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Single incision transumbilical laparoscopic appendectomy: initial experience

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A B S T R A C T

Introduction: Appendicitis is the most common abdominal emergency. The treatment is surgical and single incision laparoscopic surgery (SILS) involves performing laparoscopic surgery through a single transumbilical point, in an attempt to improve the results of laparoscopic surgery.
Material and method: A total of 73 patients with suspected acute appendicitis were operated on using the SILS technique between June 2009 and August 2010. All patients were operated on by the same surgical team, and the navel was the only point of entrance. Post-surgical pain was assessed using a numerical scale at the time of discharge.
Results: None of the patients required conversion to conventional laparoscopy. The mean surgical time was 40±14 (16-80) minutes. There were no complications during or after the surgery. The mean post-surgical pain score was 3±1 (1-7) and the mean hospital stay was 18±7 (9-42) hours.
Conclusion: SILS is a safe and effective technique for appendicitis. In the future, the most common surgical procedures could be performed through the navel. This would be by surgeons, highly experienced in advance laparoscopic surgery in order to introduce this new technique safely without increasing morbidity and mortality.

Apendicectomía laparoscópica mediante incisión única transumbilical: experiencia inicial

Palabras clave:
Cirugía laparoscópica mediante incisión única
Apendicectomía
Acceso transumbilical

R E S U M E N

Introducción: La apendicitis es el proceso abdominal de urgencia más común. El tratamiento es quirúrgico y la cirugía laparoscópica mediante una única incisión (CLIU) implica la realización de la cirugía laparoscópica a través de un único punto transumbilical, en un intento de superar los resultados de la cirugía laparoscópica.
Material y método: Entre junio de 2009 y agosto de 2010, 73 pacientes con sospecha de apendicitis aguda fueron operados por la técnica CLIU. Todos los pacientes fueron intervenidos por

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el mismo equipo quirúrgico y el ombligo fue el único punto de entrada. El dolor postoperatorio se evaluó en el momento del alta de acuerdo a una escala numérica.
Resultados: Ninguno de los pacientes requirió conversión a laparoscopia convencional. El tiempo quirúrgico medio fue de 40 ± 14 (16-80) min. No hubo complicaciones intraoperatorias ni postoperatorias. La media de dolor postoperatorio fue de 3 ± 1 (1-7) y la estancia media hospitalaria fue de 18 ± 7 (9-42) horas.
Conclusión: La CLIU es una técnica segura y eficaz para la apendicitis. En el futuro los procedimientos más comunes se podrán realizar a través del ombligo, siendo necesaria una alta experiencia en cirugía laparoscópica avanzada para introducir esta nueva técnica con seguridad sin añadir morbimortalidad.

Introduction

Appendicitis is the most common abdominal emergency and has to be treated surgically. Laparoscopy is used more and more frequently as it has advantages over open surgery: less surgical trauma, improved postoperative recovery and aesthetic results, the whole abdominal cavity can be examined in obese patients and child-bearing women, unexpected findings are controlled, and the patient is able to quickly return to performing everyday activities.[1]

Minimally invasive surgical techniques have developed during recent decades: NOTES (natural orifice transluminal endoscopic surgery), magnet surgery, SILS (single incision laparoscopic surgery), etc., in an attempt to improve on traditional laparoscopic surgery results. SILS involves performing laparoscopic surgery with a single transumbilical incision, in order to achieve better results than those from laparoscopic surgery.

The purpose of this study is to present our initial experience with this surgery using a single transumbilical incision for emergency acute appendicitis treatment.

Material and method

Prospective study of 73 patients with suspected acute appendicitis that underwent appendectomy using SILS, from June 2009 and August 2010. All patients were operated on by the same surgical team and the same technique.

Patients were given information about the intervention and signed an informed consent.

All patients with suspected acute appendicitis that needed emergency surgical treatment were included in the study. Those patients with suspected appendicular adhesions were excluded.

The study variables were the following: age, sex, body mass index (BMI); appendix characteristics, postoperative pain, hospital stay, immediate (<30 days) and delayed (>30 days) complications. Postoperative pain was assessed at discharge using a numerical scale from 1 to 10, where 1 was no pain and 10 was the worst degree of pain experienced (Figure 1).

Data were analysed using SPSS version 15.0 for Windows® (SPSS, Chicago, Illinois, USA). All data are reported using mean±standard deviation and range.

Surgical technique

The patient was positioned in the supine position, with the surgeon and assistant to the left. A 2 cm-vertical infraumbilical incision was performed until the peritoneum was opened, under direct vision, and the navel skin was then everted. A SILS Port (Covidien®) with access channels for three cannulae was then inserted into the cavity. Pneumoperitoneum is established and three 5 mm-trocars are inserted, using one of them for a 30º angled scope (Figure 2). The patient was placed in the Trendelenburg (30º) and right lateral decubitus (20º) positions to ensure that the appendicular region was sufficiently exposed.

As they are inserted through a single port, instruments that can be rotated and turned at between 0º and 80º angles at their distal end are used, allowing a sufficient work angle. This allows the surgeon to work in opposite directions and therefore creates an adequate work triangle (roticulator Endo Dissect , roticulator Endo Grasp , roticulator Endo Mini-Shears , Covidien) (Figure 3). All instruments are equipped with monopolar electrocautery.

The appendix was cut using a 4.5 mm endodissector (blue load) and the meso-appendix ligature was performed with endoloop. The appendix was removed using a specimen bag. The aponeurosis was closed using a long-term absorbable suture and the skin was closed with a short-term absorbable suture.

Results

Seventy-three patients underwent appendectomy using SILS: 43 (59%) were women and 30 (41%) men with an average age of 29±12 (11-65) years and a mean BMI of 24±4 (17-31).

Eleven patients (15%) had gangrenous appendixes and 8 (11%) had normal appendixes (Table).

Mean operation time was 40±14 minutes (16-80). All interventions were completed successfully, without having to be transferred to traditional laparoscopy surgery. Nor were there any operational incidences.

Figure 1 – Numerical scale for pain.

Mean postoperative pain measured using a numerical scale was 3±1 (1-7).

Mean hospital stay was 18±7 (9-42) hours.

Within the first 30 days following the intervention, 2 patients developed asymptomatic periumbilical haematoma. Patients did not need to be admitted to hospital and the condition resolved spontaneously. All patients attended check-ups with a mean follow-up of 7.7±4.5 (0.4-14.2) months. None of the patients currently have postoperative complications.

Table 1 – Type of appendix

Normal	8	11%
Phlegmonous	23	31.5%
Purulent	31	42.5%
Gangrenous	11	15.1%

Discussion

Techniques requiring less invasive access have been developed within the field of surgery in an attempt to reduce post-operative morbidity. Laparoscopic procedures have numerous advantages when compared with open surgery techniques. They have improved post-operative recovery programmes (fast-track), have shortened hospital stays and have reduced morbidity, especially surgery-related morbidity.

Use of SILS can improve traditional laparoscopic surgery. The possible advantages of this procedure are aimed at reducing incisions to one single-port incision, in addition to the already recognised advantages of traditional laparoscopy. Using one single port in the navel improves the aesthetic outcome and does not penetrate the muscle, minimising the incisional pain. Furthermore, by not using lateral ports, we

Figure 2 – SILS-Port and 5 mm-30° scope.

also avoid the risk of haemorrhage due to epigastric vessel injuries.[2] This involves a fast recovery and better aesthetic outcomes, which may not be very relevant for some surgeons, but are very important to the patient.

Using SILS, the surgeon has the same level of vision as traditional laparoscopic surgery (unlike with other procedures, such as NOTES), meaning that it does not take long to learn it. On the other hand, it is a procedure which can easily be switched to traditional laparoscopy without the surgeon having to change position or the instruments.

SILS has been used since the end of the 90 s for a variety of procedures. In 1998, a single-incision laparoscopic appendectomy was reported,[3] where the appendix was tied off using laparoscopy. The appendectomy was extracorporeal using a single umbilical incision. Other authors have performed a great variety of umbilical procedures with or without appendix exteriorisation. In almost all cases patients were children.[4-6]

Figure 3 – Instruments used.

All of this is in accordance with the medical literature regarding urological procedures with SILS.[7,8] Piskun[9] reported the first laparoscopic cholecystectomy using a single incision. Colorectal surgery,[10] adrenalectomy,[11] colecystectomy[12,13] and bariatric surgery procedures[14,15] have recently been performed using this technique. All of these publications highlight the viability of SILS, although most of them are isolated cases and there are no extensive or randomised prospective studies. One of the reasons is that the applicability of this technique has not lead to its generalised use due to technical difficulties. The greatest technical difficulty associated with SILS is instrument handling. This is because the instruments and the camera are introduced at the same time and in parallel through a single port, tending to restrict mobility and not allowing the triangular working space that the traditional laparoscopic technique does allow. This can alter vision and perception of depth, which can hinder the intervention even more.

The instruments also cross at the entry point in the abdominal cavity, in such a way that the surgeon needs to retrain his or her eye-hand coordination, given that the instrument on the outer right side becomes the left inner instrument and vice versa. As a consequence, the surgeon sometimes has to perform the dissection using his or her non-dominant hand, meaning that the surgeon needs to be ambidextrous.

The surgeon and port assistant must maintain a perfect understanding of one another's movements so that they do not interfere with one another. This is the most important aspect for the surgical team to ensure the patient's safety and best interest.

Traditional laparoscopic instruments are being used for this new technique, but there will be less and less disadvantages as more simplified and specific instruments are designed.

These technical limitations can be associated with an increase in operative time, which will decrease as the surgeon acquires a series of strategies with surgical experience. Extensive experience in laparoscopic surgery is needed to minimise training periods and ensure that this technique is performed safely without added complications.

Our results show that surgery was longer than a laparoscopic appendectomy, which must be reduced by increasing the surgeon's experience and by designing instruments specifically for this technique. Moreover, this technique is safe, with an incidence of complications that is similar or less than traditional laparoscopy.[16-18]

We can conclude that using SILS for appendicitis is a safe and effective technique. We believe that the most common laparoscopic procedures could be carried out through the patient's navel. This means that a high level of experience in laparoscopic surgery is needed to be able to safely introduce this new technique, without adding morbidity and mortality.

Conflict of interest

The authors affirm that they have no conflict of interest.

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