts of the hand instruments.

In his talk, Liatsikos presented the results of his ongoing comparative animal study, evaluating the differences in time and precision between the different types of hand instruments. The study is currently in the process of being published. In the study, flexible instruments proved disadvantageous compared to pre-bent devices. Both practiced and inexperienced surgeons took significantly longer, on average, when they used the flexible hand instruments to perform the assigned tasks than they did with pre-bent instruments. The force and precision of the flexible instruments also proved inferior to the pre-bent ones.

But LESS surgery not only poses challenges in terms of hand instruments, but also makes demands on the optics used. Thin and deflectable scopes like the 5 mm Olympus HD EndoEYE LTF-VP feature the right advantages in this respect.

In closing, Liatsikos said: "The ideal equipment for LESS surgery are deflectable optic and pre-bent instruments that bend on the outside as well as on the inside."

## A wide range of applications

In the past, innumerable surgeries have been performed successfully with the LESS technique. With only one point of entry the operative procedure is an advancement of standard laparoscopy. That makes LESS surgery, in principle, transferrable to all standardised procedures.

The number of LESS procedures performed thus far extends into the thousands: in urology, these procedures include radical, partial or live donor nephrectomies, pyeloplasties, but also very complex procedures like radical cystectomy and radical prostatectomy. Video documentations and case reports by experts have demonstrated repeatedly the feasibility, safety and effectiveness of LESS surgery, also revealing its benefits – reflected in reduced morbidity and better cosmesis.

Gill, whose team at the Cleveland Clinic has completed more than 100 urological operations with LESS surgery, pointed out: "Using the new concept, we can execute complex and delicate surgical manoeuvres through one entry point."

At the symposium, however, the general consensus prevailed that a careful, responsible approach is the fundamental prerequisite for performing LESS surgery. This starts with the proper selection of patients and ranges to accurate documentation of case reports. "It is essential for the future of LESS surgery to select the cases carefully," Dr. R. Sotelo, Instituto Medico La Floresta, Venezuela, emphasised.

## Expansion of the principle of LESS surgery

Besides the wide range of applications, the LESS concept of the future also foresees combining LESS with various other operative techniques. "The transvaginal approach will be one more tool for all LESS procedures," Dr. Alcaraz, Hospital Clínic de Barcelona, Spain, forecasts.

Alcaraz previously performed a transvaginally assisted LESS nephrectomy with the help of the TriPort. He performed all aspects of the surgery through the multi-channel port in the umbilicus using the standard laparoscopic approach. The vagina simply acted as the extraction channel for the kidney and the



Fig. 3: The audience of the Olympus symposium

entry point for the scope. This showed that the novel multi-channel ports are versatile within indications, thereby allowing surgeons to save on incisions and trocar placements.

## Interview with Professor Jens-Uwe Stolzenburg, MD, FRCS (Ed)



University of Leipzig, Department of Urology, Leipzig, Germany

In conventional laparoscopic operations, the surgeon has to make several incisions in the abdominal wall to be able to insert the required instruments into the patient's abdomen – usually, three to four incisions are needed per surgical case. The new surgical technique called LESS (Laparo-Endoscopic Single-Site) surgery now enables doctors to perform complex procedures through one single access point – usually the navel.

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**Q: What would you regard as the benefits of LESS surgery for the patient and the attending physician?**

**A:** Since all required instruments can be inserted through a single entry port, LESS surgery appears to be "less" invasive for the patient, while probably yielding the same surgical results. Initial experiences and results prove to be very promising. Besides the cosmetic advantage – fewer or rather nearly invisible scars – the LESS procedure probably offers further benefits to the patient, such as reduced pain and faster mobilisation. Yet these are only potential benefits so far, and will have to be supported by randomised studies.

**Q: What are the advantages for the doctors?**

**A:** At this stage, the advantages for the patients constitute the primary focus. Later, however, there are potential advantages for the surgeons as well. One of the benefits, for instance, is the fact that s/he has to insert only one port and thus can prevent the risk of damaging tissue structure with further trocars.

**Q: In which indications can LESS surgery be performed in your field of practice, urology?**

**A:** In principal, LESS surgery as a special form of laparoscopy shares the same indications as conventional laparoscopy. It can therefore be employed in all standardized laparoscopic procedures in which the method and course of the operations are well described. If these procedures are performed with LESS surgery, the process remains the same; only the access through one port and the handling of the instruments differ from the conventional technique. The surgeon does not have to reinvent the surgical procedure and can concentrate on the access and instruments.

**Q: How satisfied were your patients with the results of the LESS procedure? Could their expectations with regards to minimally invasive surgery be met?**

The development of LESS surgery is in its infancy, and, indeed, the experiences gained thus far hold great promise and suggest that LESS surgery has a brilliant future. All the lecturers' fascination with LESS surgery as an advanced surgical technique set the tone of the entire event. Stolzenburg concluded as follows: "We are at the beginning of a new era of surgery. And it is a dream to perform all the surgeries through only one port or one incision. I hope we will remember this day in ten years, when we will be able to say that all of us have been a part of a new era of laparoscopy."

For further information, please contact us by email: less-surgery@olympus.eu.

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**A:** All our procedures were very successful and the patients were completely satisfied with small, almost invisible scars, little pain, early mobilisation, and a quick return to everyday life. However, this was a group of preselected patients, for example patients with small kidney tumours and low body mass indexes. Their opinions are very positive but are not completely representative.

**Q: In which indication do you expect the LESS procedure to become most successful in the field of urology?**

**A:** At this point in time I cannot predict which procedure will be the major future indication. We are still at the beginning of a new development that will be closely linked to the development of the technical equipment. Therefore, a prediction cannot be made. Most likely, the development will be similar to that of laparoscopy. For example, in the early and mid 1990s, urologists thought it was impossible to perform complex pelvic cancer cases laparoscopically. The first large series of laparoscopic radical prostatectomies was performed by French urologists between 1998-1999 and today it is a routine procedure. We can therefore forecast that LESS surgery will follow the same pattern.

**Q: The key to LESS surgery is the novel port, the TriPort, which was launched by Olympus this year in March. The TriPort enables three instruments to be inserted into the abdomen simultaneously. In addition, it possesses insufflation and venting ports. Which experiences could you gather with the TriPort from Olympus so far?**

**A:** The TriPort is a very good port with which you can work well and safely. In our clinic, we have performed all LESS surgery with the TriPort distributed by Olympus. Our experiences so far have been very good.

Personally, I pin great hopes on the QuadPort from Olympus that will soon be launched. When compared to the TriPort, the QuadPort has room for yet another instrument. It is possible to insert three working instruments plus the optic. I was given the chance to test the prototype myself in an animal experiment and was very impressed with the result. Besides the additional access, the QuadPort offers surgeons greater mobility of the instruments.

In my opinion, both ports, the TriPort and the QuadPort, hold great potential and will lead the way in the further development of the LESS procedure.

**Q: In your opinion, which role will the LESS procedure play in future MIS?**

**A:** LESS surgery will hold its ground in the field of minimally invasive surgery and take on an important role in classical laparoscopy and robotic assisted surgery. The procedure itself and the idea of performing complex surgery through one single entry holds enormous potential – and we are just at the beginning of this exciting development.