True Umbilical versus Open Hasson Technique Access for Pneumoperitoneum in Laparoscopic Cholecystectomy

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Abstract: Background: Laparoscopic cholecystectomy has become the gold standard in the treatment of symptomatic gall stones, the major advantages of laparoscopic cholecystectomy include less postoperative pain, less time required for hospitalization and recovery, and better cosmetic results. **Objectives:** The aim of this study is to compare True Umbilical versus Open Hasson technique access for pneumoperitoneum in Laparoscopic Cholecystectomy as regards Timing, Cosmetics, Pain control and Complications. **Patients and Methods:** This study included (**80)** patients with chronic calcular cholecystitis operated upon for laparoscopic cholecystectomy in the period from September 2018 to February 2019 at the general surgery department, Ain Shams University hospitals and Theodor Bilharz Research Institute (TBRI). **Results:** In this study the operative time For umbilical port site entry in seconds in true umbilical technique (Group A) Mean±SD was 40.3 ± 1.2 compared with open Hasson technique (Group B) 131.9±5.5 with significant value of importance for True umbilical technique (Group A). ($p < 0.0001$). **Conclusion:** True Umbilical technique access for establishing pneumoperitoneum in Laparoscopic Cholecystectomy is quick for port entry & closure, safe, reliable, simple, easy to learn with minimal post operative pain. So, provide surgeons with an effective and safe mean to insert the first trocar.

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1. Introduction

Laparoscopic cholecystectomy has become the gold standard in the treatment of symptomatic gall stones, the major advantages of laparoscopic cholecystectomy include less postoperative pain, less time required for hospitalization and recovery, and better cosmetic results ***(Terho et al., 2016).***

The placement of the first trocar remains a critical step in laparoscopic cholecystectomy and in order to minimize complications associated with placement of this first trocar as vascular and intestinal injuries, several techniques have been reported ***(Karaca et al., 2014).***

Two common methods are usually performed; The first called the closed technique, requires the Veress needle, which is inserted in the abdominal cavity for carbon dioxide (Co2) insufflations followed by blind introduction of the first trocar; The second called open technique was first described by Hasson ***(Ahmad et al., 2015).***

Open Hasson technique begins with a small incision c-shaped below the umbilicus and subsequently all layers of the abdominal wall are incised, the first trocar is inserted under direct vision followed by gas insufflations ***(Lal et al., 2012).***

Some prefer True umbilical technique because they feel that it gives a better visual control, through natural opening and which is simple, easy, feasible, safe, excellent functional and cosmetic results ***(Slater and Pimpalwar, 2013).***

Aim of the Work

The aim of this study is to compare True Umbilical versus Open Hasson technique access for pneumoperitoneum in Laparoscopic Cholecystectomy as regards Timing, Cosmetics, Pain control and Complications.

2. Patients and Methods

Patients:

This study included (**80)** patients with chronic calcular cholecystitis operated upon for laparoscopic cholecystectomy in the period from September 2018 to February 2019 at the general surgery department, Ain Shams University hospitals and Theodor Bilharz Research Institute (TBRI) with:

Inclusion Criteria:

All patients with chronic calcular cholecystitis operated upon for Laparoscopic cholecystectomy.

Exclusion Criteria:

Patients with midline laparotomy with distortion of the anatomy of the umbilicus.

- Patients with a history of an operation through a transverse umbilical incision.
- Patients with umbilical and paraumbilical hernia.
- Pregnancy.
- Associated Cardiac or Pulmonary co-morbidity that contraindicate General Anesthesia.

All Patients were randomly divided into (2) main groups:-

- Patients whom were operated upon Laparoscopic Cholecystectomy with True Umbilical technique for creating Pneumoperitoneum **(Group A)**
- Patients whom were operated upon Laparoscopic Cholecystectomy with Open Hasson technique for creating Pneumoperitoneum **(Group B).**

Methods:

Preoperative preparation

- Laboratory investigations (CBC, liver functions (ALT, AST, Total bilirubin, direct bilirubin, ALP, GGT, ALB), renal functions, coagulation profile).
- Radiological (abdominal ultrasonography, x-ray chest).
- Anesthetic consultation.
- Consent (the procedure was explained, written and informed consent obtained).
- Preparation (Fasting 8-10 hrs, Shaving, I.V antibiotic on induction or preoperative in acute attack.

Operative procedures

➢ **True Umbilical Technique for Pneumoperitoneum In Laparoscopic Cholecystectomy (Group A):-**

Patient positioning:

The patient was lying supine and the surgeon was positioned on the patient's left side (North American positioning).

The camera operator standed on the patient's left and to the left of the surgeon, while the assistant standed on the patient's right. The video monitor was positioned on the patient's right above the level of the costal margin. The table was rotated with the patients right side up, tilted the patient in the reverse trendlenburg position improved the exposure. Gravity pulled the duodenum, the colon, and the omentum away from the gallbladder, thereby the working space available in the upper abdomen increased.

Technique:

Traction was applied from the bottom of the umbilical scar with two toothed forceps and the umbilicus is everted, vertical True -Umbilical incision of 10mm was performed with scalpel, blunt dissection and identify the fascia at the midline, Due to the presence of a facial defect in patients without previous surgery at the umbilical region, this physiologic defect was utilized to insert Kelly forceps through the defect and the fascia will be divided under direct vision a few millimeters cephalad and a few millimeters caudally to achieve an incision till intraperitoneal so a 10mm trocar could be introduced and at the end of the procedure just One High Dermal Absorbable Vicryl 2/zero stitch was made to close the umbilical opening without skin suturing.

➢ **Open Hasson Technique for Pneumoperitoneum in Laparoscopic Cholecystectomy (Group B): -**

Patient positioning:

The patient was lying supine and the surgeon was positioned on the patient's left side (North American positioning). The camera operator standed on the patient's left and to the left of the surgeon, while the assistant standed on the patient's right. The video monitor was positioned on the patient's right above the level of the costal margin. The table was rotated with the patients right side up, tilted the patient in the reverse trendlenburg position improved the exposure. Gravity pulled the duodenum, the colon, and the omentum away from the gallbladder, thereby the working space available in the upper abdomen increased.

Technique:

C-shaped infraumbilical incision of 10mm was performed with scalpel, blunt dissection till identify the sheath, traction was applied by two Kelly forceps and cut with scissor and expose the peritoneum which was pulled upward with Kelley forceps and cut with scissor, maintained upward pull a blunt trocar was introduced under direct vision; at the end of the procedure the sheath was closed with proline 1 stitch (es), then the skin with proline 3/zero stitch (es).

In both groups; A 30- degree telescope was then inserted through the umbilical port, and an examination of the peritoneal cavity was performed. A 10-mm operating port was placed subxiphoid, and two additional 5-mm trocars were positioned subcostally in the right upper quadrant in the midclavicular and anterior axillary lines.

The two 5-mm ports were used for grasping the gallbladder and exposing the gallbladder and cystic duct. The infundibulum was retracted laterally to further expose the triangle of Calot. Traction on the fundus was upward toward the patient's head, and traction on the Hartmann pouch laterally to the right.

This combination **"dis-aligns"** the common duct and cystic duct so that they appear as distinct structures. Incorrect traction aligns the ducts so that they appear as a continuous structure and as a consequence the chance of biliary injury was increased.

The junction of the gallbladder and cystic duct was identified by stripping the peritoneum off the gallbladder neck and removing any tissue surrounding the gallbladder neck and proximal cystic duct. This dissection was continued until the triangle of Calot was cleared of all fatty and lymphatic tissue and the gall bladder infundibulum was elevated off of the liver bed. Visualization of this "critical view" was important in preventing injury to the bile ducts. At this point two structures (cystic artery and cystic duct) was seen entering the gallbladder.

The next step was clipping of the cystic duct by one clip proximally and two clips distally then divided in between. The artery was usually encountered running parallel to and behind the cystic duct. Once identified and isolated, clips were placed proximally and distally, and the artery was divided. The peritoneum overlying the gallbladder was placed on tension using the two grasping forceps, the peritoneum and adventitia between the gallbladder and liver were divided with the cautery, and the gallbladder was dissected out of the gallbladder fossa.

Prior to removing the gallbladder from the liver, the operative field was carefully searched for hemostasis and adequate placement of the cystic duct and artery clips was confirmed. The gallbladder was then dissected off the liver and was usually removed through the subxiphoid port. The fascial defect and skin incision might need to be enlarged to remove the gallbladder and contained gallstones.

Both techniques were compared as regards **Demographic data** (Age, Sex, BMI) **Presenting symptoms and signs** (RUQ pain, nausea, vomiting, Abdominal distension, History of jaundice, History of acute attack, History of pancreatitis, History of cholangitis) **Investigations performed** (Laboratory and imaging) (TLC count, Alkaline phosphatase, Total Bilirubin, ALT, Abdominal Ultrasound, ERCP) **Operative Parameters** (Timing for port entry in seconds, Port site Leakage, Timing for closure of wound in seconds, visceral injury and Major vascular injuries) and **Post operative Parameters** (Home pain score, Home analgesia score, Wound Infection, Seroma and Incisional hernia).

3. Results

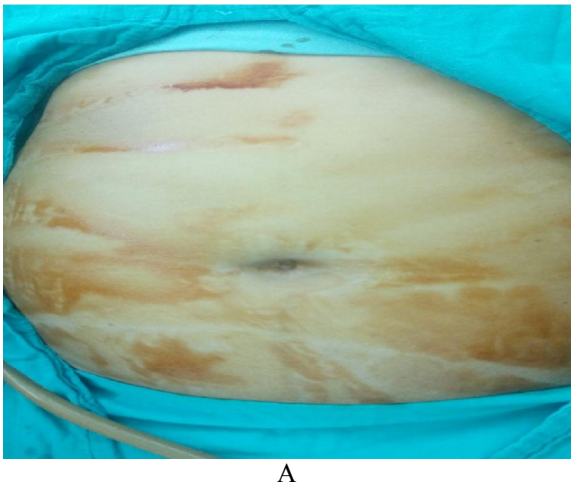
Group (A): Patients whom were operated upon Laparoscopic Cholecystectomy with True Umbilical technique for creating Pneumoperitoneum.

Steps of True Umbilical technique for creating Pneumoperitoneum all shown in **figure 1 (A, B, C, D, E, F)**

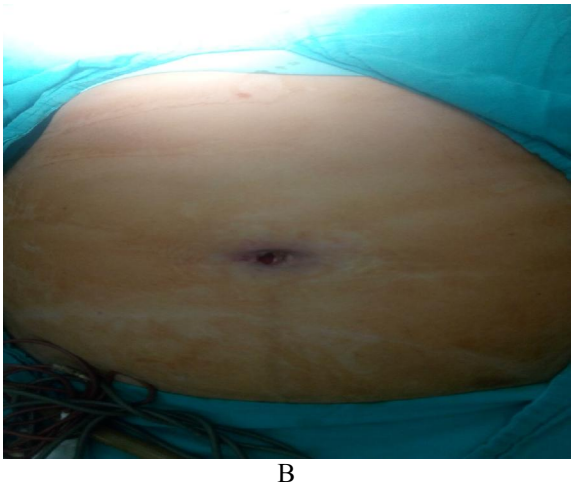
Table (1): Investigations (Laboratory and Imaging).

	Group A	**Group B**	**P- Value**
TLC Mean±SD	7.7 ± 0.23	7.18 ± 0.2	0.75
Alkaline phosphatase Mean±SD	99.1 ± 9.7	82.6± 6.5	0.01
Total Bilirubin Mean±SD	0.8 ± 0.07	0.7 ± 0.04	0.009
ALT Mean±SD	46.7 ± 3.5	43.8 ± 3.8	0.67
Abd. Ultrasound (number of Gall Bladder stones)	28 Multiple stones 12 Single stone	31 Multiple stones 9 Single stone	0.61

Laboratory investigations were done for all cases of chronic calcular cholecystitis (total leucocytic count, alkaline phosphatase, total bilirubin, ALT) and imaging (Abdominal ultrasound).



A



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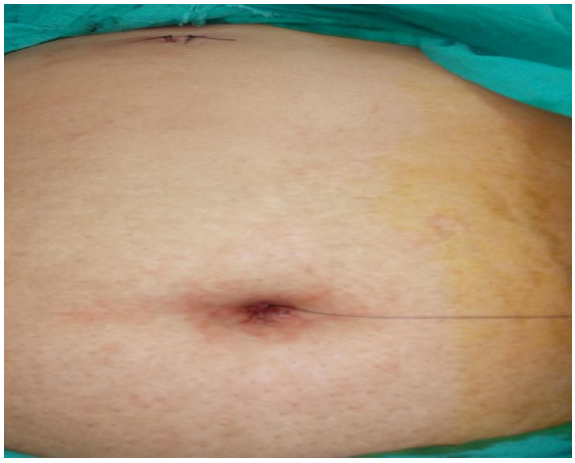

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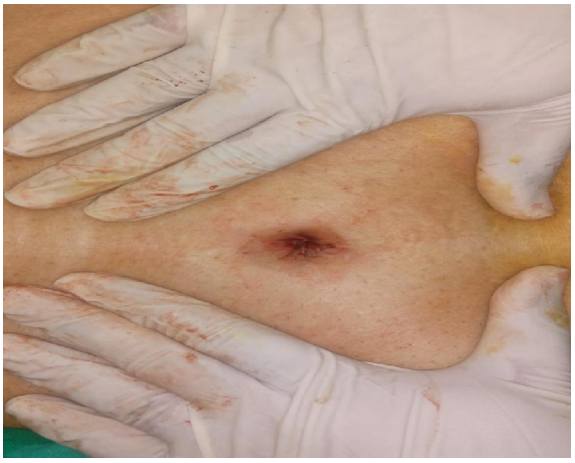
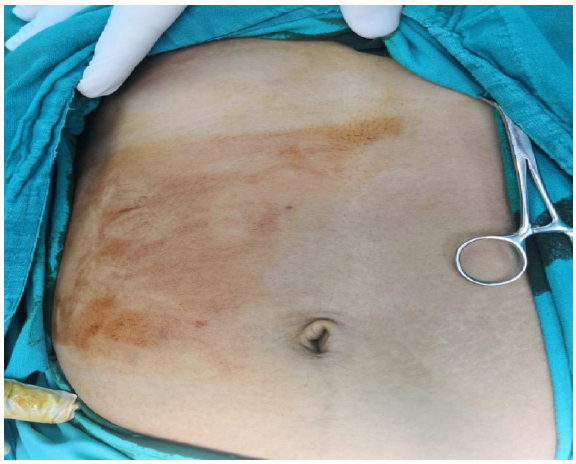


F

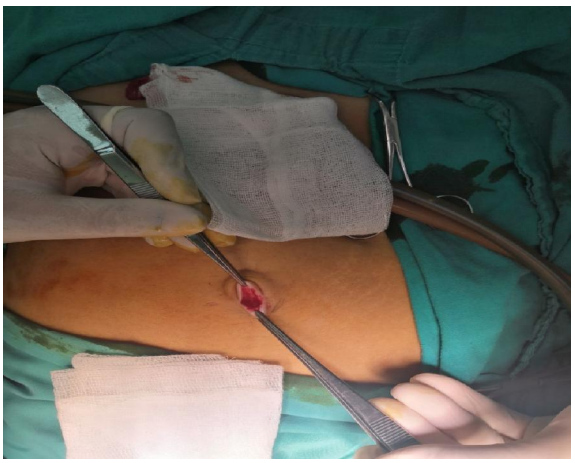
Figure (1): Steps for True Umbilical Technique for port site entry.

Group (B): Patients whom were operated upon Laparoscopic Cholecystectomy with Open Hasson technique for creating Pneumoperitoneum.

Steps of Open Hasson technique for creating Pneumoperitoneum are shown in **Figure 2 (A, B, C, D, E, F, G)**



A



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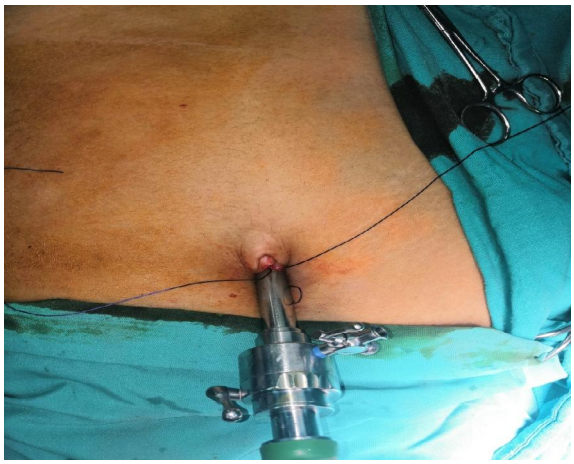

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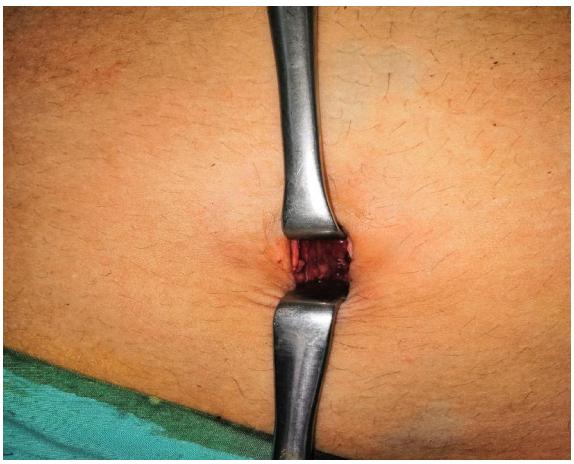

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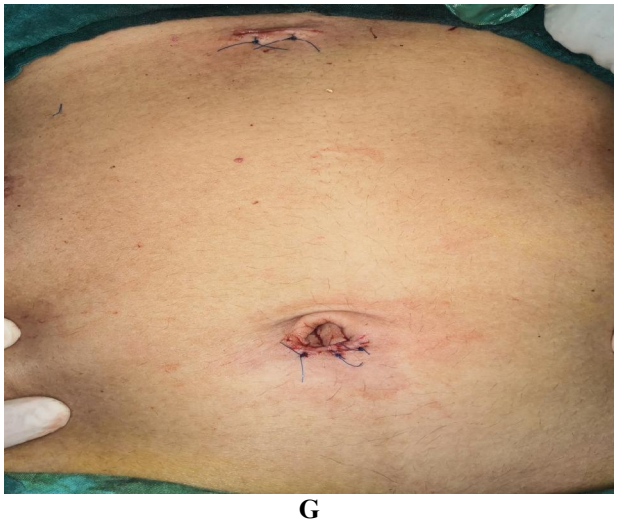

G

Figure (2): Steps for Open Hasson Technique for port site entry.

Table (2): Timing for Umbilical Port Site Entry in seconds.

	Group A	Group B	P-value
Timing For Umbilical Port Site Entry in seconds (Mean±SD)	40.3 ± 1.2	131.9±5.5	**< 0.0001**

Operative Timing For Umbilical Port Site Entry in seconds in True Umbilical technique (Group A) Mean±SD was 40.3 ± 1.2 compared with Open Hasson Technique (Group B) 131.9±5.5 with significant value of importance for True Umbilical Technique (Group A). (P-value < 0.0001).

Table (3): Operative timing for closure of Umbilical Port Site wound in seconds.

	Group A	Group B	P-value
Timing for closure of Umbilical Port Site wound in seconds **(Mean±SD)**	47.0 ± 3.02	136.0 ± 2.14	**< 0.0001**

Operative Timing For closure of Umbilical Port Site wound in seconds in True Umbilical technique (Group A) Mean±SD was 47.0 ± 3.02 compared with Open Hasson technique (Group B) 136.0 ± 2.14 with significant value of importance for True Umbilical Technique (Group A). (P-value < 0.0001).

Table (4): Home Analgesia score

	Group A	Group B	P- value
Home Analgesia score (Mean±SD)	1.2 ± 0.16	1.9 ± 0.20	0.0187

Post operative Home Analgesia score Mean±SD in True Umbilical technique (Group A) was 1.2 ± 0.16 compared with Open Hasson technique (Group B) 1.9 ± 0.20 with no significant value of importance. (P-value 0.0187).

Table (5): Post Operative Wound Infection, Seroma, Incisional Hernia

	Group A	Group B	P- value
Wound Infection	1	2	1
Seroma	1	3	0.61
Incisional Hernia	0	0	1

Post operative wound Infection in True Umbilical Technique (Group A) was 1 case compared with Open Hasson Technique (group B) 2 cases with no significant value of importance. (P-value 1). Post operative seroma in True Umbilical Technique (Group A) was 1 case compared with Open Hasson Technique (group B) was 3 cases with no significant value of importance. (P- value 0.61). None of the cases of both groups (A & B) developed post operative incisional hernia.

4. Discussion

For more than a decade, laparoscopic surgery has become the most commonly performed procedure in surgery around the world ***(Neudecker et al., 2002).***

Many surgeons have surpassed the learning curve for most procedures and therefore mayor complications have been reduced significantly.

Azevedo in a cohort of in 696,502 patients who underwent a laparoscopic procedure using the closed technique (Veress needle) to enter the abdominal cavity have reported an incidence rate of vascular and visceral injuries of 0.018% and of 0.0024%, respectively ***(Azevedo et al., 2009).***

Currently the closed technique is the preferred technique among most laparoscopic surgeons despite the associated risks. This is due largely to successful personal experiences and the fact that the open technique has been linked to some technical difficulties such as increased time to access the peritoneal cavity compared to the closed technique and gas leakage through incision ***(Lal et al., 2002).***

This study was carried out in the department of General surgery, Theodor Bilhariz Research Institute in the period from September 2018 to February 2019 and the aim of this study was to compare True Umbilical versus Open Hasson technique access for pneumoperitoneum in Laparoscopic Cholecystectomy as regards Timing, Cosmetics, Pain control and Complications and to find out which technique is preferred.

The total number of the patients in this study was 80 (40 Group A, 40 Group B) and were 29 females and 11 males with mean±SD age of 38.2 ± 1.6 years old (range 22_58 years old) in Group A (True Umbilical) with Mean±SD BMI 29.3 ± 0.7(range 22_38), patients were 31 female and 9 male with mean±SD age of 40.6 ± 1.7 years old (range 19_59 years old) in Group B (Open Hasson) with Mean±SD BMI 29.1 ± 0.7 (range 21_39).

The sex distribution in this study revealed that cholecystolithiasis was more common in females with a female to male ratio of 29 _ 11 in Group A & 31 _ 9 in Group B. This was in agreement with many studies which found that the gallstones were more common in females ***(Stanley et al., 2010).***

The most common decades of life for development of cholecystolithiasis in this study were the fourth and fifth decades (50%) of our patients. This was in some agreement with several studies which found that the gall stones were more common in the fourth to Fifth decade of life ***(Topal et al., 2007).***

The most common complaint in this patients was right upper quadrant pain (RUQP). These findings were in some agreement with several studies which reported that, the most common complaints were (RUQP), epigastric pain, nausea and jaundice came as the sixth most common complaint ***(Topal et al., 2007).***

In this study the operative time For umbilical port site entry in seconds in true umbilical technique (Group A) Mean±SD was 40.3 ± 1.2 compared with open Hasson technique (Group B) 131.9±5.5 with significant value of importance for True umbilical technique (Group A). **(p < 0.0001).**

Operative Timing For closure of Umbilical Port Site wound in seconds in True Umbilical technique (Group A) Mean±SD was 47.0 ± 3.02 compared with Open Hasson technique (Group B) 136.0 ± 2.14 with significant value of importance for True umbilical technique (Group A). **(P-value < 0.0001).** This similar to several studies reported that true umbilical technique is simple to learn, perform and once mastered, it can be done promptly without delaying the operation ***(Moberg et al., 2007).***

In this study Operative Umbilical Port Site Gas Leakage in True Umbilical Technique (Group A) was reported in 5 cases compared with Open Hasson Technique (group B) that reported in 14 cases with no significant Value of importance. **(P-value 0.2101).**

In this study there was no visceral and vascular injury in both Groups (A & B). In a meta-analysis by Bonjer HJ, vascular injuries occurred in 0.083% of patients using the closed technique and in 0.075% of patients using the open technique, while visceral injuries occurred in 0.048% of patients using the closed technique and in 0.0% using the open technique, The meta-analysis showed a tendency to eliminate visceral injuries and reduce the risk of major complications with the open technique ***(Bonjer et al., 1997).***

The open technique was described by **Hasson** in 1971 and was recommended in patients with a previous laparotomy in whom they expected to find adhesions ***(Hasson, 1971; Munro, 2002; Merlin et al., 2003).***

The major technical problem encountered was gas leakage through the incision resulting in modifications and the development of newer techniques derived from the original one. Today, trocars have advanced designs; they are equipped with a security system capable of preventing the leakage of gas and the incidental extraction of the trocar. The European Association of Endoscopic Surgery guidelines concluded that there is no available evidence to support any of the two techniques ***(Neudecker et al., 2002).***

A recent analysis of 3,000 cases of open vs. closed entry techniques showed that the open technique has better outcomes in terms of major complications, which included failure to create pneumoperitoneum, emphysema extending up to the neck causing dyspnoea, bowel perforation, bladder perforation and mesenteric vascular injury (open vs. closed: 1.33% vs. 0.13, p <. 001). Roger Pozzo, describe a modification to the open technique with a trans umbilical incision, which provides a fast, secure, and effective way of entering abdominal cavity under direct vision. The technique uses the umbilicus, a region that had remained unused in this type of procedures for a long time, Some of the advantages of this method are that it does not require a long time to perform, it is safe and effective, and it can be used in many clinical situations, including previous abdominal operations ***(Roger et al., 2016).***

In this study Post Operative 24 hours pain score Mean±SD in True Umbilical technique (Group A) was 4.8 ± 0.23 compared with Open Hasson technique (Group B) 5.7 ± 0.35 with no significant value of importance **(P-value 0.0344).**

While post operative 24 hours Analgesia score Mean±SD in True Umbilical technique (Group A) was 1.2 ± 0.16 compared with Open Hasson technique (Group B) 1.9 ± 0.20 with no significant value of importance**. (P- value 0.0187).**

In this study post operative wound Infection in True Umbilical Technique (Group A) was reported in single case compared with Open Hasson Technique (group B) was 2 cases with no significant value of importance **(P-value 1)**.

In a study done by **Roger Pozzo**, the surgical site infection rate was similar (0.84%) to that reported in the literature (0.6%) ***(Roger et al., 2016).***

Post operative seroma in True Umbilical Technique (Group A) was reported in single case compared with Open Hasson Technique (group B) in 3 cases with no significant value of importance **(P-value 0.6153).**

None of the cases of both groups (A & B) developed post operative incisional hernia.

Lastly, through the use of the open technique vascular and visceral injuries can be virtually eliminated, significantly improving patient safety ***(Compeau, 2011).***

Conclusion

From this study it is concluded that

1) True Umbilical technique access for establishing pneumoperitoneum in Laparoscopic Cholecystectomy is quick for port entry & closure, safe, reliable, simple, easy to learn, minimal post operative pain and is associated with minimal morbidity; So, provide surgeons with an effective and safe mean to insert the first trocar.

2) It is recommended to use this technique as a routine procedure to access the peritoneal cavity for abdominal laparoscopic surgery.

References

1. Ahmad G, Gent D, Henderson D, et al.: Laparoscopic entry techniques. Cochrane Database Cyst Rev 2015; 8:43-54.
2. Azevedo JLMC, Azevedo OC, Miyahira SA, et al: Injuries caused by Veress needle insertion for creation of pneumoperitoneum: a systematic literature review. Surgical Endoscopy. 2009; 23(7): 1428- 32.
3. Bonjer HJ, Hazebroek EJ, Kazemier G, et al.: Open versus closed establishment of pneumoperitoneum in laparoscopic surgery. British Journal of Surgery. 1997; 84(5): 599-602.
4. Compeau C, McLeod NT, Ternamian A.: Laparoscopic entry: a review of Canadian general surgical practice. Canadian Journal of Surgery. 2011; 54(5): 315-20.
5. Hasson HM: A modified instrument and method for laparoscopy. American Journal of Obstetrics & Gynecology. 1971; 110(6): 886-7.
6. Karaca AS, Çapar M, Ali R.: The first trocar entry in the laparscopic cholecystectomy, which technique? [Laparoskopik Kolesistektomide İlk Trokar Girişi, Hangi Teknik?]. Journal of Clinical and Analytical Medicine 2014; 5:1-3.
7. Lal P, Sharma R, Chander R, et al.: A technique for open trocar placement in laparoscopic surgery using the umbilical cicatrix tube. Surgical Endoscopy. 2002; 16(9): 1366-70.
8. Merlin TL, Hiller JE, Maddern GJ, et al: Systematic review of the safety and effectiveness of methods used to establish pneumoperitoneum in laparoscopic surgery. British Journal of Surgery. 2003; 90(6): 668-679.
9. Moberg AC, Petersson U, Montgomery A: An open access technique to create pneumoperitoneum in laparoscopic surgery. Scandinavian journal of surgery: SJS. 2007; 96(4): 297-300.
10. Munro MG: Laparoscopic access: complications, technologies, and techniques. Current Opinion in Obstetrics & Gynecology. 2002; 14(4): 365-74.
11. Neudecker J, Sauerland S, Neugebauer E, et al.: The European Association for Endoscopic Surgery clinical practice guideline on the pneumoperitoneum for laparoscopic surgery. Surgical Endoscopy. 2002; 16(7): 1121-43.
12. Roger P, Rodrigo A, Fernando C, et al: Trans umbilical laparoscopic access during laparoscopic procedures, 2016; 11(2): 261-69.
13. Slater BJ and Pimpalwar A.: 'The umbilical fat sign': an important and consistent landmark during single port/incision laparoscopic surgery and standard laparoscopy. Eur J Pediatr Surg 2013; 23: 140–142.
14. Stanley J, John P and Jan K: Prospective Randomized Trial of LC_LCBDE vs ERCP/S_LC for Common Bile Duct Stone Disease, Arch Surg. 2010; 145: 28-33.
15. Terho PM, Leppäniemi AK and Mentula PJ: Laparoscopic cholecystectomy for acute calculous cholecystitis: a retrospective study assessing risk factors for conversion and complications. World J Emerg Surg. 2016; 11:54.
16. Topal B, Aerts R. and Penninckx F: Laparoscopic common bile duct stone clearance with flexible choledochoscopy, Surg Endosc. 2007, 21:2317–2321.

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