



# Single-port Laparoscopy with Modified Needle Hook-assisted Extracorporeal High Ligation of Hernia Defects (Suwardi's Technique): An Experience from Single-center Hospital

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## Abstract

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**BACKGROUND:** Laparoscopy has long been used for the evaluation of hernia defects on the contralateral side when performing herniated tears in children. In 1997, El Gohary first reported laparoscopic treatment of hernia repair in a female patient. Since then, laparoscopic inguinal hernia ligation has been performed in various medical institutions with a variety of methods including closing the defect intraperitoneally and extracorporeal ligation of the herniated ring defect.

**CASE PRESENTATION:** Data were taken from January 2016 to December 2020 in the Pediatric Surgery Department of Dr. Moewardi General Hospital, Surakarta. A total of 22 cases, consisting of 19 boys and 3 girls aged 1–14 years (mean 5 years), underwent single-port laparoscopy with modified extracorporeal ligation of hernial defects using an epidural needle. From the results of surgery from January 2016 to December 2020, there were 22 patients with a follow-up period of 6 months who were carried out with a single port without the assistance of forceps and hydrodissection with a single-port laparoscopic technique that had been modified extracorporeally using an epidural needle and were able to evaluate the contralateral side. Thus, it shortened the operating period and the patient was able to be discharged 24 h postoperatively without any complications.

**CONCLUSION:** From 22 patients who used single-port technique with modified extracorporeal ligation of hernia defects using epidural needles, the results were shorter operation time, without complications and satisfying cosmetic results.

## Introduction

In 1997, El Gohary first reported laparoscopic action on hernia repair in a female patient. Since then, laparoscopic inguinal hernia ligation has been performed in various medical institutions with a variety of methods including closing the defect intraperitoneally and extracorporeal ligation of the herniated ring defect [1].

At present, it has been described that laparoscopic hernia repair with extracorporeal ligation as compared to intraperitoneal suturing results in a significant reduction in intraoperative time, a lower recurrence rate, and excellent cosmetic results [2]. This article discusses the technique of extracorporeal ligation of an inguinal hernia assisted by two epidural needles that are formed into hooks used percutaneously so as to minimize injury to the skin, muscles, and nerves.

## Case Presentation

Data were taken from January 2016 to December 2020 in the Pediatric Surgery Department

of Dr. Moewardi General Hospital, Surakarta. There were 22 cases, consisting of 19 boys and 3 girls aged 1–14 years (mean 5 years) underwent single-port laparoscopy with modified extracorporeal ligation of hernia defects using epidural needles formed into hooks (Suwardi's technique).

### Suwardi's technique

Insert the infraumbilical Veress needle, then insert the infraumbilical 5 mm trocar as a laparoscope camera (Figure 1). Identify herniated defects in the right and left inguinal rings. The landmark for hook needle insertion is midway between the umbilicus and spina iliaca anterior superior on the ipsilateral side of the hernia defect where the needle hook is inserted (Figure 2). Laparoscopic light-guided, 17 G epidural needle (Terumo, diameter 1.40 mm, length 80 mm) is inserted and traversed along the bottom half of the internal inguinal ring (Figure 3). The needle is then traversed extraperitoneally under the testicular blood vessel, the spermatic duct, without performing a hydrodissection between the pre-peritoneal spaces and removing the peritoneum (Figure 4).

In this technique, hydrodissection is not performed, which usually involves infusion of normal

saline into the pre-peritoneal tissue because it reduces visualization of structures in the peritoneum (vasa and vas deferens). The non-absorbable 2.0 monofilament thread is passed through the lumen of the epidural needle inside the abdominal cavity and the outside the skin.

The non-absorbable thread is then pulled in a loop through the lumen of the epidural needle. The epidural needle is then removed from the abdomen along with the thread. The defect in the hernial ring is then closed and the loop in the peritoneum is tied extracorporeally. This approach places the knot over the fascia. This procedure is done in succession through one needle prick. If there is a defect on the contralateral, the same action on the contralateral side is performed in the same procedure.

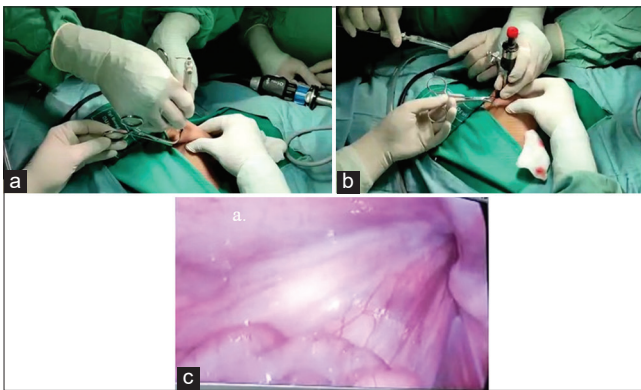


Figure 1: (a) Insertion of the Veress needle into the infraumbilical. (b) Laparoscope port insertion. (c) Evaluate the inguinal canal, in this case, the defect is in the left inguinal canal

## Results

The clinical characteristics of the patients are shown in Table 1. The mean follow-up period was 6 months. The 22 patients were treated with a single port without the aid of forceps. This single-port laparoscopic technique with extracorporeal modification

with an epidural needle can evaluate the contralateral side, close the hernia defect, and shorten the duration of surgery. All patients were carried out on an outpatient basis within 24 h postoperatively without any post-operative complications.

## Discussion

In 1995, Takehara *et al.* developed an extraperitoneal laparoscopy/laparoscopic percutaneous extraperitoneal closure (LPEC) to treat inguinal hernias in children. This technique is performed by placing the laparoscope through the infraumbilical incision, then grasping the forceps through the trocar on the right or left infraumbilical side. Then, a LPEC needle with a thread is inserted percutaneously in the inguinal line into the abdominal cavity. The hernia bag that is still

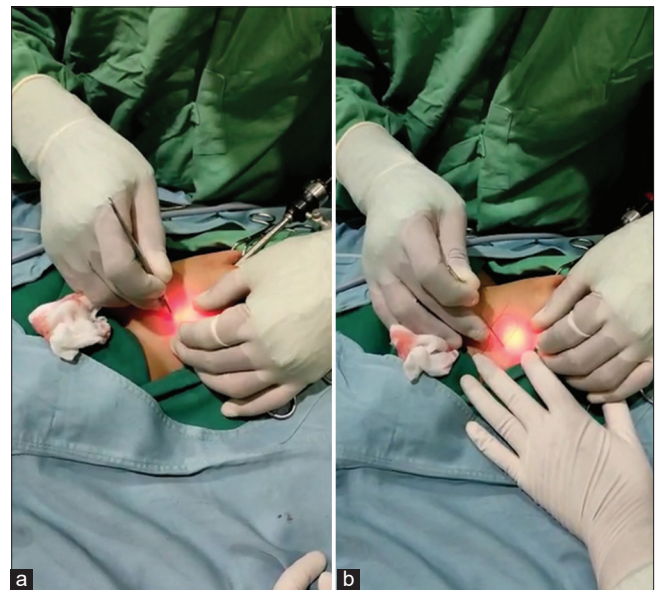


Figure 2: (a) Incision on the inguinal skin using mess no. 11. (b) Insertion of the epidural needle through the previous incision wound

Table 1. Clinical characteristics of patients

Patient	Sex	Age (years)	Side of the hernia	Contralateral hernia	Pneumoperitoneum timing	Complications	Follow-up
1	L	1	Right	None	34	-	6
2	L	1	Right	Present	31	-	6
3	L	1	Right	None	40	-	6
4	L	3	Right	None	29	-	6
5	P	3	Right	None	25	-	6
6	L	3	Left	None	32	-	6
7	L	3	Right	None	25	-	6
8	L	3	Right	None	30	-	6
9	P	3	Left	None	29	-	6
10	L	4	Left	None	31	-	6
11	L	4	Right	Present	27	-	6
12	L	4	Right	None	45	-	6
13	P	5	Left	None	47	-	6
14	L	5	Right	None	41	-	6
15	L	6	Right	None	28	-	6
16	L	7	Right	None	29	-	6
17	L	7	Right	Present	31	-	6
18	L	7	Left	None	38	-	6
19	L	8	Right	None	38	-	6
20	L	8	Right	Present	35	-	6
21	L	9	Right	None	34	-	6
22	L	14	Right	None	32	-	6



Figure 3: Modified epidural needle

open is closed extraperitoneally with a suture that is looped around the internal inguinal ring using an LPEC needle. This approach allows the surgeon to carry out contralateral exploration without adding an additional port followed by closure of the processus vaginalis [3].

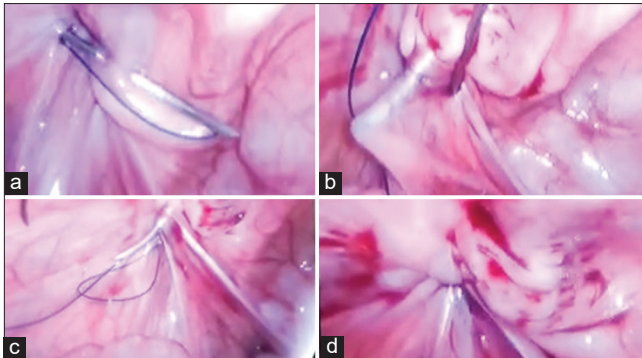


Figure 4: (a) The epidural needle is passed through the peritoneum right at the inguinal defect. (b) The second epidural needle passes through the peritoneum, circling the defect from the inguinal. (c) Loop through the second needle. (d) Closed defect

Tatekawa described a laparoscopic technique assisted by one grasping forceps to close the hernia ring using a non-absorbable monofilament thread that is inserted into the abdominal cavity through a needle on one side of the inguinal ring and pulled out through the other side with a needle shaped like a hook. The knot is made outside the abdominal cavity [2].

As another modification, this technique is assisted by injection of normal saline into the pre-peritoneal space to prevent injury to the blood vessels in the peritoneum [2]. In extracorporeal modified single-port laparoscopy using a hook-shaped epidural

needle without the aid of a forceps, it is important to prevent nerve and muscle injury that can occur during circular suturing of the herniated ring. This technique does not use hydrosection because it interferes with the visualization of blood vessels in the peritoneal wall. It is also important that the peritoneum is completely closed at the bottom of the ring so that it does not leave a gap between the vas deferens and the ligaments. If there is a gap, it can be closed approximately. Since the tool used to insert the thread is a modified epidural needle in the shape of a hook without completely removing the needle blade, there is little chance of nerve and muscle injury over the circular suture area. In addition to, damage to the spermatic chorda can be prevented by hydrodissection in the pre-peritoneal space. However, hydrodissection is not performed in this procedure because it affects the identification of blood vessels on the peritoneal surface [4], [5], [6], [7].

## Conclusion

This case report describes a single-port extracorporeal ligation technique assisted by an epidural needle shaped like a hook to close the inguinal hernia defect (Suwardi's technique). This technique is cheap enough to perform with minimal complications. This technique provides a shorter operating time and satisfying cosmetic results.

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