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EXPERIENCE WITH DIRECT TROCAR INSERTION IN 260 PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

***Background*: The establishment of pneumoperitoneum is a sine qua non for the performance of laparoscopic procedures. There are several methods of achieving this including direct trocar insertion (DTI).**
***Aims/Objectives:* The aim of this study is to share our experience with DTI and to describe the procedure. The specific objectives are to determine the success and complication rates of DTI.**
***Methods*: This is a retrospective study over a 4year period. The records of 260 consecutive patients who had laparoscopic cholecystectomy using DTI as the initial entry technique for establishing pneumoperitoneum were analyzed.**
***Results:* A total of 260 patients were studied comprising 260 females and 30 males. The age range was 20 to 70 years with a mean age of 38years. The success rate was 98.5%. No complications were recorded.**
***Conclusion:* DTI is easy to perform, safe, has high success rate and a low complication rate. It is a worthy alternative to other well-established techniques for initial entry and pneumoperitoneum.**

INTRODUCTION

Access to the peritoneal cavity and the subsequent creation of pneumoperitoneum is the first step in all laparoscopic procedures. There are several laparoscopic access techniques, and these include the open (Hasson's) technique, Veress needle technique, Direct trocar insertion, optical (direct vision) technique and the radially expanding shielded trocar. These techniques are either open or closed. The open technique is via the use of the Hasson's trocar. The closed methods include the use of Veress needle and Direct Trocar Insertion (DTI). [1]

A significant amount of all complications due to laparoscopic surgery occur at initial entry/ access. [2] This is akin to a significant number of aviation accidents occurring during the relatively short phase of take-off and ascent thus the importance of studies on entry techniques with a view to preventing entry complications cannot be overemphasized. Some of these complications include bowel injury, minor

and major vessel injury, bladder injury, omental injury as well as preperitoneal and bowel (intraluminal) insufflation. [3,4] A Cochrane review in 2012 showed no advantage of a particular entry technique (including DTI) over the others in terms of the occurrence of major complications. [1]

The surgeon's choice of initial entry technique is influenced by his education and training, bias for methods used by his mentors and trainers, experience, geographical location and the specialty to which he belongs.

The aim of this study is to share our experience with direct trocar insertion (DTI) and to describe this technique of initial entry and insufflation for laparoscopic procedures. The specific objectives are to determine the success/ failure rates and the complication rates of this procedure as well as to review the existing literature on the topic

METHODS

This is a descriptive, retrospective study of all patients who had laparoscopic cholecystectomy for symptomatic cholelithiasis over a 4-year period from 1998 to 2002 at the King Khalid General Hospital, Hafr Al Batin, Saudi Arabia. All consecutive patients who had laparoscopic cholecystectomy were included in the analysis. DTI was the method of initial entry and insufflation used in all patients. The patients were evaluated and investigated as appropriate and admitted to the ward a day before surgery where they were reviewed by the anesthetist. The planned operation and its possible complications were explained to the patients and an informed consent was obtained. General anesthesia with endotracheal intubation and muscle relaxation was used in all patients. With the patient supine, after routine cleaning and draping, the surgeon stood on the left side of the patient with the assistant on the right. Two towel clips were applied to the subcutaneous tissue just by the sides of the umbilicus to aid lifting of the abdominal wall. A small supraumbilical incision was made through which a 10mm trocar was then inserted at 45 degrees to the abdominal wall and directed towards the pelvis. With controlled force using a twisting, pronation-supination movement of the forearm, the trocar was advanced. The lifting of the abdominal wall with the towel clips provided countertraction. A give was felt on breaching the fascia and the peritoneal cavity was entered. The obturator was then withdrawn, and the cannula connected to the carbon dioxide insufflator. Insufflation pressures of between 5-10mmHg and about four to six liters of gas were used in all patients for successful pneumoperitoneum. This is considered as a successful DTI. The laparoscope was then inserted through the cannula and the other ports were then inserted under direct vision. Thereafter the surgeon proceeded with the cholecystectomy in the standard fashion. At completion of the procedure, the specimen is extracted, the accessory ports are removed under direct vision. The abdomen is dessuflated by opening the valve in the primary 10mm trocar. The incision for DTI is closed with delayed absorbable suture.

Variables measured include the age and sex of the patients as well as the success and complication rates. Extracted data was entered in a proforma. These were analyzed using simple ratios and percentages.

RESULTS

A total of 260 patients had direct trocar insertion for initial entry for the establishment of pneumoperitoneum prior to laparoscopic cholecystectomy. There were 230 females (88.5%) and 30 males (11.5%) with a male to female ratio of 1:7.7. The age of participants ranged from 20years to 70years with a mean age of 38 years. The

procedure was successful in 256 patients giving a success rate of 98.5%. Conversely the failure rate was 1.5%. In the four patients in whom DTI failed, a Veress needle was inserted through the tract already created by the trocar and satisfactory pneumoperitoneum was achieved via this alternative method. No complications were reported.

DISCUSSION

All of our two hundred and sixty patients had laparoscopic cholecystectomy. This is not surprising as it is one of the commonest laparoscopic procedures performed in General Surgery and has since become the gold standard for cholecystectomy. Similar studies have shown similar results. [5,6] There were 230 females and 30 males in our study with a male to female ratio of 1:7.7. This is because cholelithiasis is commoner in females. The average age of 38 years in our study is close to 40 as in the mnemonic of the 5 Fs taught in medical school for gall bladder stones; female, forty, fat, fair, fertile

The first description of Direct Trocar Insertion in the literature was by Dingfelder over forty years ago where he reported a 100% success rate with the technique in 301 patients. [7] Copeland et al also reported similar results in a series of 2000 patients. [8] Like Dingfelder and Copeland, this technique is commoner amongst Gynecologists and most of the work in this area is credited to them. [2,7,8,9,10,11] According to Copeland, the keys to a successful DTI were adequate muscle relaxation, adequate incision and elevation of the anterior abdominal wall. [8] General anesthesia with muscle relaxation was used in all our patients. We use a small, curved incision just above the umbilicus. Other surgeons have reported access via a "smiling" infraumbilical incision [9,12] while others have reported going directly through the umbilicus.[13] Other points of access include the Palmer's point [14], the Lee-Huang point [2] and the Jain's point. [15] The Palmers point is a point 3cm below the left subcostal margin while the Lee-Huang point is located in the midline midway between the umbilicus and xyphoid process. [2] The Jains point is a point where a line drawn upwards from 2.5cm medial to the left anterior superior iliac spine bisects the horizontal level of the umbilicus on the left side. These should be considered as alternative entry points for DTI when umbilical entry is contraindicated. Such contraindications include widespread adhesions from previous abdominal surgery or the presence of an umbilical hernia. In our practice we elevate the anterior abdominal wall with 2 towel clips placed at both sides of the umbilicus held by surgeon and assistant. Elevation of the abdominal wall serves to prevent injury to the abdominal viscera and vessels. It also provides counter traction thus aiding insertion. Other authors have described other methods of elevation including elevation by hand [16], use of towel clips [13], use of skin and subcutaneous sutures [17], as well as sutures to the rectus sheath. [18]

The success rate with DTI in our patients was 98.5%. Numerous other studies have reported similar and even better results. [6,7,8,9,16,17] There were four failures with the DTI procedure in our study. Access and insufflation were later achieved via the Veress needle technique thus the need for surgeons to be conversant with more than one access technique.

Direct trocar insertion is the fastest of all the entry techniques and is the least used in clinical practice. [19] With DTI, what is a three-step procedure with the conventional Veress needle technique (Veress insertion, insufflation and trocar insertion) is abridged to a one step procedure thus saving time. A study published in 2019 by Kaistha et al compared the use of DTI to the open

(Hasson's) technique. [20] In the open method, the incision is carried down to the fascia and peritoneum which are also incised, and the trocar is then inserted into the peritoneal cavity under direct vision as described by Harrith Hasson. There was a statistically significant difference (p=0.01) in terms of port access time. [20] This has been shown to reduce the overall time of the procedure from the umbilical incision to the final removal of the laparoscope in some studies. [9,11] Godara et al in a retrospective study in 2015 reported a mean time to achievement of pneumoperitoneum of 1 minute for a DTI group of 100 patients compared to 3.48 minutes in a Veress needle group of 100 patients. This was statistically significant. [21] The same author conducted a randomized prospective study 3 years later and the time taken to achieve full pneumoperitoneum was significantly faster in a DTI group compared to a Veress needle group (p=0.00001). [22] Other studies have reported similar statistically significant results. [9,10,11]

We recorded no minor or major complications with the use of this procedure. Kaistha et al believe DTI is not in widespread use among clinicians because of the fear of inflicting injuries to intraabdominal organs as it is a blind procedure. [20] In their study, DTI was superior to the Hassons technique in terms of pain and port site infection and this was significant statistically. [20] There was no difference between DTI and Hasson's open method in terms of the occurrence of major complications. [20] In a Cochrane review of laparoscopic entry techniques in 2012, the only significant advantage of the Hasson's technique over DTI was a reduction in the number of failed entries. [1]

There are a number of studies in the literature in which DTI was compared to Veress needle in patients undergoing laparoscopic cholecystectomy. [23,24,25] Altun and colleagues in their study of 283 cholecystectomy patients, found no significant difference in major and minor complications between the DTI and Veress needle groups. [23] However Prieto-Diaz-Chavez working with a smaller group of similar patients (42 in each group), showed a statistically significant difference in terms of complication rates (DTI=2.3%, VN=23.8%, p=0.009) in favour of DTI. [24] In a meta-analysis of randomized clinical trials comparing DTI to VN consisting 2940 women [26], the VN group had a significantly higher incidence of minor complications and repeated multiple insertions. There was no difference between the 2 groups with respect to the occurrence of major complications. [26]

A drawback of this study is that it is a retrospective study. The procedure was performed by only two surgeons who have a preference for direct trocar insertion. This may have led to a reasonable level of expertise which may account for the high success rate and low complication rates. We did not measure the time of access with this technique. Also, this technique was not compared to other well-known entry techniques like the Veress needle and Hasson's techniques.

CONCLUSION

There are various access techniques in laparoscopic surgery including DTI. DTI is easy to perform, fast, has a high success rate and a low rate of complications. It is as good as and is a plausible alternative to other standard entry/insufflations techniques. It should be made clear that no technique has been scientifically proven to be superior to another and we will need more studies especially randomized controlled trials and meta-analyses on this topic.

Clinical Significance: The significance of this study is that surgeons, especially general surgeons are aware and familiar with the technique of DTI as well as its benefits so

that it can become a tool in the armamentarium of the surgeon.

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