

Needlescopic inguinal herniorrhaphy in children – a new simplified technique

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ABSTRACT

Needlescopic techniques have been used recently in repairing inguinal hernias (IH), which has made this type of surgery more feasible and less invasive. The technique is being developed further. The objective of this study is to describe and assess the results that can be achieved by using a new simplified technique (Reverdin needle, RN) in needlescopic inguinal herniorrhaphy (NH) in children. All patients with symptomatic IH confirmed by clinical examination were subjected to elective needlescopic herniorrhaphy. One-hundred and fifty patients with 186 groin hernias, from two hospitals in Egypt and Saudi Arabia, in the period from October 1999 to May 2002, were assigned to NH using RN. The RN was used to insert a purse-string suture around the internal inguinal ring (IIR) to be tied extracorporeally. A total of 186 IH defects in 150 children were repaired successfully. There were 130 males and 20 females with a mean age of 20.58 ± 21 months (range 8–96 months). Right-sided IH was present in 86 patients (57.33%); among these patients, an opened IIR was found and repaired in 12 cases (8%). Left-sided IH was present in 30 cases (20%), bilateral hernia in 19 cases (12.67%), and recurrent IH in 20 cases (10%). The mean duration of surgery was 8.7 ± 1.18 min for unilateral and 12.35 ± 2 min for bilateral hernia repair. No intra or postoperative complications. The mean hospital stay was 7.79 ± 1.28 h. The new technique had all the advantages of needlescopic herniorrhaphy in children (less invasive, less pain, short hospital stay) combined with the advantages of reduced operating time, simplicity, and feasibility. It may be preferable for the intracorporeal suturing and knot tying. However, it needs long-term follow up.

KEY WORDS: Children, Inguinal herniorrhaphy, Needlescopic, Reverdin needle

Inguinal hernia (IH) repair is one of the most frequently performed surgical procedures in infants and young children.^[1] Owing to the advances in pediatric laparoscopic instrumentations and increased experience with the technique of laparoscopy, a number of centers routinely perform needlescopic inguinal herniorrhaphy (NH) in children.^[2] With the increasing number of needlescopic procedures in children, needlescopic suturing and knot tying are becoming integral parts of the skills that any laparoscopist must acquire.^{[3],[4]} Intracorporeal suturing and knot tying for closure of the IH may need a long learning curve and it may take a long time, specially for junior laparoscopic surgeons.^[5] In this study, a new simplified technique for NH using Reverdin needle (RN) was used for the first time. Our new technique is simple, safe, easy to apply, and avoids the difficulty of intracorporeal suturing and knot tying. It resulted in a marked reduction of the operative time.

PATIENTS AND METHODS

We devised a new simplified technique for insertion of intracorporeal suturing and knot tying using RN (Marten Medizin-Technik, D-78501 Tuttlingen, Germany) to close 186 IHs 150 children. This study was conducted in Al-Azhar University Hospitals, Cairo, Egypt, and Al-Mishary Hospital, Riyadh, Saudi Arabia, between October 1999 and May 2002. All patients were subjected to a thorough clinical examination, ultrasonography, and routine laboratory investigations. They received preoperative ceftriaxone (50 mg/kg) on the morning of surgery as a prophylactic. After induction of general endotracheal anesthesia, the patient was placed supine in the Trendelenburg's position. Pneumoperitoneum was created by inserting the Veress needle through an infraumbilical stab incision to a pressure of 10–12 mm Hg and a 2.7-mm trocar was inserted in its place. Through this port, a 2.7-

mm needlescope was used for initial visualization of the pelvis and internal inguinal rings (IIR) on both sides. A 3-mm accessory port was inserted at the lateral border of the right-rectus muscle at the level of the umbilicus. A snip incision of the skin was done 2 cm above and lateral to the right-IIR and 2 cm above and medial to the right-IIR for insertion of the RN. A 3/0 PDS suture was mounted into the hole of the needle [Figure 1-7].

The needle was introduced into the abdominal cavity and was manipulated to pass through the superior and inferior margins of the IIR incorporating the peritoneum and



Figure 1: Showing Reverdin needle



Figure 2: Insertion of Reverdin needle (RN) into the abdomen



Figure 3: Left inguinal ring



Figure 4: Reverdin needle (RN) passed into the abdomen

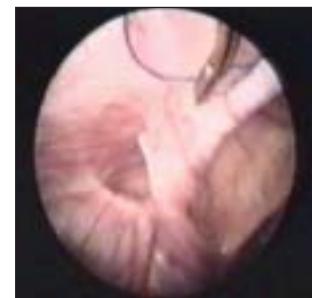


Figure 5: Reverdin needle (RN) superior margin of internal inguinal ring (IIR)



The cord structures are pushed away during insertion of suture

Figure 6: Reverdin needle (RN) piercing inferior margin of internal inguinal ring (IIR)



Figure 7: Suture withdrawal

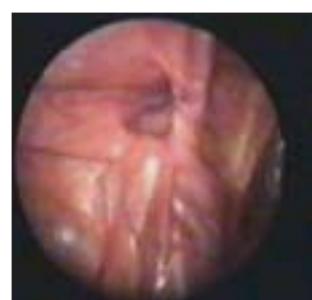


Figure 8: Suture passed through superior and inferior internal inguinal ring (IIR)

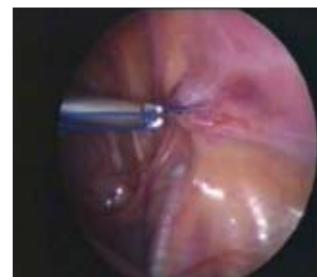


Figure 9: Knot tying around internal inguinal ring (IIR)

transversalis fascia. Then the roof of the hole of RN was opened by pushing its slider backward to release the thread, which is grasped and pulled out of the hole by dissector. Then the hole of RN was closed by pushing its slider forward and the needle was withdrawn to start another suture similar to the first one but without thread. The cord structures are clearly seen and excluded away by dissector during insertion of the sutures for protection. The stitches were placed in such a manner that the spermatic vessels and the vas deferens were left unimpaired within a relatively loose fold. The free end of the thread was mounted again into the opened hole of RN and then the needle with the thread was withdrawn 1 cm medial to the first suture forming a mattress suture. The RN was then passed again into the superior and inferior margins of the IIR mounted with the thread. Again, the hole of the RN was opened and the thread was grasped and pulled out by dissector. The two ends of the thread were withdrawn through the operating port for the extracorporeal knot tie [Figures 8, 9]. Then the tie was pushed inside the abdomen by knot pusher and tightened closing the IIR lateral to the spermatic cord to avoid its injury and/or entrapment. If an open inguinal ring or an open processus vaginalis was found contralaterally, this was closed at this stage.

A total of 186 IH in 150 children were closed by this technique. Postoperatively all the patients were allowed to drink and eat when it seemed appropriate. Ambulation was routinely encouraged and all patients were discharged in the evening of the same day of operation and seen after 7 days, 2 weeks, 6 months, and 1 year later.

RESULTS

A total of 186 IIR defects were closed using RN. There were 130 males and 20 females. Right-sided IH was present in 86 patients (57.33%). Among these patients, an open left-inguinal ring was found and closed in 12 cases (8%). Left-sided IH was present in 30 cases (20%), bilateral hernia in 19 cases (12.67%), and recurrent IH in 20 cases (13.33%). The mean duration of surgery was 8.7 ± 1.18 min (range 7–13 min) for unilateral and 12.35 ± 2 min (range 8–16 min) for bilateral hernia repair. All patients achieved full recovery without intra or postoperative complications. The mean hospital stay was 7.79 ± 1.28 h (range 5–11 h). At follow-up examination, more than 6 months later, there was practically no visible scars. At the 1-year follow-up, all children were available for examination and no case of recurrence or hydrocele was observed.

Statistical analysis

The data were analyzed using Systac 9.0 software (SPSS

Inc., Chicago, IL, USA). Proportions and percentages were used to summarize categorial variables, while descriptive statistics such as means and standard deviations were used for numerical variables.

DISCUSSION

In children, the standard surgical treatment of IH is limited to ligation of the hernia sac at the IIR without narrowing the ring.^[2] The IIR is normally reached by dissecting the hernia sac from the cord structures through inguinal crease incision. Postoperatively, the access trauma itself is the main source of damage and pain. Therefore, it seems more appropriate to approach IHs in children from within, leaving the outer abdominal wall intact. This is the fundamental rationale of NH.^{[2],[6]}

NH in children has been described previously for indirect as well as direct and recurrent hernias. The procedure has been performed with 5-mm trocars in 218 children^[7] and with 3-mm trocars in 201 boys.^[2] At first, a purse-string suture was used to close the IIR, but after some initial recurrences, it was modified by adding a semicircular peritoneal incision opposite the inferior epigastric vessels.^{[6],[8]} Our technique requires only one 3-mm operating port and RN to close the IIR and there was no need to incise the peritoneum at the internal ring. As shown from the results of this study, NH using RN has a high-success rate, and no injury to the spermatic cord structures and no recurrences were reported. It resulted in marked decrease of operative time.

A total of 186 IHs were closed safely in 150 children. The technique used for closure of the wide IIR was intracorporeal insertion of purse-string sutures using only one 3-mm trocar and RN for the first time. The cord structures are clearly seen and excluded away by grasper to avoid its injury and/or intrapment. The stitches were placed lateral to the cord structures.

Routine exploration of the contralateral internal ring was adopted in all cases. Unsuspected open contralateral internal ring was diagnosed and closed in 12 patients. We, therefore, decided to close all openings wider than 2 mm in diameter in the hope that no hernia subsequently will develop because it remains unclear whether a small open processus vaginalis develops subsequently into a hernia. Application of this policy may avoid a second hospitalization and operation as well as unnecessary routine bilateral open exploration.

In children, few reports on NH using 2 and 3 mm instruments have been published.^{[2],[7]} The technique now

seems safe enough to permit minimally invasive hernia surgery in girls and boys of any age.^[9] Gorsler and Schier used nonabsorbable Z-sutures to close 403 inguinal rings in 279 children. Their mean operating time was 14 min for unilateral hernias, and 21 min for bilateral hernias. They had a recurrence hernia in 3.4% of cases and post-operative hydroceles in 1.7%.^[2] Montupet et al used a nonabsorbable purse-string suture to close the IIR for small hernias and interrupted suture to close larger hernias in children (4–5 mm diameters). They had recurrence in 4.4% of their cases.^[8] Schier used 2-mm instruments without a trocar for intra-abdominal suturing of the open inguinal rings in 25 girls by the placement of two Z-sutures with good results.^[10]

The reported recurrence rate for open herniotomy in children ranges from 2 to 6.3%^{[7],[11],[12]} and that for laparoscopic herniorrhaphy from 0.7 to 4.5%.^{[2],[8],[13],[14]} In the present study, no single case of recurrence was seen at 1-year follow-up and the scars were almost invisible.

The NH needs a long-learning curve but once the technique of intracorporeal suturing and knot tying is mastered it becomes straightforward, requiring approximately 20 min for bilateral and 14 min for unilateral hernias.^{[2],[14]} However, in this study, the use of RN to close the IIR has resulted in the shortening of the operative time too much. No intra- or postoperative complications were reported in this series. The cosmetic results were excellent as a 2.7-mm needlescope and one 3-mm accessory trocar for tie pusher were used in all cases. It avoids the difficulty of intracorporeal suturing and knot tying. It does not need a long learning curve and it is an effective and a rapid technique for closure of IH in children. The mean operative time for unilateral and bilateral NH was 8.7 ± 1.18 min and 12.35 ± 2 min, respectively.

The NH in children is known to require a longer operating time than open herniotomy. Many reports showed that it ranges from 25 to 74 min.^{[2],[15],[16]} However, studies have shown the technique to be safer, more cost-effective, less invasive, and has a shorter hospital stay than open herniotomy. In addition, it yields a better cosmetic result than open surgery.^[2]

On the basis of our knowledge, and after looking at the English literatures, RN has never been used before in repairing IH in children. Only Greca et al. used RN holder to repair a right-sided Morgagni hernia in a symptomatic adult. They stated that the technique is extremely simple, rapid, and effective. It can also be performed by surgeons, who are not specially trained in intracorporeal suturing and knot tying.^[17]

In conclusion, NH provides a rapid, easy, and accurate method for the treatment of congenital IH in children. We found this original technique to be more simple, safe, and effective. It resulted in the shortening of the operative time and it can also be performed by surgeons, who are not specially trained in intracorporeal suturing and knot tying. The cosmetic results are excellent and better than other needlescopic techniques. It also has diagnostic value for the hidden contralateral hernias saving the patient from a later surgery, as well as unnecessary routine bilateral open exploration. At 1-year-follow up, all patients were available and no single case of recurrence was reported. However, long-term follow up will be needed to determine the validity of these initial results and the rate of recurrence after a longer time.

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