Minimally Invasive Surgery – Minimised
Primary-care physicians’ guide to single-incision laparoscopic surgery
The single-incision laparoscopic technique: The latest evolution in minimally invasive surgery

In the last few years, a new surgical technique has been pioneered, which has the potential to reduce the impact of surgery on patients, as well as alleviate pressures on the healthcare system. The single-incision laparoscopic technique allows many abdominal procedures suited to conventional three- or four-port laparoscopic surgery to be performed through a single incision, utilising a specialised multi-channel access port.

Potential benefits to patients following a single-incision laparoscopic procedure include the possibility of no visible scarring, the elimination of pain from multiple sites of entry and a faster recovery time compared with open surgery. This technique is the latest evolution in minimally invasive surgery, building on developments in laparoscopic surgery seen over the last 20 years (Figure 1). Just as conventional laparoscopic procedures are now commonplace for many operations, offering benefits over open surgery, uptake of the single-incision laparoscopic technique is likely to increase as surgeons and hospitals work to deliver a higher level of patient satisfaction.

**Figure 1. Potential advantages of the single-incision laparoscopic technique**

<table>
<thead>
<tr>
<th>Open surgery</th>
<th>Conventional laparoscopic surgery</th>
<th>Single-incision laparoscopic surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Typically a 15 cm incision</td>
<td>• Up to 4 small incisions</td>
<td>• 1 small, 20 mm incision</td>
</tr>
<tr>
<td>• Large scar</td>
<td>• 3 or 4 small scars</td>
<td>• Potential for no visible scar</td>
</tr>
<tr>
<td>• Hospital stay: 3–7 days</td>
<td>• Hospital stay: 1–3 days</td>
<td>• Hospital stay: 1–3 days*</td>
</tr>
<tr>
<td>• Moderate pain</td>
<td>• Mild or minimal pain due to multiple sites of entry</td>
<td>• Mild or minimal pain; may eliminate pain from multiple sites of entry*</td>
</tr>
<tr>
<td>• Return to work in up to 6 weeks</td>
<td>• Return to work within 5–10 days</td>
<td>• Potentially return to work within 5–10 days*</td>
</tr>
</tbody>
</table>

*Potential benefits: currently under investigation in clinical trials
What is the single-incision laparoscopic technique?

The single-incision laparoscopic technique is a minimally invasive surgical approach performed using a multi-channel access port inserted into a single incision of 20 mm, generally in the umbilicus. Surgeons use a combination of existing and specially designed articulating instruments to perform laparoscopic procedures through the single port.

The technique is suitable for most abdominal procedures that can be performed using conventional laparoscopic surgery. It has been employed in a range of general and complex procedures to date (Box 1).

**Box 1. Procedures for which the single-incision laparoscopic technique has been employed**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Procedure</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholecystectomy&lt;sup&gt;1–6&lt;/sup&gt;</td>
<td>Adrenalectomy&lt;sup&gt;15&lt;/sup&gt;</td>
<td>Liver resection</td>
</tr>
<tr>
<td>Appendectomy&lt;sup&gt;1,7–10&lt;/sup&gt;</td>
<td>Colectomy&lt;sup&gt;16&lt;/sup&gt;</td>
<td>Nephrectomy&lt;sup&gt;19–22&lt;/sup&gt;</td>
</tr>
<tr>
<td>Diagnostic laparoscopy&lt;sup&gt;11&lt;/sup&gt;</td>
<td>Fundoplication</td>
<td>Prostatectomy&lt;sup&gt;23&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hernia repair&lt;sup&gt;12,13&lt;/sup&gt;</td>
<td>Gastric banding&lt;sup&gt;17&lt;/sup&gt;</td>
<td>Sleeve gastrectomy&lt;sup&gt;24,25&lt;/sup&gt;</td>
</tr>
<tr>
<td>Tubal ligation&lt;sup&gt;14&lt;/sup&gt;</td>
<td>Gastric bypass&lt;sup&gt;18&lt;/sup&gt;</td>
<td>Splenectomy&lt;sup&gt;26&lt;/sup&gt;</td>
</tr>
<tr>
<td>Oophorectomy&lt;sup&gt;14&lt;/sup&gt;</td>
<td>Hysterectomy&lt;sup&gt;14&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>


What could a single-incision laparoscopic procedure mean for your patient and the healthcare system?

**Your patient**

The single-incision laparoscopic technique minimises the invasiveness of surgery by reducing the number of incisions needed during the operation. This could result in benefits over conventional laparoscopic and open surgery (Box 2), while delivering the same surgical result. Trials to confirm the clinical advantages over conventional laparoscopic surgery are still underway. Importantly for patients, the technique offers the potential for an optimal cosmetic outcome, with one small scar (approximately 20 mm) resulting from the single incision, which may be hidden in the umbilicus.

**The healthcare system**

The single-incision laparoscopic technique offers healthcare providers the opportunity to better meet patients’ needs in terms of fulfilment of patient choice and delivery of a higher level of patient satisfaction from an improved overall experience. One survey of 750 respondents has indicated that such a technique would be the first option for many patients.\(^\text{27}\)

The technique also has the potential to benefit the healthcare system as a whole by:

- alleviating pressure on primary-care providers in terms of reduced numbers of patients requiring follow-up treatment
- lowering costs for hospitals in terms of reduced length of hospital stays

Box 2. Potential patient benefits offered by the single-incision laparoscopic technique

- Potential for no visible scarring because the single incision is usually hidden inside the navel
- Elimination of pain from multiple sites of entry
- Quicker time to recovery (compared with open surgery), meaning shorter hospital stays

Box 3. Potential benefits to the healthcare system offered by the single-incision laparoscopic technique

- Increased ability to meet patients’ needs
- Reduced primary-care burden
- Reduced length of hospital stays

In the dynamic and evolving healthcare environment, innovation is key to providing quality healthcare to patients. The Covidien SILS™ Port, a device that can be used with a single-incision laparoscopic technique, has been nominated by the UK National Health Service as one of the ‘Top 10 innovations of 2009’, demonstrating the significance of this advancement in developing and improving services for the benefit of patients and healthcare professionals.\(^\text{28}\)
Application in the field

Single-incision laparoscopic procedures have been employed successfully in many surgical areas. The technique builds on the well-established principles of conventional laparoscopic surgery – a method of access first used in the early 1900s, which became well-established in general surgery in the 1990s. Clinical papers emerging from around the world indicate that the technique is well tolerated in many different procedures and applicable to a broad group of patients. Planned and ongoing clinical trials are expected to confirm the benefits associated with the single-incision laparoscopic technique over the coming years (examples of these are listed in Box 4).

**Box 4. Clinical trials assessing the single-incision laparoscopic technique**

<table>
<thead>
<tr>
<th>Trial</th>
<th>Endpoint</th>
<th>Study period</th>
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<tbody>
<tr>
<td>Randomized, controlled study of different pain scores in single transumbilical incision laparoscopic cholecystectomy versus classic laparoscopic cholecystectomy (n=40)</td>
<td>Significantly lower abdominal and shoulder-pain scores following single-incision laparoscopic cholecystectomy (except invisible scar)</td>
<td>Sep 2008 – Dec 2008</td>
</tr>
<tr>
<td>Single incision laparoscopic cholecystectomy (n=20)</td>
<td>Safety and feasibility (time frame: 12 months)</td>
<td>Mar 2008 – Mar 2009</td>
</tr>
<tr>
<td>A randomized trial of single-port laparoscopic cholecystectomy versus four-port laparoscopic cholecystectomy (n=50)</td>
<td>Post-operative pain scores (visual analogue pain scale from 0–10) assessed on Day 1 post-operation and at the post-operative follow-up visit in the clinic</td>
<td>Feb 2009 – Feb 2011</td>
</tr>
<tr>
<td>Single-port access cholecystectomy versus standard laparoscopic cholecystectomy – randomized study (n=200)</td>
<td>Cosmesis, body image and quality-of-life scale (time frame: at 1 month)</td>
<td>Feb 2009 – Feb 2011</td>
</tr>
<tr>
<td>Prospective, randomized, controlled trial of traditional laparoscopic cholecystectomy versus SILS™ Port laparoscopic cholecystectomy (n=200)</td>
<td>Feasibility and safety of single-incision laparoscopic cholecystectomy (using a Covidien SILS™ Port) versus four-port laparoscopic cholecystectomy as indicated by intra-operative and post-operative adverse events (time frame: 10 time points to 1 year)</td>
<td>Apr 2009 – Sep 2011</td>
</tr>
<tr>
<td>A randomized, controlled trial of single-incision laparoscopic (SILS) versus conventional laparoscopic appendectomy for the treatment of acute appendicitis (n=150)</td>
<td>Significantly lower abdominal and shoulder-pain scores following single-incision laparoscopic cholecystectomy (except invisible scar)</td>
<td>Jan 2010 – Aug 2012</td>
</tr>
</tbody>
</table>

Note: As at January 2010. Only one of the clinical trials listed here use the Covidien SILS™ Port
Frequently asked questions

Q. How many single-incision laparoscopic procedures have been carried out to date?
A. In Europe alone, it is estimated that more than 6000 surgical procedures have been carried out successfully using the single-incision laparoscopic technique (estimated number at January 2010).

Q. Are there any risks associated with this type of procedure?
A. All surgery has risks and, as with any surgical procedure, the safety depends on the skill of the operator. However, the single-incision laparoscopic technique builds on the well-established principles of conventional laparoscopic surgery.

Q. Are there clinical trials under way to assess this technique?
A. A number of randomised, controlled clinical trials are underway to assess the safety, feasibility and efficacy of single-incision laparoscopic procedures versus conventional laparoscopic procedures (see Box 4).

Q. Which procedures might the single-incision laparoscopic technique replace?
A. In theory, the single-incision laparoscopic technique is suitable for most procedures that can be carried out using conventional laparoscopic techniques. However, single-incision laparoscopic procedures may not fully replace conventional laparoscopic surgery, as there will remain instances where conventional laparoscopic or open surgery is still necessary. The decision will be made by the surgeon on a case-by-case basis.

Q. What is the opinion of governing bodies, such as the National Institute for Health and Clinical Excellence (NICE), regarding the single-incision laparoscopic technique?
A. Within the UK, NICE has issued guidance regarding single-incision laparoscopic cholecystectomy. At present, there are no formal European-level recommendations in place, although various parties (such as the European Association for Endoscopic Surgery) are looking into establishing guidelines.

Q. What are patients’ expectations around the single-incision laparoscopic technique?
A. Patients are important stakeholders in the healthcare system and often drive the uptake of new procedures. Media evidence indicates that demand for single-incision laparoscopic procedures is increasing among patients, reflecting the potential patient benefits associated with the technique.

Please note that these responses do not refer to the Covidien SILS™ Port but to single incision procedures.
Patient and surgeon views

The situation: Deterioration of a long-standing kidney dysfunction led Susie’s surgeon to recommend a complete nephrectomy. Susie already had a three-inch abdominal scar (which occasionally felt lumpy and sore) from previous emergency renal surgery when she was 2 years of age. The conventional laparoscopic procedure using three incisions may have left her with more scarring.

‘I was delighted that the single-incision laparoscopic procedure was an option for me. The fact that it could leave me without any noticeable scars was a huge deciding factor.’ – Susie


The patient benefit: The potential for no visible scarring was a primary factor in Susie’s decision to undergo the single-incision laparoscopic procedure; other reasons included the potential for the elimination of pain from multiple incisions and a quicker recovery compared with open surgery.

Surgeons’ views

‘The single-incision laparoscopic technique has great potential in gynaecology… Developing the technique may be a route by which more laparoscopic procedures in gynaecology are offered, reducing the role of open surgery.’ – Dr Robin Crawford, UK

‘I am absolutely convinced that this technique is a positive development for colorectal surgery.’ – Dr Boris Vestweber, Germany

‘The single-incision laparoscopic technique is a promising new option that offers patients the opportunity for more discreet surgery and will also drive surgery towards something that is simpler for the patient, compared with other surgical alternatives.’ – Dr Roberto Tacchino, Italy

‘Once the single-incision laparoscopic technique has been mastered, it is safe and effective and applicable to many urological laparoscopic procedures.’ – Dr Vincenzo Ferrara, Italy

‘Although still relatively young, the single-incision laparoscopic technique is a positive step towards a future of less aggressive, minimally invasive general surgery.’ – Dr Oscar Vidal Perez, Spain
References

20. Raman JD, Cadeddu JA. Indian J Urol 2008;24:457–60

This document contains information about the single-incision laparoscopic technique and its potential benefits. Neither the information presented nor the benefits described can be related to the Covidien SILS™ Port. Clinical studies are underway to establish if the benefits of the single-incision laparoscopic technique can be expected from the SILS™ Port. This document was produced by Alpharmaxim Healthcare Communications. The content does not necessarily represent the views of Alpharmaxim Healthcare Communications.

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