

ORIGINAL RESEARCH

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Preferred technique of creating pneumoperitoneum for laparoscopy by pediatric surgeons

Amar A. Shah*  and Anirudh V. Shah

Abstract

Background: Minimally invasive pediatric surgery has gained popularity over open conventional surgery as it offers benefits to both patients and health care practitioners. Creation of pneumoperitoneum is a must for any laparoscopic procedure. Different pediatric surgeons have their individual preferences regarding the technique to create pneumoperitoneum prior to laparoscopy. The aim of this study was to evaluate the preference of technique for the creation of pneumoperitoneum in pediatric laparoscopy among Indian Pediatric Surgeons. The study was designed by communication with members of the Indian Association of Pediatric Surgeons using a predefined questionnaire. 180 pediatric surgeons responded to the survey. The respondents included pediatric surgeons in institutional and private practice. The reasons behind their preference were enumerated and evaluated.

Results: Seventy-one percent of pediatric surgeons preferred the primary open technique for the creation of pneumoperitoneum. Seventeen percent exclusively used Veress needle whereas 12% were using both techniques varying from patient to patient.

Conclusion: Creation of pneumoperitoneum remains an important safety issue for all pediatric surgeons. Pediatric Surgeons in India prefer using the primary open technique for the creation of pneumoperitoneum for laparoscopic surgery.

Keywords: Pediatric laparoscopy, Indian Pediatric Surgeons, Pneumoperitoneum

Background

Pediatric minimally invasive surgery has revolutionized surgical practice over the past 2 decades. It results in smaller scars, quicker recovery, and less postoperative pain when compared to open surgery [1, 2]. Furthermore, there is evidence to suggest that the overall risk of complications following laparoscopic surgery is lower than with laparotomy [3, 4]. Creation of pneumoperitoneum is a must for any laparoscopic procedure. Most of the complications are related to this first and most important step.

Many different devices and techniques have developed over the years claiming a safe approach for creating of pneumoperitoneum. This can be via closed entry using the Veress needle and CO₂ insufflation, open non-insufflated method (Hasson), and optical entry methods using optical trocars. Despite the relative safety of these techniques, almost every kind of intra-abdominal organ and vascular injury has been reported to occur. [5, 6] The preferences of different surgeons for creating pneumoperitoneum will vary depending on their training, location of practice, available infrastructure, and clinical experiences. We aimed to evaluate the preference of pediatric surgeons in India for the creation of pneumoperitoneum prior to laparoscopy.

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Methods

The study was designed by personal communication with members of the Indian Association of Pediatric Surgeons using a predefined questionnaire.

The following questions were asked:

1. What technique do you use for the creation of pneumoperitoneum?
2. Have you always been using this technique? If so, since how long? If not, which was the previous technique used?
3. If you have changed from a previous technique, what was the reason for change?
4. Have you encountered complications in your current/previous technique?
5. Whether you are in institutional/private practice/both?
6. Since how many years are you performing laparoscopic surgery in children?

The survey was sent to 430 pediatric surgeons from the Indian Association of Pediatric Surgeons performing laparoscopic surgery. The results were tabulated and evaluated.

Results

The survey generated a total of 180 responses (41.8% response rate). The responders worked in teaching institutions, corporate hospitals, and private practice. The preferred techniques for the creation of pneumoperitoneum are summarized in Fig. 1. Seventy-one percent preferred the primary open technique for the creation of pneumoperitoneum. Seventeen percent exclusively used Veress needle whereas 12% were using both the open technique and Veress needle varying from patient to patient.

Interesting views were received from the respondents of all the three groups. Surgeons using exclusive Veress needle opined that they had been trained in pediatric laparoscopy using the Veress needle and hence they are comfortable using the same. Use of the Veress needle as per them saved time, prevented peri-trocar air leak, and saved the hassle of taking stay sutures. Surgeons using the exclusive open technique opined that they had been trained using the open technique only and are comfortable using this technique. They were of the view that the transumbilical route was simple safe and fast and were worried about the complications reported following the use of Veress needle in adults. Cost restraint was also a factor citing the high expense of the disposable Veress needle. Twelve percent of surgeons were using both the open and closed techniques. The reasons cited by them were that if the child had a previous surgery, they used open technique and if not, they used the Veress needle. Others preferred using the Veress needle for children aged more than 5 years and in obese patients. A few surgeons who were also doing robotic surgery opined that they used open technique for laparoscopic surgery and used Veress needle for robotic surgery.

The common complications enlisted by pediatric surgeons were abdominal wall bleeding, pre-peritoneal insufflation, and omental insufflation. No major vessel injury, embolism, or mortality was reported in any of the three groups.

Discussion

A large number of publications on laparoscopic entry are from gynecologists and adult surgeons [7–10]. Our survey of 180 practicing pediatric surgeons is probably the first of its kind study in India to know the preferred technique of creating pneumoperitoneum in children. Our data is consistent with the published adult literature in both North America and Europe [11–13]. The

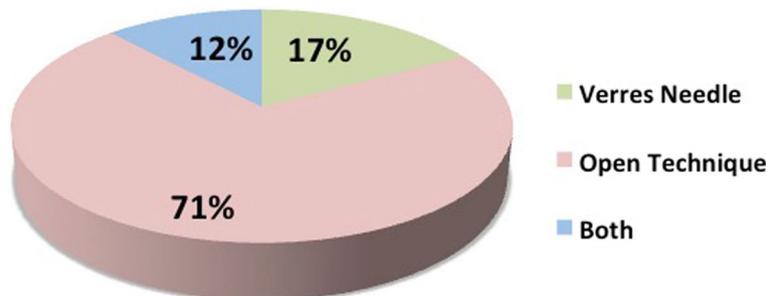


Fig. 1 Graph showing the preferred technique of creation of pneumoperitoneum among 180 pediatric surgeons. Actual numbers represented in the graph: total pediatric surgeons: 180; pediatric surgeons using exclusively Veress needle: 31 (17%); pediatric surgeons using exclusively open technique: 127 (71%); and pediatric surgeons both techniques: 22 (12%)

data however contrasts the preferred closed technique of using Veress needle for primary insufflation, which is favored by almost 80% of gynecologists [14].

The safety profile of the closed technique has always been questioned. Open technique on the other hand has been advocated to avoid injury to viscera and vessels. However, inadvertent serious primary port insertion mishaps have been reported in literature [15–18]. A recent Cochrane review by Watson et al. [19] compared the laparoscopic entry techniques in adults. They concluded that the overall evidence was insufficient to support the use of one laparoscopic entry technique over another. Two separate meta-analyses on the other hand have demonstrated statistically higher rates of vascular and bowel injury with closed versus open laparoscopy [20, 21]. The fact that almost 35% of general surgeons and most gynecologists selectively use the Veress needle in their practices indicates some variance with regards to laparoscopic access capabilities and choice [20, 21]. Several aspects of laparoscopic port dynamics and patient safety remain unclear and need to be elucidated. Given the importance of patient safety and surgical risk management in minimally invasive surgery, further evaluation will be necessary to determine factors influencing the manner by which pediatric surgeons evaluate, teach and adopt laparoscopic entry techniques. In an effort to mitigate inadvertent laparoscopic entry mishaps, improve patient safety, and harmonize clinical practice, several international surgical bodies, including the European Association of Surgery (EAS) and the Society of Obstetricians and Gynecologists of Canada (SOGC), have recently published laparoscopic entry clinical practice guidelines. [22, 23].

There is scope to collect data from pediatric surgeons across different countries regarding complications related to the laparoscopic entry. This can be compiled and similar guidelines can be formulated by the Pediatric Surgical Associations to help budding pediatric surgeons.

Conclusion

The contrast in different entry techniques between surgeons is difficult to explain. The decision-making however seems to be influenced by teaching patterns during residency and/or clinical experience. Many pediatric surgeons were of the opinion that they were comfortable using one particular technique and hence had no reason to change.

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None

Authors' contributions

AAS: acquisition, analysis, and interpretation of data and drafting the manuscript. He is the corresponding author and will be accountable for all aspects of the work. AVS: conceptualized and designed the study and critically revised

the manuscript. Both authors approved the final version of the manuscript. The author(s) read and approved the final manuscript.

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Availability of data and materials

The study is a survey of pediatric surgeons across India. The data has been tabulated in the table in the manuscript.

Declarations

Ethics approval and consent to participate

Ethics approval was waived as the presentation is from a private children hospital owned by the authors. All the pediatric surgeons who were communicated and responded to consent to participate in the study.

Consent for publication

This study is a survey and the authors have obtained the necessary approval for publication of the data from the hospital.

Competing interests

The authors declare that they have no competing interests.

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