Original Article

Three Port Laparoscopic Cholecystectomy by a Modified Technique

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Abstract

Introduction: *Since the introduction of laparoscopic cholecystectomy (LC) several modifications have been introduced to its procedure. Main aim of these modifications is to improve cosmesis & reduce pain. Several institutes are routinely performing conventional 3 ports laparoscopic. In modified 3 ports LC, the third port was moved from right hypochondrium to umbilicus, to conceal it in the umbilical scar, thereby giving the three port comfort to the surgeon and two port benefits to the patient.*

Methods: *This observational study was conducted in the Department of Surgery of Shaheed Suhrawardy Medical College & Hospital from September 2015 to October 2016. After taking valid consent a total 45 patients were selected for modified 3 ports LC. Here we tried to see the safety and benefit of this modified technique by assessing operating time, intra-operative complications, open conversion rate, postoperative wound infection, post-operative hospital stay, pain score and satisfaction with cosmetic outcome.*

Results: *3 patients were excluded from study due to different reasons. So, among total 42 (N) patients 30 (71.4%) were female & 12 (28.6%) were male. Operative time was 58.48 ± 32.52 minutes (range 34 to 180 minutes). 2 patients required conversion to open surgery. Pain score was 2.07 ±1.71 and cosmetic score was 8.67 ± 1.99.*

Conclusion: *Modified 3 port laparoscopic cholecystectomy can be performed safely with a higher cosmetic satisfaction in selected cases by expert surgeon.*

Key Words:
Three ports, Laparoscopic cholecystectomy

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Introduction

In 1987 Prof. Philip Mouret performed 1st successful laparoscopic cholecystectomy (LC).[1] Later on LC become the gold standard treatment of gall stone diseases. Standard LC is being performed using 4 ports both in American and French position.[2] Several modifications have been introduced to LC.[3] There is a trend towards reducing the number & size of the trocars and change of trocars position. Actual aim of these modifications is to reduce the pain, requirement of analgesia and to improve cosmesis.[3-4] LC can be performed using 2 ports, 3 ports and single incision.[4,5] In two port technique multiple stitches were taken through gallbladder for retraction, which may increase the possibility of infection to the parieties and also increase the chance of in advent spillage of stones during cholecystectomy.[6] In Single Incision Laparoscopic Surgery (SILS) as there is a large single fascial defect, which may increase the risk of hernia development.[7] In conventional 3 port LC fundus holding port is omitted. Many surgeons have been reported that the forth port is not necessary and it is already accepted as a safe and effective procedure for gall bladder diseases.[8] In many institute conventional three-port LC is the primary option.[7] Recently some surgeons reported about a new modification in 3 port LC technique. In modified 3 ports LC the third port is moved from right hypochondrium to umbilicus, to conceal it in the umbilical scar. As a result surgeons get comfort of three port and patients get

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benefits of 2 port thechnique.[9-10] Several studies were done on this modified 3 port technique, but mostly the results were inconclusive. So, this study was conducted to assess the safety and feasibility of 3 ports LC in a modified technique.

Materials & Methods

This observational study was conducted in the Department of Surgery of Shaheed Suhrawardy Medical College & Hospital from September 2015 to October 2016. All the patients who had symptomatic gall stone diseases and selected for elective cholecystectomy, were included in this study. Preoperatively patients were evaluated by complete history, physical examination, routine laboratory tests, LFT, USG of HBS, ECG, CXR. Patients with severe acute cholecystits, empyema gall bladder, Mirizzi's syndrome, acute pancreatitis, previous upper abdominal surgery and the patients who were not fit for laparoscopic surgery on anesthetic grounds were excluded from the study. Using purposive sampling method 45 patients were selected and valid consent was taken. The main outcome variables were operating time, intra-operative complications, conversion to open surgery, postoperative wound infection, length of hospital stay; pain score and satisfaction with cosmetic outcome were recorded. Post operative pain was assessed by using a numeric visual analog scale from 1 to 10 (mild to severe pain) on 1st post operative day (POD). Cosmetic outcome was also assessed by using visual analog scale from 1 to 5 (worst to best) on 7th POD follow up.

Modified operative technique

Under general anesthesia operations were performed in the standard position for LC. On the left lip of umbilicus at 4 O'clock position a 10mm optical port was made in blind method and pneumoperitonium was created. Another 10mm port was made in epigastric region, same as conventional 4 ports LC. Then by using grasping forceps feasibility of the modified technique was assessed. If it was seems to be feasible camera was shifted to epigastric port and a 5 mm working port was made under vision, on right lip of umbilicus at 8 O'clock position. Then camera was again shifted at 10 mm umbilical port. 5 mm umbilical port was used as left working port. Gall bladder was held on infundibulum and pushed towards the right shoulder to retract and explore the Calot's triangle. After performing standard cholecystectomy gall bladder was removed through epigastric port. When required drain was placed and finally wounds were closed.

Statistical analyses

The data was presented in the form of tables and figures, as necessary. Statistical analyses of the results were done by using computer based statistical software SPSS version 20. Means, standard deviations, percentage frequencies were determined as indicated. The Student's t test was used to analyze and compare the data with the reference value. A value of $P < 0.05$ was considered statistically significant.

Results

Among total 45 patients 1 patient was lost follow up and in 2 patient's gall bladder was hard, thickened & grossly fibrosed and after initial per-operative assessment, modified 3 port technique was not performed. These three patients were excluded from the study. Among this total 42 (N) patients 30 (71.4%) was female & 12 (28.6%) was

Fig.-1: *External view of ports position*

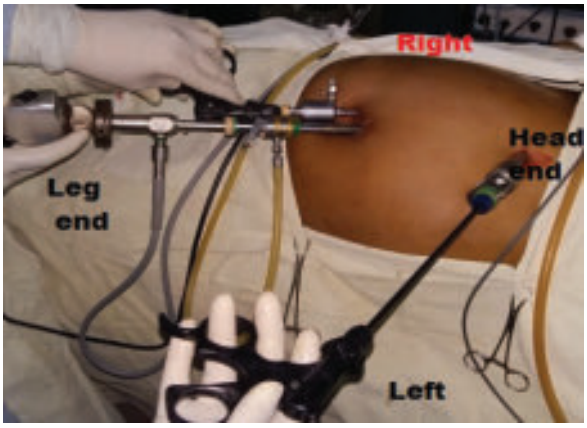


Fig.-2: *External view of Hand instruments*

male. Mean age was 31.98 ±8.16 years and the age range was 18 to 50 years. Indications for operation was shown in Table – I. Mean operation time was 58.48 ±32.52 minutes, which was similar to conventional 4 port operation time. During operation in 1 case due to excessive bleeding, conversion to open was required and another patient was converted to open surgery due to severe adhesion at Calot's triangle. Others per – operative hazards & post operative wound infection rate were shown in Table – III. Mean pain score on 1st POD was 2.07 ±1.71 and mean cosmetic score on 7th POD was 8.67 ± 1.99. Post operative hospital stay was 1.35 ± 1.41 day.

Table – I

Demographic characteristics & diagnosis (N=42)

Variables		Frequency(N=42)	Percent(%)
Gender	Male	12	28.6%
	Female	30	71.4%
Age	Mean ±SD (Range) years	31.98 ±8.16 (18-50)	
Pre-operative diagnosis	Symptomatic gall stone	32	76.2%
	Chronic cholecystitis	8	19%
	Gall bladder polyp	2	4.8%

Table – II

Outcome variables (N=42)

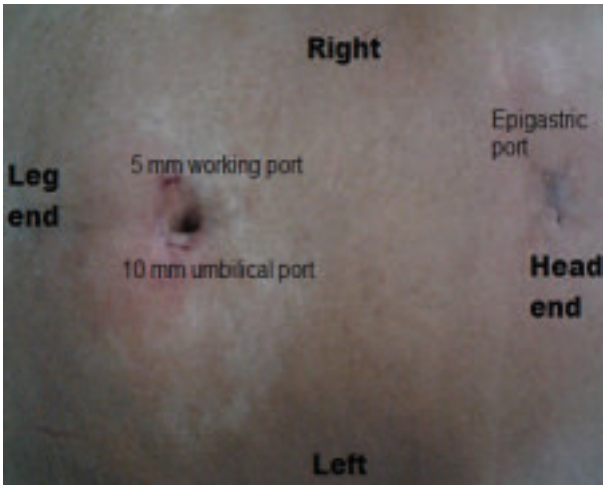
Variables	Reference value	Study result	P value
Operation timeMean ±SD (minutes)	57.76 ±30.80 [2]	58.48 ±32.52	.770[a]
Pain score (1-10)Mean ±SD	2.91 ±1.20 [3]	2.07 ±1.71	.003[a]
Cosmetic satisfaction score (1-10) Mean ±SD	7.8 ± 1.70 [3]	8.67 ± 1.99	.007[a]
Post operative hospital stay (Days)	1.44 ± 0.17 [3]	1.35 ± 1.41	.70[a]

[α] One Sample t-test from reference value

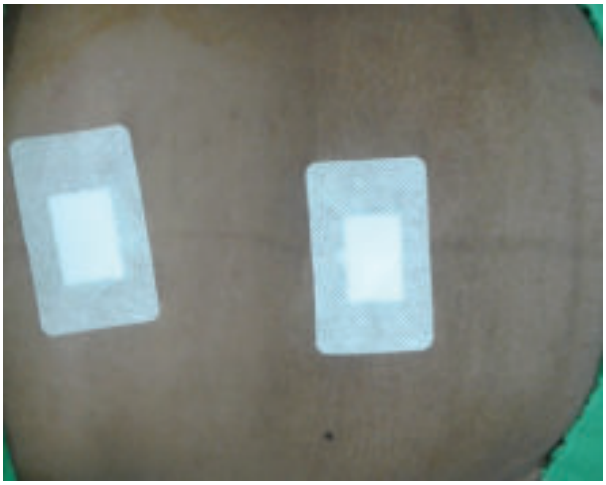
Table – III

Other variables (N=42)

Variables		Frequency (N=42)	Percent(%)
Per – operative hazards	Perforation of gallbladder	2	4.8%
	Injury to liver	1	2.4%
	Excessive Bleeding	1	2.4%
Conversion to open	Yes	2	4.8%
	No	40	95.2%
Post operative wound infection	Yes	2	4.8%
	No	40	95.2%



III



IV

Fig.- III & IV: *Cosmetic outcome of Modified 3 port LC*

Discussion

4 ports LC is gold standard treatment for symptomatic gall bladder diseases. With increasing experience many surgeons are now can perform LC without using the 4th port. Some expert surgeons are doing LC in modified 3 port technique. In this technique 3rd port was shifted from right hypochondrium to umbilical scar to improve cosmesis & reduce number of pain sites. But many surgeons have expressed concerns about the safety of modified 3 port LC that it is difficult to achieve critical view of safety in this technique, which may increase the chance of inadvertent injuries. However Chalko et al published their experience of modified 3 port LC in 50 selected cases by an experienced surgeon. They found good result & patient satisfaction in their study.

In our study all cases were also selected by adequate pre-operative checkup, even after that in 2 cases modified 3 port technique was abandoned after initial per-operative assessment. In that 2 cases gall bladder was fibrosed and thick walled. Achievement of critical view of safety was difficult in this technique specially in long hanging gall bladder. But as all the operation was done by experienced surgeon these difficulties were overcame.

Due to the new port position, normal agronomy of laparoscopy was distorted. So, we also felt some instrumental collision in this modified 3 ports technique. Which was partially overcame by appropriate port positioning at 4 O'clock & 8 O'clock position.

But for this port placement, patient felt pain only in two site where as in conventional 4 port LC patient feels pain in 4 site. That's why pain score of modified 3 ports LC was less and which was significantly lower than the reference value of pain score of conventional 4 ports LC (2.07 ± 1.71 Vs 2.91 ± 1.20, p = .003). In modified 3 ports technique 2 scars were concealed in umbilical scar, finally patient only had one 10mm visible scar on epigastric region. In conventional 4 ports LC 3 scars were found in upper abdomen. Regarding cosmetic outcome modified 3 ports LC was highly satisfactory to the patients (p = .007). Zhu J et al. was also had similar cosmetic outcome in their study[7].

SILS and Natural Orifice Transluminal Endoscopic Surgery (NOTEs) also had superior cosmetic outcome[7]. But they requires special instruments, port[6]. Whereas modified 3 port LC can be done by conventional LC instruments. Moreover in SILS as there is a large single fascial defect, which increases the risk of hernia development[7]. NOTES require a multidisciplinary team, a long and difficult surgical procedure and there are ethical problems related to the trans-vaginal route[7].

In our study the rate of conversion to open surgery, operation time, post-operative hospital stay and post-operative complication was similar to that of conventional 4 ports LC. But we should remember that in our study only highly selected patient were under went this modified 3 port technique. So comparing these means with the results of conventional 4 port LC was actually not well matched. To bring conclusion regarding these issues we need a randomized control trial between these two methods. According to the experience of this study we can say that modified 3 port LC is technically possible and safe for highly selected cases when operation is done by an experienced surgeon. And it is associated with better pain & cosmetic outcome. But it is not suitable in early period of learning curve.

Conclusion

Cholecystecomy in a modified 3 port technique is safe in experienced hand, with an acceptable operative outcome & excellent cosmetic result in selected cases.

References

1. Al-Azawi D, Houssein N, Rayis AB, McMahon D, Hehir DJ. Three-port versus four-port laparoscopic cholecystectomy in acute and chronic cholecystitis. BMC Surg. 2007;7:5–10.https://doi.org/10.1186/1471-2482-7-8
2. Sharma PK, Mehta KS. Three port versus standard four port laparoscopic cholecystectomy- a prospective study. JK Sci. 2015;17(1):38–42.
3. Kumar M, Agrawal CS, Gupta RK. Three-port versus standard four-port laparoscopic cholecystectomy: a randomized controlled clinical trial in a community-based teaching hospital in eastern Nepal. JSLS. 2007;11(3):358–62.
4. Bari SU, Islam FU, Rather AA, Malik AA. Three port versus four port laparoscopic cholecystectomy: a prospective comparative clinical study. Int J Res Med Sci. 2019;7(8):3054. https://doi.org/10.18203/2320-6012.ijrms20193394
5. Afzal M, Rehman S. An analysis of 3-port laparoscopic cholecystectomy: How often 4th port is required? J Coll Physicians Surg Pakistan. 2016;26(2):163–4.
6. Chalkoo M, Ahangar S, Patloo AM, Matoo AR, Baqal FS, Iqbal S. A medical school experience with three port laparoscopic cholecystectomy with a new modification in technique. Int J Surg [Internet]. 2013;11(1):37–40. Available from: http://dx.doi.org/10.1016/j.ijsu.2012.11.005
7. Zhu J, Huang J. A Modified Three-Port Laparoscopic Cholecystectomy: Shifting the Third Port to the Umbilicus. Surg Sci. 2016;7(2):82–8. https://doi.org/10.4236/ss.2016.72011
8. Gunjiganvi M, Harsha H, Moirangthem G, Singh CA. A study of three-port versus four-port laparoscopic cholecystectomy. J Med Soc.2013;27(3):208. https://doi.org/10.4103/0972-4958.127395\
9. Sasnur P, Nidoni R, Narasanagi B, Sindgikar V, Mulla RA. Modified Three Port Laparoscopic Cholecystectomy: How We Do It Differently? J Evol Med Dent Sci. 2013;2(52):10089–91. https://doi.org/10.14260/jemds/1740
10. Mayir B, Dogan U, Koc U, Aslaner A, Býlecýk T, Ensarý CO, et al. Safety and effectiveness of three-port laparoscopic cholecystectomy. Int J Clin Exp Med. 2014;7(8):2339–42.
11. Mohameda MMTZ. Three-port versus conventional four-port laparoscopic cholecystectomy: a comparative study. Egypt J Surg. 2019;38:722–8. https://doi.org/10.4103/e