



# Laparoscopic single instrument closure of inguinal hernia in female children: A novel technique

Ahmed AbdElgaffar Helal \*

Pediatric Surgery Department, Al-Azhar University, Cairo, Egypt



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## ABSTRACT

**Background:** Inguinal hernia repair is the most common operation performed by pediatric surgeons, and herniotomy through a groin incision is the gold standard. Recently minimal access surgery (MAS) has challenged this conventional surgery. At the moment, cosmesis became the target of all MAS especially in female. So, MAS techniques have developed to become more minimally invasive, from 3 to 2 and now single port technique. However, most recent emerging techniques show a tendency for simple extracorporeal suturing with subcutaneous knotting, which has many drawbacks. We introduce a novel technique for laparoscopic repair of inguinal hernia in female children using laparoscopic single instrument closure (LSIC) with intracorporeal knotting.

**Patients and methods:** This prospective study was conducted at Al-Azhar University Hospital, between February 2012 and August 2014. Sixty girls with 68 congenital inguinal hernias were subjected to LSIC. Criteria for enrollment include: female gender, unilateral or bilateral inguinal hernia. Exclusion criteria include: recurrent hernia, hernia in morbid obese children, complicated hernia, girls who could not tolerate pneumoperitoneum. The main outcome measurements include: operative time, feasibility of the procedure, complications and cosmesis.

**Results:** A total of 60 girls with 68 congenital inguinal hernias were subjected to LSIC, with a mean age of  $2.2 \pm 2.25$  years (range = 0.58–10.00 years). Complete purse string of internal inguinal ring (IIR) with intracorporeal knotting was done for all cases. All cases were completed laparoscopically without conversion. The mean operative time was  $10.5 \pm 2.2$  minutes for unilateral hernia repair and  $20 \pm 4.3$  for bilateral cases. All patients achieved full recovery without intraoperative or postoperative complications.

**Conclusion:** LSIC of inguinal hernia in female children is feasible, simple, secure and more cosmetic. It avoids the drawbacks of extracorporeal knotting.

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The incidence of female inguinal hernia is 1.9%. It is interesting that 1 in 50 females will eventually develop inguinal hernia in her life time [1]. Although, laparoscopic inguinal hernia repair in children is gaining ground as a safe, feasible, and popular method [2], MAS for inguinal hernia repair in children is still a controversial topic, and many pediatric surgeons continue to debate its safety, efficacy, cosmesis as well as cost effectiveness [3].

Recently, many centers perform laparoscopic hernia repair in children with excellent visual exposure, minimal dissection, less postoperative pain, and better cosmetic results especially in female children. Traditionally, the two needle holder (TNH) technique is the most common technique used to close the IIR by either purse string or Z-shaped suture and there are some reports describing the insertion of a purse string suture by percutaneous techniques using conventional needle holder or endoscopically under laparoscopic guidance (subcutaneous endoscopically assisted ligation of the internal ring). However, the use of extracorporeal knotting causes many drawbacks, as undue tensions

on the tissues, loosening of the suture with high recurrence rate, development of granuloma, sinus, infection, and skin puckering at the site of a subcutaneously placed knot. All these drawbacks can be avoided with intracorporeal knot tying [4–6]. We introduce a novel technique for laparoscopic repair of inguinal hernia in female children, by using LSIC, with intracorporeal knotting [7]. The goal of this study is to describe the feasibility, safety and efficacy of LSIC of inguinal hernia in female children.

## 1. Patients and methods

This prospective study was conducted at the Pediatric Surgery Unit of Al-Azhar University Hospitals, Cairo, Egypt, between February 2012 and June 2014. A total of 68 inguinal hernias were repaired with LSIC in 60 girls. Criteria for enrollment included: female gender, unilateral or bilateral inguinal hernia. Exclusion criteria included: recurrent hernia, hernia in morbid obese female, complicated hernia (e.g., incarcerated ovary), patients who could not tolerate pneumoperitoneum (e.g., congenital heart disease). All children were subjected to full history taking, thorough clinical examination, and routine laboratory investigations (CBC, BT, CT, liver and renal profile). The main outcome measurements include: operative time, feasibility of the procedure, complications and

\* Al-Houssain University Hospital, Darrasa, Cairo, Egypt. Tel.: +20 1005107647, +20 1110773436.

E-mail address: [helalhmada@yahoo.com](mailto:helalhmada@yahoo.com).

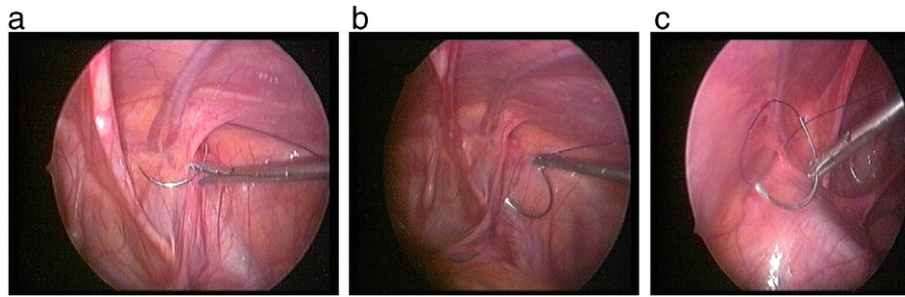


Fig. 1. a–c, The direction and position of the needle are adjusted by the needle holder, by pushing it against the peritoneum around the ring.

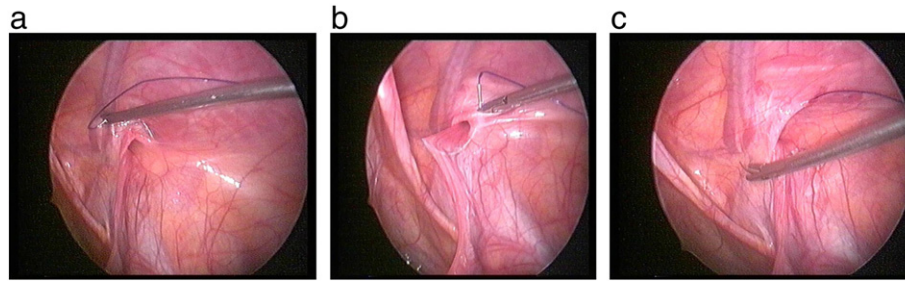


Fig. 2. a–c, The needle is advanced along the lateral margin and the floor of IIR under the peritoneum.

cosmesis. Ethical committee of our hospital approved the study protocol and a written informed parental consent was obtained.

### 1.1. Surgical technique

The principle of our repair is closure of the IIR in female children with complete purse string suture using single laparoscopic needle holder instrument, with intracorporeal suture knotting. The procedure was begun by positioning the patient supine in Trendelenburg's position with tilting to the opposite side of the hernia. Through a supraumbilical incision, 5-mm 30 degree angled telescope, was inserted via a 5-mm port. Pneumoperitoneum was created to pressure of 8–12 mmHg (according to age). The pelvis was carefully inspected. The uterus was identified, and the inguinal rings were evaluated. If a contralateral hernia was identified, it will be repaired at the same time with only few minutes added to the procedure, with no additional instruments or incisions. A 3 mm stab incision was made in the ipsilateral mid clavicular line (according to the hernia side) at the level of the umbilicus, to introduce 3-mm laparoscopic needle holder directly through the abdominal wall, holding the end of the thread just before its junction with the needle (2-0 polyester, round needle), while the long end of the thread was held outside the abdomen. The direction and position of the needle were adjusted by the needle holder

manipulating it against the posterior abdominal wall (Fig. 1A–C). We started our repair by introducing the needle at 3 o'clock meridian (on both sides) in the peritoneal leaflet at the level of IIR and then the needle was advanced along the inferior margin of IIR (Fig. 2A–C). Then we take it out again into the peritoneal cavity at 9 o'clock meridian (Fig. 3A and B). To reintroduce it again through this last point, to encircle the superior half of the IIR, and to come out again from the same opening at 3 o'clock meridian (Fig. 4A and B) encircling the IIR completely without any skip areas (Fig. 5A and B). We used the single instrument intracorporeal knot tie described by Ismail and Shalaby [7].

## 2. Results

Overall, 60 girls with 68 inguinal hernias underwent laparoscopic hernia repair using LSIC technique. Demographic, preoperative, intraoperative, and postoperative data were collected and analyzed. They were 60 females, with 68 hernia with a mean age of  $2.2 \pm 2.25$  years (range = 0.58–10.00 years). The demographic data of all patients were shown in Table 1. LSIC technique has been used for closure of IIR with intracorporeal knot tie and all cases were completed laparoscopically without conversion. The mean operating time was  $10.5 \pm 2.3$  minutes for unilateral cases and  $20 \pm 4.3$  minutes for bilateral cases. All patients achieved full recovery without intraoperative or postoperative

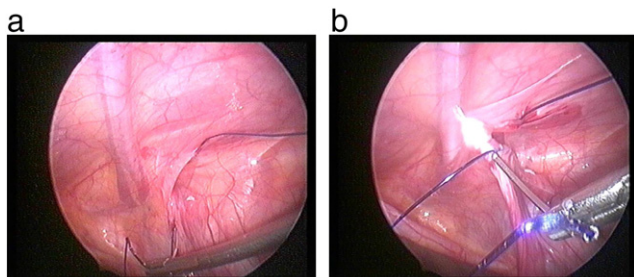


Fig. 3. a and b, Backward movement of the needle holder along the medial margin of IIR.

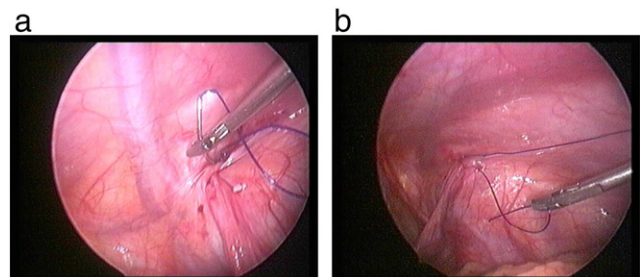


Fig. 4. a and b, Then along the superior margin of the IIR to complete the purse suture.

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