

COMPARISON OF OPEN VERSUS CLOSED PNEUMOPERITONEUM IN LAPAROSCOPIC SURGERY

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ABSTRACT

Background: For endoscopic visualization of the peritoneal cavity, pneumoperitoneum has to be created. This study was conducted to compare the mean time consumption for creation of pneumoperitoneum from open (transumbilical) and closed (Veress needle) method in laparoscopic surgery.

Material & Methods: It was a cross sectional study conducted at Department of Surgery, Gomal Medical College, D.I.Khan, from March 1, 2014 to August 30, 2014. One hundred and thirty patients were selected using consecutive sampling. The patients enrolled in the study were admitted patients of both genders requiring laparoscopic surgery. Females with third trimester pregnancy, and patients with midline laparotomy scar were excluded. Informed consent was taken from every patient before surgery. They were divided in two equal groups selected using random number table; Group A= Closed (VN) and Group B= Open (Transumbilical). Time for the creation of pneumoperitoneum was calculated. It started from the incision until creation of 14 mmHg intra-abdominal pressure. Qualitative variables like gender, diagnosis, complications were presented as percentages. Continuous variables like age and time for creating pneumoperitoneum were presented as Mean \pm Standard Deviation. Data was analyzed using SPSS version 10. The significance of difference between time taken by either procedure was measured by Independent sample 't' test. $P \leq 0.05$ was taken as significant.

Results: Time required to insert laparoscope was significantly different in both groups; 125.56 ± 6.2 seconds for Veress needle group and 90.6 ± 2.02 seconds for open (transumbilical) group.

Conclusion: Open (transumbilical) method of creation of pneumoperitoneum is much less time consuming than closed (Veress Needle) technique.

KEY WORDS: Pneumoperitoneum; Artificial Pneumoperitoneum; Laparoscopy; Laparoscopic Surgery.

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INTRODUCTION

Laparoscopic surgery includes operations within the abdominal or pelvic cavities, whereas keyhole surgery performed on the thoracic or chest cavity is called thoracoscopic surgery. Laparoscopic and thoracoscopic surgery belong to the broader field of endoscopy. There are a number of advantages to the patient with laparoscopic surgery versus an open procedure. These include reduced pain due to smaller incisions, hemorrhage and shorter recovery time.¹

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Inducing pneumoperitoneum is the first step in carrying out laparoscopic surgery for diagnostic and therapeutic purposes. Methods available for creating a pneumoperitoneum and inserting the laparoscope at the beginning of a laparoscopic procedure can be divided into open or closed entry techniques.

Closed techniques include Veress Needle (VN) technique and the direct trocar technique, which involve the blind insertion of the trocar directly into the peritoneal cavity, followed by laparoscopic inspection and subsequent gas insufflations. The open (Hasson) technique consists of an initial incision into the peritoneum allowing direct visualization of the insertion of a blunt trocar, before gas insufflation and laparoscope introduction.

For endoscopic visualization of the peritoneal cavity, pneumoperitoneum has to be created that distends and separates the abdominal wall from

its contents. For safe and effective surgery, visual clarity, space to perform diagnostic procedure and normal physiological condition is required. For good laparoscopic surgery, one must understand its basic principles. A working space within the abdominal cavity is initially established by insufflating the peritoneal cavity with carbon dioxide to a pressure of 10 to 15 mm Hg. The laparoscope is inserted into the abdomen with a trocar and hollow sheath containing a port for continuous CO₂ insufflation, as well as valves and gaskets to allow the insertion and removal of the laparoscope without allowing the carbon dioxide to escape. The diameter of the laparoscope and initial laparoscopic sheath is 5 or 10 mm. In an operation, accessory sheaths are inserted to introduce laparoscopic instruments. The instruments used in laparoscopic surgery are generally elongated, narrower versions of standard surgical tools. The surgeon works with instruments inserted through one or two sheaths while the laparoscope is focused on the operative field by an assistant. The video cameras have high resolution and magnify images 5 to 15 times and provide a clear image of the operative field.

There are four basic techniques used to create pneumoperitoneum: Blind VN, Direct trocar insertion, Optical trocar insertion, and Open laparoscopic surgery.

Veress needle and direct trocar insertion are blind techniques. Direct trocar insertion without previous pneumoperitoneum was reported to be a safe alternative to VN insertion.² The VN technique for establishing pneumoperitoneum is widely used yet associated with slow insufflation and potentially life-threatening complications.³ The injuries most commonly occur by VN or direct trocar that punctures or lacerate aorta, common iliac artery and inferior vena cava.⁴ Blind insertion of the VN and direct trocar is significant cause of complications in laparoscopic surgery. Despite this risk close technique is still more popular than open one.⁵⁻⁶

The objective of this study was to compare the mean time consumption for creating pneumoperitoneum up to 14 mmHg of open (transumbilical) with closed method (VN) in laparoscopic surgery.

MATERIAL AND METHODS

It was a cross sectional study conducted at department of surgery, Gomal Medical College, D.I.Khan, from March 1, 2014 to August 30, 2014.

One hundred and thirty patients were included in the study. Sampling technique was non-probability consecutive sampling. The patients enrolled in the study were all admitted patients of both genders requiring laparoscopic surgery. Females with third trimester pregnancy, and patients with midline lap-

arotomy scar and those who refused to be a part of the study were excluded. The patients enrolled in the study were all admitted patients requiring laparoscopic surgery. All patients underwent detailed history and basic required investigations according to performa. All the patients were informed that they are part of a study and informed consent was taken from every patient before surgery. Procedure and purpose of the study was explained to them in detail. They were divided in two equal groups selected using random number table; Group A= Closed (VN) and Group B= Open (Trans-umbilical). All of the patients were operated upon by consultant surgeon. Time for the creation of pneumoperitoneum was calculated. It started from the incision until creation of 14 mmHg intra-abdominal pressure. These observations were made for both open and closed pneumoperitoneum. There was no difference in the presence of surgical antecedents, elective or emergency surgery, in both groups.

Qualitative variables like gender, diagnosis, complications were presented as percentages. Continuous variables of the study age and time for creating Pneumoperitoneum were presented as Mean \pm Standard Deviation. Data was analyzed using SPSS version 10. Descriptive and inferential statistics were applied. The significance of difference between time taken by either procedure was measured by Independent Sample 't' test. $P \leq 0.05$ was taken as significant.

RESULTS

Among the different cases which underwent laparoscopy most were acute or chronic cholecystitis both comprising 31% and 46% in group A while 28% and 57% in group B respectively. Patients with appendicitis were found to be in 15% in group A and 8% in group B (Table 1). Regarding the gender 85% were female suffering from different ailments and 15% were male in group A while 90% female and 10% male in group B (Table 2). The time required to insert the laparoscope was significantly different in both groups (Table 3): 125.56 ± 6.2 (SD) sec for the Veress needle group and 90.6 ± 2.02 sec for open

Table 1: Percentage of different cases in each group.

Diagnosis	Group A (%)	Group B (%)
Acute cholecystitis	31	28
Chronic cholecystitis	46	57
Undescended testis	3	1
Appendicitis	15	8
Mucocele	5	6

Table 2: Gender distribution and age ranges of patients in both groups.

Group	Males (%)	Females (%)
A	15	85
B	10	90

Table 3: Time to create pneumoperitoneum.

Group	Number of Patients	Mean Time (Sec)	SD
A	65	125.6	6.2
B	65	90.6	2.02

(trans-umbilical) group ($p < 0.05$).

DISCUSSION

Laparoscopic surgery is being popularized because of its many advantages over laparotomy. In addition to the benefits to patients of small incision, quicker recovery and shorter hospital stay, it allows the surgeon to have better visualization and magnification of the anatomy and pathology of abdominal cavity. The most important and potentially dangerous step in laparoscopy is peritoneal access, which may have lethal consequences. Establishment of pneumoperitoneum by using VN is the most commonly practiced method. In Canadian survey of 407 operators 93.6% reported the use of VN for pneumoperitoneum before insertion of primary trocar.⁷

Study published in a Scandinavian journal noted that the blind Veress technique requires 214-300 seconds for abdominal cavity access. The access time was considerably shorter in our study (median 93 seconds)⁸ compared to other studies (240-300 seconds) where open access has been used.⁸⁻¹⁰ Borgatta reported 130 sec time for closed pneumoperitoneum.¹¹ Byron et al also reported significantly longer time insertion in VN group (5.9 2.2 min).¹² The time used for creation of pneumoperitoneum with VN was 5 minutes, by open method 8 minutes and by new technique only one minute and 30 seconds.¹³

CONCLUSION

Open (transumbilical) method of creation of pneumoperitoneum is much less time consuming than closed (Veress Needle) technique.

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CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None declared.