



Laparoscopic cholecystectomy with two mini cosmetic incisions

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Abstract

Minimally invasive surgery gained popularity between general surgeons especially laparoscopic four-port cholecystectomy. By introducing different methods such as NOTES and SILS, the costs elevated with its cosmetics. We aim to study a new technique of laparoscopic cholecystectomy by two incisions with best cosmetics, and same quality and lower cost as conventional four-port laparoscopic cholecystectomy and make a comparison between them. In a double-blind clinical trial from December 2012 to September 2014, patients with cholelithiasis who presented to general surgery clinic and candidate for laparoscopic cholecystectomy were studied. Half of patients underwent double-incision laparoscopic cholecystectomy and other half underwent conventional four-port laparoscopic cholecystectomy. The mean age and BMI were higher in double-incision and four-port group, respectively, but not statistically different. Also male to female ratio was 6:1 in double-incision group and 9:1 in four-port group, and they were not statistically different. The mean operation time was about 2 min more in double-incision group, but it is trivial to consider a significant difference at level of 5%. The mean pain score (0–10) was significantly lower in double incision group in comparison with four-port group ($p < 0.0001$). Patients in double incision group reported higher satisfaction and were sooner in return to work than in four-port group ($p < 0.0001$). It seems that DILS for uncomplicated cholelithiasis is safe. By reducing port number, we succeed in reducing the pain and need for analgesics, reducing hospital staying and sooner return to work. By taking into account using conventional CLS instrument and lowering the hospital charges, it could be a good alternative to SILS.

Keywords Laparoscopic cholecystectomy · Double ports · SILS

Introduction

Laparoscopic cholecystectomy is the treatment of choice for gallstone disease [1]. After introducing and familiarity of surgeons with this technique, laparoscopic cholecystectomy has changed in many aspects [2] including lowering port number and size to achieve lesser pain and better cosmetics [3]. These methods consist of single-port laparoscopic surgery (SILS) and natural orifice surgery [1–4]. Advancing in these methods led to increase the cost in minimally invasive surgery [5–7]. So in this study, we aim to perform economic

laparoscopic cholecystectomy with conventional instruments to lower the cost and use the benefit of lowering port number for lesser pain and better cosmetics. In this study, we compare classic four-port laparoscopic cholecystectomy with double-incision laparoscopic cholecystectomy by conventional instruments by means of cost pain and cosmesis.

Materials and methods

In a double-blind clinical trial from December 2012 to September 2014, patients with cholelithiasis who presented to general surgery clinic and candidate for laparoscopic cholecystectomy were studied. Based on the study of Kenju et al. [11] and using mean operation time in two groups of DILC and NC, we calculated the adequate sample size. With desired study power of 80%, type I error of 5% and method of t test, the required sample size for each group was at least 66 and that with considering 5% of attrition we increased sample size by 70.

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Patient with recent acute cholecystitis (< 6 weeks), history of cholangitis, choledocholithiasis and previous abdominal surgery were excluded from the study. Then, patients were divided randomly one by another into two groups: double-incision laparoscopy surgery (DILS) and classic laparoscopic surgery (CLS). The informed consent was taken after explaining both techniques and the study. After pre-operative evaluation patients put on operating list.

Surgical technique

In DILS technique patient was positioned in supine position and underwent general anesthesia. Then, 1 cm incision was made in umbilicus and fascia, then opened and first 5 mm port entered under direct vision. A 5 mm port was placed and 5 mm 30° camera was inserted. The abdominal cavity was explored for any contraindication for surgery (like severe adhesion or severe inflammation). Another 5 mm port was inserted beside the 5-mm port. Then, a 10-mm incision was made just above the pubic hair in hypogastria trending right to the midline. A 10 mm port was inserted under direct vision. Then, the scope was changed for 10 mm, 30° one. Conventional instrument was inserted through the umbilical ports and cholecystectomy was performed conventionally. If after the entry of 5 mm port for scope the condition was not safe for DILS then by changing the 5 mm scope and port with 10 mm scope and port, the classic cholecystectomy was

done. For CLS after 10 mm incision, the first 10 mm trocar was inserted via opened fascia under direct vision. Another 10 mm port was inserted in sub-xiphoid area under direct vision of the scope. Another 5 mm port was inserted on gallbladder fundus and another 5 mm port was inserted in anterior or mid axillary line according to surgeon preference.

All operation was performed by one surgeon. Then, other members of team performed data collection without knowledge about the type of surgery. So we double-blinded the study.

Statistical analysis

Results are presented as mean ± SD or frequency (percent). Distribution of nominal variables were compared between two groups using Chi-square or Fisher’s exact and differences of those continuous variables was determined by Student’s *t* test and Mann–Whitney for ordinal variables. SPSS®, version 16 (SPSS, Chicago, IL, USA) was used for statistical analysis and statistical significance was defined as a *p* value of less than 0.05 (Fig. 1).

Results

This study had been done on 140 patients with acute and chronic abdominal pain half of them underwent double incision and the rest four-port laparoscopy randomly.

Fig. 1 CONSORT flow diagram: laparoscopic cholecystectomy trial

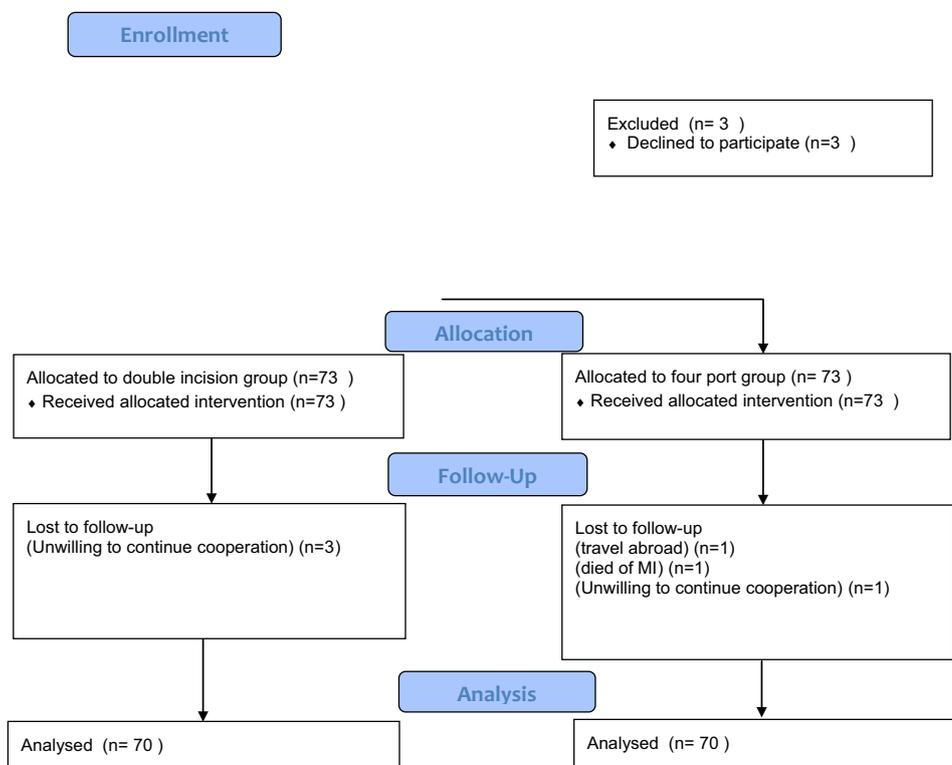


Table 1 Demographic characteristics of patients

| Variable | Group | | p value |
|--------------------------|--------------------------|--------------------|---------|
| | Double incision (n = 70) | Four port (n = 70) | |
| Gender ^a | | | |
| Male | 10 (14.3%) | 7 (10%) | 0.438 |
| Age ^b (year) | 38.63 ± 11.69 | 10.93 ± 41.6 | 0.123 |
| BMI (kg/m ²) | 27.74 ± 3.3 | 27.37 ± 3.51 | 0.528 |
| Operation time (min) | 41.84 ± 11.13 | 39.8 ± 10.87 | 0.274 |

^aFrequency, %
^bMean ± SD

Table 2 Complication during and after surgery

| Variable | Group | | p value |
|--------------------------|---------------------|---------------|------------|
| | Double incision (%) | Four port (%) | |
| Intra-operative bleeding | 2 (2.9) | 2 (2.9) | 1 |
| Conversion to open | 0 | 3 (4.3) | 0.245 |
| Incisional hernia | 0 | 2 (2.9) | 0.496 |
| Bile duct | 0 | 0 | 1 |
| Need for analgesics | 23 (32.9) | 30 (42.9) | 0.223 |
| Vomiting | 16 (22.9) | 14 (20) | 0.68 |
| Nausea | 23 (32.9) | 14 (20) | 0.085 |
| Pain score (VSA) | 0.54 ± 0.86 | 2.47 ± 1.71 | < 0.0001** |

**p<0.01

Patients who failed to use double-incision technique were operated in CLS mode but excluded from the study.

Demographic characteristics of two groups are summarized in Table 1. The mean age and BMI were higher in double-incision and four-port group, respectively, but not statistically different. Also male to female ratio was 6:1 in double-incision group and 9:1 in four-port group and they were not statistically different. The mean operation time was about 2 min more in double incision group, but it is trivial to consider a significant difference at level of 5%.

The rate of intra-operative bleeding was the same across two groups. Complications during and after surgery are shown in Table 2. There was no conversion to open in double group, while three cases of conversion to open in four-port group occurred. No incisional hernia occurred in double-incision group and in neither of two groups there had not been sign of bile duct. Among complication after surgery, need for analgesics, vomiting and nausea had more frequencies, but they were not statistically different between two types of laparoscopy. The mean pain score (0–10) was significantly lower in double-incision group in comparison with four-port group (p < 0.0001).

Table 3 Satisfaction and recovery after surgery

| Variable | Group | | p value |
|-------------------------------|-----------------|-------------|------------|
| | Double incision | Four port | |
| Cosmetic satisfaction | 9.71 ± 0.45 | 8.03 ± 1.38 | < 0.0001** |
| Length of hospital stay (day) | 0.92 ± 0.31 | 2.24 ± 0.95 | < 0.0001** |
| Days of return to work | 3.37 ± 1.49 | 4.92 ± 1.31 | < 0.0001** |

**p<0.01

Patients in double incision group reported higher cosmetic satisfaction and were sooner in return to work than in four-port group (p < 0.0001) (Table 3.)

All patients were followed 3 and 6 months after surgery and just two cases of bile leak in four-port group and three cases in double-incision group had been seen.

Discussion

After investigating for similar technique or study, we found some other minimally invasive methods of cholecystectomy but not same as us. In a study by Ye et al. [2], the SILS method was compared with classic four-port laparoscopic cholecystectomy with better results in cosmetics in spite of longer operative time. In another article by Dabbagh and colleagues [4], SILS was compared to mini-laparoscopy with shorter operative time. The pain score was the same in both groups but it was lesser in our study in DILS group compared to CLS. Hospital staying was shorter in mini-laparoscopy group, which is against ours. It is important to note that their study is performed with low volume and the technique is somehow different. In the study performed by Hosseini et al. [5] a comparison was made between SILS and CLS. There were no differences between groups in terms of operation time, post-operative pain and return to work which is in contrast to our study. Sulu et al. [6] confirm that the SILS takes more time than CLS but in our study it had no meaningful difference. Hospital staying in Sulu study was the same in both groups but our study showed that the

DILS patients stay shorter. In the study by Aktimur et al. they compare groups in the view of cosmetics and umbilical hernia. The CLS group had no hernia after 6 months but SILS group had four incisional hernias in their umbilicus because the umbilical opening in fascia is about 2 cm with greater risk of hernia but in our technique fascia was opened 5 mm and in two different site of fascia in umbilical area, so we had no hernia. Their cosmetic results were similar to ours. In a study Ken Ju et al. [2] compares the methods (but their technique in double incision is different from ours). The operative time was the same but hospital staying was shorter in DILS (like us). Post-operative pain and need for NSAIDs was not different but in our study the need for analgesics and post-operative pain were lower in DILS. In another study by Sabuncuoglu and colleagues [8] SILS and DILS and CLS were evaluated. The operation time was higher in SILS in contrast with our results but the amount of intra-operative bleeding, post-operative pain, narcotic use and hospital staying was not different. Patients' satisfaction was higher in SILS group significantly. In an article by Antonio et al. [9] DILS technique is performed successfully but port placement was different and the article points out that the technique is feasible and safe. Another article by Wroblewski et al. [10] port placement is somewhat different and the Collots' triangle exposed differently. It is important to mention again that we used the conventional ports and instrument in DILS with the same operation cost to CLS, but SILS is performed by special port and curve instruments that result in much higher operative cost.

Conclusion

It seems that DILS for uncomplicated cholelithiasis is safe. By reducing port number, we succeed in reducing the pain and need for analgesics, reduce hospital staying and sooner return to work. The patients were more satisfied cosmetically. By taking into account using conventional CLS instrument and lowering the hospital charges, it could be a good alternative to SILS.

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Compliance with ethical standards

Ethical statement We aim to study a new technique of laparoscopic cholecystectomy by two incisions with best cosmetics, and same quality and cost as conventional four port laparoscopic cholecystectomy

and make a comparison between them. His work was supported by the vice chancellery of research of Mashhad University of Medical Sciences, Mashhad, Iran, and performed in the Endoscopic and Minimally Invasive Surgery Research Center of Mashhad University of Medical Sciences, Mashhad, Iran.

Conflict of interest The authors declare no conflict of interest.

Research involving human participants and/or animals The study was approved by the Ethics Committee of Mashhad University of Medical Sciences, Mashhad, Iran (ID:911162)

Informed consent Informed consent was obtained from the patient.

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