



## Original article

# Single port laparoscopic cholecystectomy in major ambulatory surgery (MAS)<sup>☆</sup>

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## A B S T R A C T

**Introduction:** Natural orifice endoscopic surgery is a new surgical procedure still in the development phase. The most natural entry for surgeons is to use an already existing scar, such as the navel. The recent introduction of trocars designed for this purpose has made it possible to put this into practice.

**Material and methods:** We present our preliminary experience in single trans-umbilical incision laparoscopic cholecystectomy, by means of a prospective study which included 26 patients operated on between January 2009 and January 2010. We also attempt to find out whether it can be performed in a MAS programme.

**Results:** All patients had uncomplicated cholelithiasis, although in 5 of them cholecystitis was identified during the surgery. The mean surgical time was 51.2min. The mean hospital stay was 25.7 h, and 76.92% of patients were admitted for less than 24 h. There were no re-admissions or significant intra-operative or post-operative complications.

**Conclusions:** On looking at our results, single port laparoscopic cholecystectomy could be included in a major ambulatory surgery programme.

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## Colecistectomía laparoscópica de puerto único en un programa de CMA

## R E S U M E N

**Introducción:** La cirugía endoscópica por orificios naturales es una nueva modalidad quirúrgica en fase de desarrollo. La vía más natural para los cirujanos es usar una cicatriz ya existente como es el ombligo. La reciente introducción de trocates diseñados para este fin ha hecho posible su puesta en práctica.

## Palabras clave:

Colecistectomía por puerto único

Cirugía mayor ambulatoria

Acceso transumbilical

<sup>☆</sup>Part of this study was presented at the Reunión Nacional de Cirugía de Las Palmas (Las Palmas National Surgery Conference) in October 2009 as a presentation to the Major Outpatient Surgery committee.

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**Material y métodos:** En este estudio presentamos nuestra experiencia preliminar en la colecistectomía laparoscópica con puerto de acceso único umbilical, mediante un estudio prospectivo que incluye a 26 pacientes intervenidos entre enero 2009 y enero 2010. También pretendemos conocer su posible realización en régimen de CMA.

**Resultados:** Todos los pacientes presentaban coledocistitis no complicadas, aunque en 5 se identificó una coledocistitis en la cirugía. El tiempo quirúrgico promedio fue de 51,2 min. La estancia hospitalaria media fue 25,7 h. En el 76,92% de los pacientes el ingreso fue menor de 24 h. No hubo ningún reintegro ni complicación intraoperatoria o postoperatoria importante.

**Conclusiones:** A la vista de nuestros resultados la colecistectomía laparoscópica por puerto único favorece su inclusión en un programa de cirugía mayor ambulatoria.

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## Introduction

The method of choice for the majority of surgeons for performing a cholecystectomy is a laparoscopic approach using various points of access through the abdominal wall. Endoscopic surgery through natural orifices is a new surgical technique in the development and experimental phase both in animals and humans. The potential advantages include absence of visible scars, and reduced pain and discomfort. The most natural point of access for surgeons is to use already existing scars, such as the naval, to introduce the instruments that facilitate laparoscopic procedures. This approach was first used in 1997 by Navarra et al<sup>1</sup> in a laparoscopic cholecystectomy using two periumbilical incisions that were later joined to remove the gallbladder. Recently, single trocars have been designed with various ports of access that enable a cholecystectomy to be performed with guaranteed safety.<sup>2</sup>

The possibility of performing a laparoscopic cholecystectomy in a major ambulatory surgery (MAS) unit was published by our group in 1998.<sup>3</sup> Subsequently, several articles have reflected the safety and advantages of this method. In this pilot study, we attempted to research the feasibility of a programme for laparoscopic transumbilical cholecystectomy in patients with symptomatic cholelithiasis and its possible use as a MAS.

## Material and methods

Here we present our preliminary experience with laparoscopic cholecystectomy using a single point of access in a prospective study. This study included 26 patients who were operated on in the Ciudad Real General University Hospital between January 2009 and January 2010, with a reference population of 550 000 inhabitants. The general surgery department has two openings for training a resident doctor per year. The new technique was developed in the field of minimal access surgery, in order to minimise the damage to the abdominal wall and improve patient recovery. At least 10 surgeons and the residents actively participated in the development of this project.

Patients were initially selected with a diagnosis of non-complicated cholelithiasis and without previous laparotomies.

All patients were informed as to the nature of the procedure, and gave their informed consent. Patients were admitted the same day as the surgery under a MAS regimen and were given prophylactic antibiotics according to protocol. The periumbilical region was preoperatively sterilised with povidone-iodine. An initial approach was made in each patient through a single transumbilical port, and 4 patients required an accessory 5mm trocar at the start of the study. In 24 patients, we used a 5 mm SILS™ port (Covidien) trocar, and a LESS™ port (Olympus) was used in two cases. A high definition, 5 mm, 0° optical system was used in each case. Even though articulated laparoscopic clamps were available, we used conventional, non-articulated instruments in the majority of cases. In some cases, it was necessary to raise the gallbladder with a transparietal 0/0 straight silk suture that went through the fundus to improve the exposure of the surgical area. The traction provided by a 5 mm grasper was sufficient in most cases to adequately expose the Calot's triangle for dissection. Traction and countertraction manoeuvres provided visualisation of the area, and the traction clamp usually needed to be placed at different heights of the gallbladder. A monopolar hook was used for the dissection with a wide opening in the anterior and posterior peritoneum. The cystic duct and artery were isolated and then controlled using 5 mm laparoscopic clips. Intraoperative cholangiography was not carried out in any of the cases. The gallbladder bed was dissected using a hook dissector, and the gallbladder was extracted through the umbilical port. The umbilical incision was sutured using conventional techniques. Patient follow-up lasted one month.

## Results

We performed 26 single-port-access cholecystectomies, with an accessory trocar needed in 4 patients at the beginning of the study. The mean patient age was 50.5 years (range: 18-80), and 18 patients were female and 8 male. Even though we preoperatively selected patients with non-complicated cholelithiasis, we identified a cholecystitis in 5 patients, which was histologically confirmed as chronic cholecystitis. All patients included in the study had a normal liver profile, ultrasound imaging was consistent with cholelithiasis, and, in

some cases, a slight thickening of the wall of the gallbladder was observed.

The mean duration of the surgical procedure was 51.2 min (range: 30-90). The surgery lasted less than 1 hour in 73.8% of patients, and was less than 45min in 53.85% of cases (Figure 1). In the procedures that lasted more than 1h, patients were obese, had cholecystitis, or technical difficulties that required an accessory trocar (3 patients). In some cases, a minimal perforation of the gallbladder was produced with a slight leakage of bile, although traction of the gallbladder towards the abdominal wall prevented a major spill. The bile leak was immediately aspirated.

The mean duration of hospitalisation was 25.7 h (range: 9-72). In 76.92% of patients, the period was less than 24 h (Figure 2). Patients were observed in the major ambulatory surgery unit, and if the patients were admitted during the afternoon shift (after 14:00 h), they were discharged the next morning. The procedure was thus considered to be an extended MAS (admission less than 24 h). The surgical wound became infected in two cases. Both cases were related to cholecystitis and perforation of the gallbladder. No patients were readmitted and there were no significant intraoperative or postoperative complications, apart from the infected surgical wounds.

## Discussion

Although the first case of a laparoscopic cholecystectomy by a single incision was described over 10 years ago, experience with this technique is limited in our field. Our pilot study has researched the possibility of performing a laparoscopic cholecystectomy through the navel, as a natural orifice. A single incision was made that could be converted into a multi-port surgery if the conditions should require it. The theoretical advantages of this approach include improved aesthetic results, reduced postoperative pain, and rapid recovery, all of which greatly favour the inclusion of these patients in a MAS program.<sup>4</sup>

Nowadays, laparoscopic cholecystectomy is considered to be the method of choice for removing the gallbladder in most parts of the world, since its advantages over an

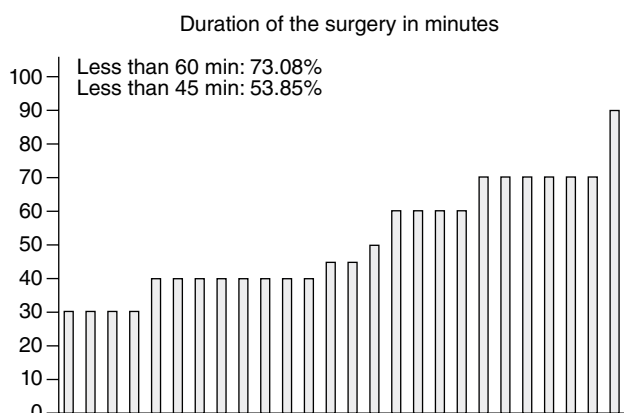


Figure 1 – Duration of the surgical procedure.

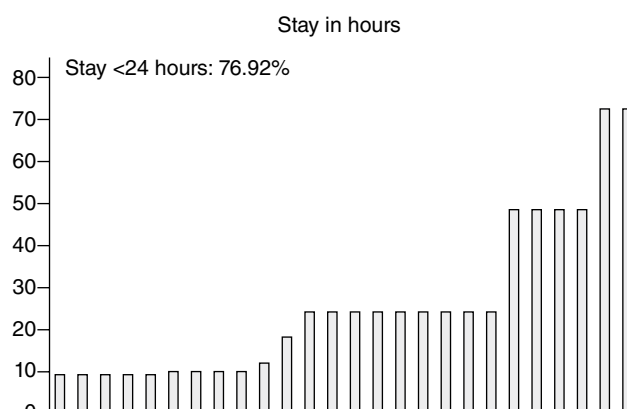


Figure 2 – Duration of hospital stay.

open cholecystectomy have been clearly proved.<sup>5</sup> However, there have been for some time various initiatives to try and minimise operative trauma by reducing the number of trocars used in this procedure. The use of three trocars instead of four, or the use of mini-instruments, are attempts at advancing in this direction.<sup>6</sup> Another effort made in this field has been the introduction of natural orifice transluminal endoscopic surgery (NOTES), and more recently, single-port transumbilical surgery.<sup>4,7</sup>

Currently, NOTES surgery is in its initial development stages, and further research is needed to determine the best approach (oral, anal, or urethral), along with an adequate method to close the internal organs that minimises the risk of peritonitis due to leaks from the closure.<sup>4,7,8</sup> The most advanced mixed technique is the transvaginal endoscopically-assisted cholecystectomy described by Bessler et al<sup>9</sup> and Marescaux et al.<sup>10</sup> However, this method can only be applied in women, and the impact that it could have on fertility and discomfort during sexual relations has not been established.<sup>9-11</sup>

The navel is located in the centre of the abdomen and could be considered as a natural scar through which the camera and trocars could be introduced for laparoscopic procedures. Navarra described the first transumbilical laparoscopic cholecystectomy, and since then, several authors have described this same procedure using various techniques.<sup>12,13</sup>

The appearance of new transumbilical trocars with various working channels (SILS, LESS), along with semiflexible cameras and a new range of clamps adapted to this new environment is allowing research groups to propose new procedures, among these, the transumbilical cholecystectomy.

In our opinion, this access opens up a world of possibilities that will be developed later. Cholecystectomy and appendix surgery are the most developed techniques today.<sup>13,14</sup> Future possibilities will come from even more highly adapted clamps, along with new modifications of the rest of the surgical materials (cameras, endostaplers, etc.).

Although the aesthetic benefits of these techniques have been clear from the beginning, no clear conclusions had been made on the benefits for postoperative pain and recovery. However, randomised trials have begun to appear with pain scales in which single-port laparoscopic cholecystectomy has resulted in reduced postoperative pain

requiring less painkillers than in conventional laparoscopic cholecystectomy.<sup>15</sup> The infections in the 2 patients from our study made us think about protective methods to try and avoid perforations during the extraction of the gallbladder, as well as during the manoeuvres used to suspend it. New trocars such as the LESS now come with a protective bag, and mechanisms have been described for suspending the gallbladder without the need to perforate it. As we learnt more about the procedure, we realised that a traction point is not always necessary.

In light of our results, single-port laparoscopic cholecystectomy could be included in a MAS program, for the patients that comply with inclusion criteria for such a program.

### Conflict of interest

The authors affirm that they have no conflicts of interest.

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