



## The Chennai port closure method: A novel simple technique for laparoscopic port closure



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### ABSTRACT

**Purpose:** Large-size ports used for laparoscopic and robotic procedures will require appropriate closure to reduce the probability of trocar site complications including hematoma and hernia. Closure of these ports is done by various methods like the open method extending skin incisions, S-retractor, Carter Thomason method, and so on. Chennai port closure (CHC) method, a novel technique that had been in practice in our unit for more than 2 years, ensures direct visualization of the suture placement, and hence, the abdominal wall fascia and peritoneum are secured.

**Materials and Method:** We herein describe an easy technique for fascial closure in port size ( $\geq 10$  cm) after minimally invasive surgery, including both laparoscopic and robotic procedures, using a cobbler needle in 151 patients in the study period between February 2017 and March 2020 for various urological procedures. This technique was done before the introduction of the trocar sheath and ensures direct visualization of the abdominal fascial closure.

**Results:** There were no major intraoperative events, additional operating time, and need for any costly instruments. No bowel injuries or trocar site hernias were documented during a mean follow-up of 28 months. Presently, this technique is used by many surgeons in our hospital without much difficulty.

**Conclusion:** The Chennai port site closure technique is an effective, simple, easy-to-apply, and safe procedure.

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### INTRODUCTION

Minimally invasive surgery (MIS) is the standard of care for many abdominal surgeries. Ports of size 10 mm and above are generally closed to reduce the risk of hernia formation. Satisfactory closure of the ports will require a good approximation of the rectus sheath. The majority of complications documented in the literature are incisional hernias [1–3]. Numerous techniques have been introduced into clinical practice to reduce the port site complications that occur in 1% to 6% of cases, and hence, various techniques and instruments have been designed to minimize the trocar-site complications, which include an extension of skin incision, utilization of Carter Thomason port closure equipment, or use of S-retractors to achieve a satisfactory port closure [4,5].

The limitations of these include inadequate width of rectus sheath in the future, lack of rectus sheath itself, placement of the suture in one of the ends of the trocar site, and hence inadequate opposition of the

wound. Moreover, instrument avoidance also reduces time and cost. These errors could potentially lead to trocar site hernias (TSHs) and hematomas.

In this article, we describe a simple technique to negate the issues of missing the rectus sheath during the port closure. Our technique ensures adequate visualization and finger confirmation closure of the rectus sheath, muscle, and peritoneum.

### MATERIALS AND METHODS

This Chennai port closure (CHE) technique was done in 151 patients who underwent laparoscopic and robotic procedures for various urological pathologies between February 2017 and March 2020 in our hospital. Port sizes  $\geq 10$  cm were closed by this technique. Data were collected retrospectively and analyzed. All the patients were operated on by the same surgeon. Postoperatively, all the patients were prescribed a standard analgesic dosage. The outcomes were measured by the surgeon, nurses, and general practitioners. They include intraoperative complications related to trocar insertion and trocar site hernia. Follow-up period ranged from 3 to 36 months (mean = 28 months) for any complications related to the trocar site which was closed using CHE by clinical examination, ultrasound, and CT scan if needed.

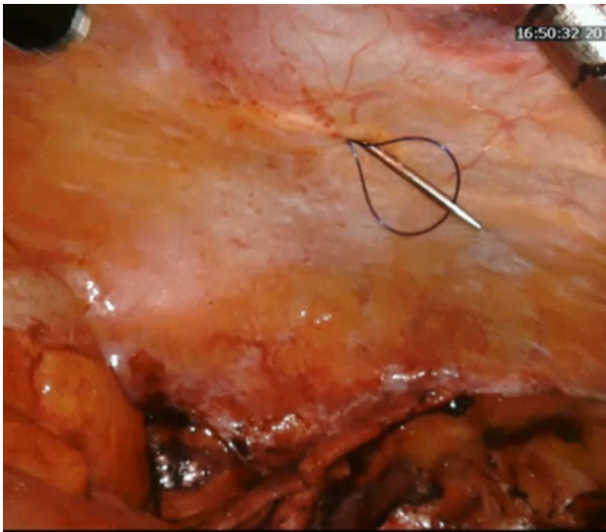
*Abbreviations:* MIS, minimally invasive surgery; CHE, Chennai port closure; PDS, polydioxanone; TSH, trocar site hernia.

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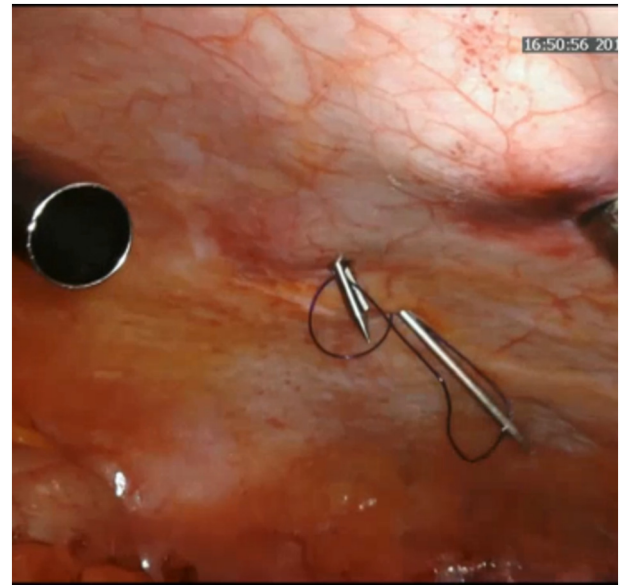
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**Fig 1.** The needle along with the suture is inserted into the peritoneal cavity under vision, and a loop is formed.

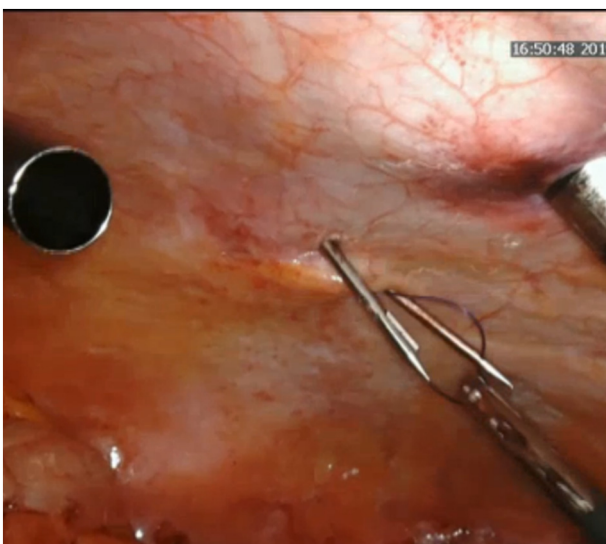


**Fig 3.** The suture is then pulled back with the help of the cobble needle.

### Operative Technique

It is developed by the authors and named as Chennai port closure technique (CHE). The newer technique is described below:

- a. At the time of the initial port placement, the ports requiring closures (10 mm and above) are identified. The first 8 mm port is placed using a Veress needle. In the skin, the subcutaneous incision is made and deepened up to the rectus sheath without piercing it.
- b. The suture for port closure (1-0 PDS) is introduced into the abdominal cavity by using a needle. This suture is stabilized using a laparoscopic equipment (Figs 1 and 2).
- c. A counter-coup puncture is made at a place opposite the first puncture in the rectus sheath using an extraction needle, and the thread is taken out. Hence, the loop is held outside (Figs 3 and 4).
- d. Under vision, the trocar is inserted between the 2 sutures (Fig 5).
- e. At the end of the procedure and after the port is removed, these two sutures are tied together extracorporeally, and adequacy of the closure is confirmed by finger and visually. Figure 6 provides an overview of the entire technique.



**Fig 2.** Laparoscopic equipment is inserted to pull back the suture, and counter-coup puncture is done diametrically.

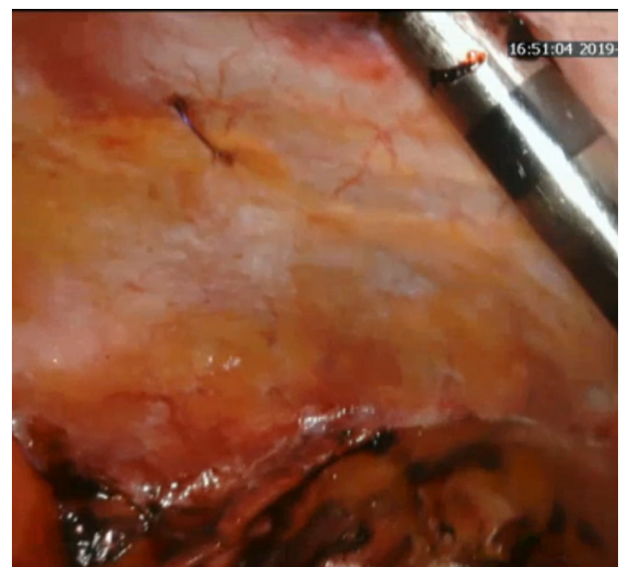
### RESULTS

This technique was used in 151 patients with no major intraoperative events. None of the patients operated on using the CHE technique encountered hematoma. None of the patients has reported trocar site hernia (TSH) at the time of publication. Table 1 describes the type of surgery and follow-up results of the CHE techniques.

### DISCUSSION

Minimal access surgeries are becoming the future for various surgical procedures. We believe the closure of the large-size ports is an essential component to reduce TSH. The current study aimed to evaluate the safety, efficacy, and cost-effectiveness of the technique.

The most annoying and avoidable complications are TSHs, which can occur at any trocar site. The prevalence of TSHs varies among institutions. It depends upon numerous factors such as surgeon



**Fig 4.** The loop is held outside.

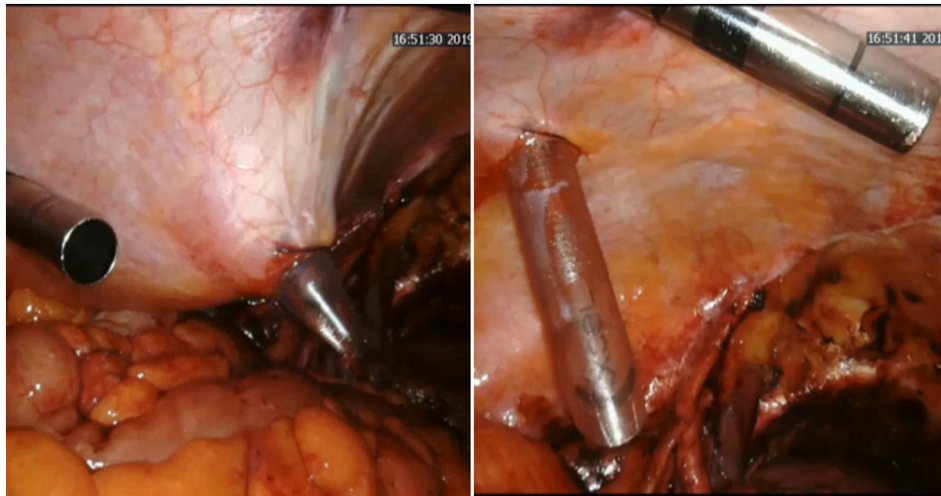


Fig 5. A trocar of the desired size is introduced inside the abdominal cavity.

experience as well as surgical technique. The risk factors accounted for TSH are the trocar design, trocar diameter, pre-existing fascial defects, host factors, the direction of insertion of the trocar, operating surgeon, drain insertion, and site of port [6].

The occurrence of TSHs is frequently common in obese patients. This is because of the larger preperitoneal space and increased intra-abdominal pressure [7]. Port size is an added risk factor; some surgeons recommend port closure size > 5 mm at the fascial level [8]. Besides the classical hand-sutured technique, 29 original methods have been described for the fascial closure, and Shaher categorized the different port closure techniques into three: (a) extracorporeal assistance

technique (requiring 1 additional port), (b) techniques that use assistance from inside the abdomen (requiring 2 additional ports), and (c) closure techniques that can be performed with or without visualization [9,10]. The described techniques in the literature need special devices, are time consuming, need assistance from inside the abdomen, or are unavailable in the hospital. In contrast, our technique (CHE) involves the use of the cobbler needle, which is relatively cheaper. It is also a single-step process without removal of the port to achieve the closure as the port is inserted after the rectus sheath is taken under control. The only disadvantage is that we need to take care that the port placement is in the center of the loop of suture. The key to that, in our experience,

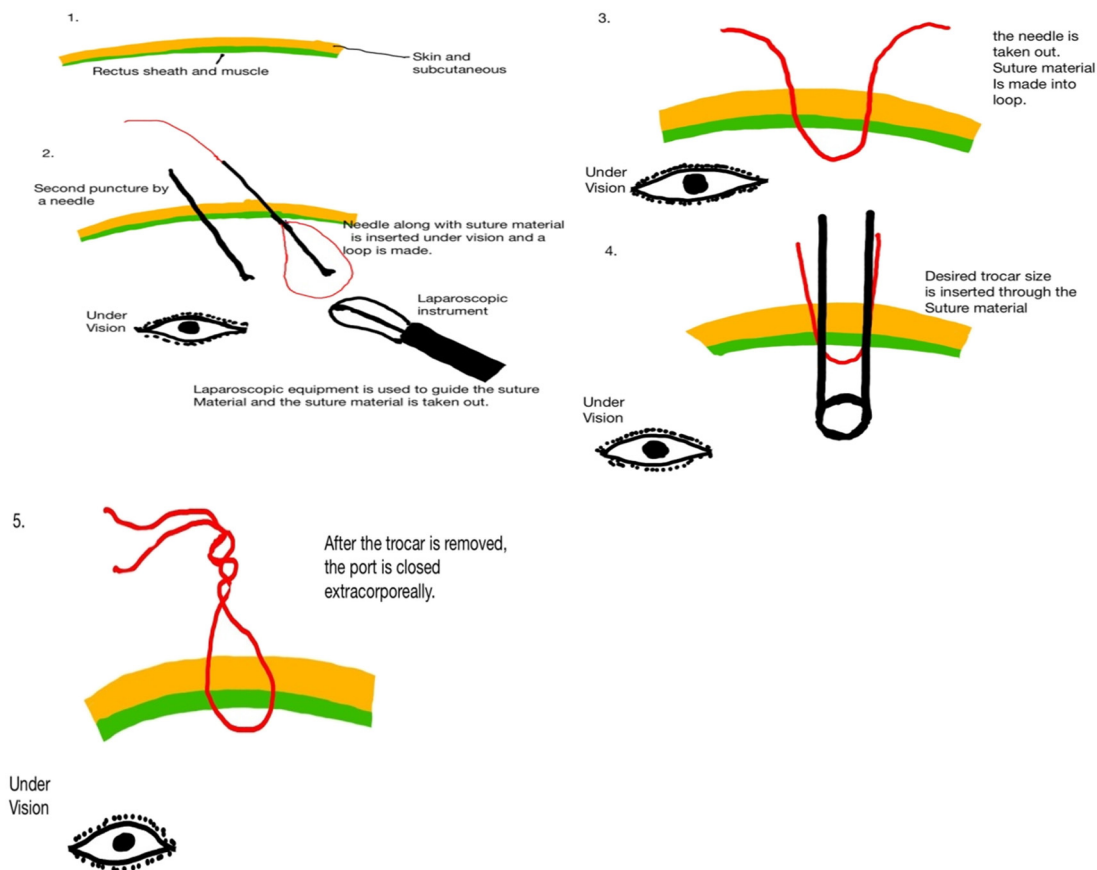


Fig 6. Schematic diagram illustrates the steps (1 to 5) of the Chennai port closure technique.

**Table 1**  
Surgeries and type of complications in Chennai port closure technique

<i>Follow-up results</i>					
<i>Type of surgery</i>	<i>No complications</i>	<i>Bleeding</i>	<i>Trocar site infection</i>	<i>Trocar site hernia</i>	<i>Total</i>
Robotic nephrectomy	26	–	–	–	26
Robot-assisted laparoscopic prostatectomy	80	–	–	–	80
Robotic partial nephrectomy	21	–	–	–	21
Robotic nephroureterectomy	3	–	–	–	3
Robot-assisted adrenalectomy	9	–	–	–	9
Robotic pyeloplasty	11	–	–	–	11
Robotic cystectomy	1	–	–	–	1
<b>Total</b>	<b>151</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>151</b>

is to keep the loop slightly loose to visualize the entry points of the sutures on the inner side and the use of a needle to see the direction of the port insertion. It is imperative to confirm closure at the end of the procedure. The average time taken for this technique was comparable to standard techniques. It was easily replicable as well as demonstrated by our registrars.

In the observed study, none of the patients operated on using this technique reported any complications like TSH during the follow-up period. The authors also believe that this technique is done in a distended abdomen without any leakage of the pneumoperitoneum. The ability to harness adequate closure of the port will be much better than the standard closure.

Another advantage of the current technique is that the point of entry in the rectus sheath is done before the incision is made, hence ensuring that the approximation of all the rectus sheaths and muscles is adequately closed by a single loop suture at the end of the procedure as a single loop suture. We also believe that the need to extend the incision in an obese patient will not be necessary in the new technique. The patient selection is not randomized, and that is an obvious weakness of our study.

In conclusion, laparoscopic port closures are essentially important to reduce and prevent the occurrence of TSHs. The Chennai port site closure technique is a safe, feasible, efficient, and inexpensive technique, especially for large-size ports.

## Author Contribution

Conception and design of the study: Nivash Selvaraj, Srivathsan Ramani, Kunal Dholakia, Narasimhan Ragavan.

Data collection: Nivash Selvaraj, Narasimhan Ragavan.

Analysis and interpretation: Nivash Selvaraj, Srivathsan Ramani, Kunal Dholakia.

Writing the paper: Nivash Selvaraj, Narasimhan Ragavan.

Critical revision of the article: Srivathsan Ramani, Narasimhan Ragavan.

Final approval of the article: Nivash Selvaraj Narasimhan Ragavan, Srivathsan Ramani.

Statistical analysis: Nivash Selvaraj Narasimhan Ragavan.

## Conflict of Interest

None to declare.

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