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Long-term follow-up of laparoscopic transcutaneous inguinal herniorraphy with high transfixation suture ligature of the hernia sac

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ABSTRACT

Background: Laparoscopic transcutaneous inguinal hernia repair in children may reduce postoperative pain, improve cosmesis, allow for less manipulation of the cord structures, and offer easy access to the contralateral groin. However, there is concern for unacceptably high recurrence rates when the procedure is generalized. To address this increase in recurrence, in 2011 we described in this journal a modification of the laparoscopic transcutaneous technique that replicates high transfixation ligature of the hernia sac with the aim of inducing more secure healing, preventing suture slippage, and distributing tension across two suture passes. We now describe our long-term follow-up of this novel repair.

Methods: After obtaining IRB approval, a retrospective chart review and phone follow-up were performed on all patients who underwent laparoscopic transfixation ligature hernia repair between October 2009 and August 2014 (including further follow-up of the 21 patients reviewed in the 2011 report of this technique). Data collection included demographics, laterality of hernia, evidence of recurrence, complications, and time to follow-up.

Results: Median follow-up was 24 months (range 2–52 months). Three pediatric surgeons performed 216 laparoscopic transfixation ligature repairs on 166 patients. Demographics: mean age 29.5 months (range 1–192 months); male 67.2% and female 32.8%; 4.2% of patients were premature at operation. Repairs were bilateral in 42% of patients, right sided in 34%, and left sided in 24%. Three patients together experienced 4 recurrences, for an overall recurrence rate of 1.8%. Two of the recurrences occurred in a 2-month old syndromic patient with severe congenital heart disease who recurred twice after laparoscopic transfixation ligature repair then subsequently failed an attempt at open repair. Excluding this one outlier patient, the recurrence rate was 0.9%. The complication rate was 1.7% (3 hydroceles and 1 inguinal hematoma; all resolved spontaneously).

Conclusion: Laparoscopic high transfixation ligature hernia repair can be adopted by surgeons with basic laparoscopic skills, and result in excellent outcomes with acceptable recurrence rates.

The traditional open hernia repair, which has recurrence rates of approximately 1% [1], is being supplanted by a multitude of minimal access surgery (MAS) techniques at a number of institutions. Laparoscopic inguinal hernia repair in children may reduce postoperative pain, improve cosmesis, allow for less manipulation of the cord structures, and offer easy access to the contralateral groin [2–4]. The two most commonly used MAS techniques include the transabdominal approach with intracorporeal suturing, and the transcutaneous approach, of which there are a number of variations [2–7]. Such MAS approaches have a steep learning curve. However, recurrence rates in some series have approximated that of the open repair when performed by experienced surgeons, ranging from 1.13% to 4.3% [4,5,7]. In 2009, we described a single surgeon experience of a laparoscopic transcutaneous simple ligature hernia repair with recurrence rates comparable to the open repair [4]. However, when this procedure was generalized to all the surgeons in our practice, our recurrence rates increased to about 4% (unpublished data).

It has been suggested that in addition to surgeon experience, certain anatomic features (large hernia defect, thick abdominal wall, etc.) are more difficult to repair laparoscopically and thus contribute to the higher rate of recurrence [6]. Knot slippage, a "seton-like" effect where the suture cuts through peritoneal tissue, and increased tension distributed across only one suture have been anecdotally implicated in observed failures.

In 2011, our institution described a modification of the laparoscopic transcutaneous technique that replicates high transfixation ligation of the hernia sac with the aim of inducing more secure healing, preventing suture slippage, and distributing even tension across two suture passes (Fig. 1) [8]. This modification of the transcutaneous technique intends to overcome the above difficulties and more closely replicate the suture ligation of the hernia sac used during a traditional open repair, although it stops short of the herniotomy that typically accompanies open repair. We now describe our long-term follow-up of patients undergoing this novel repair.

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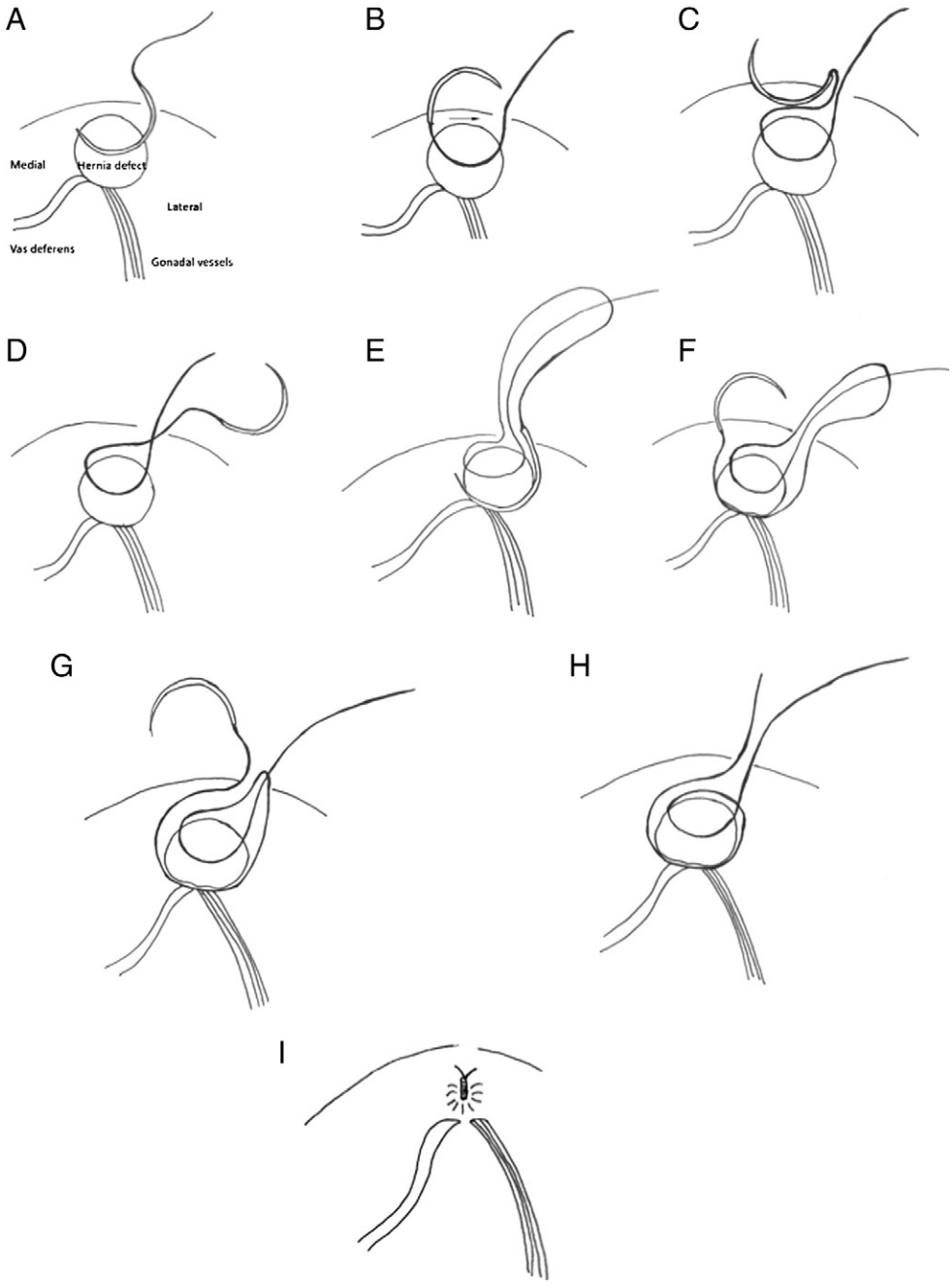

Fig. 1. A–I: Laparoscopic transcutaneous transfixation ligation of the hernia sac: Schematic of the traversion of the needle. (A) The needle is passed through a 1–2 mm incision placed just lateral to the internal inguinal ring and passed halfway across the hernia sac. (B–D) The needle is then brought out partially through the skin and once the swage of the needle is above the fascia, the needle is passed retrograde through the subcutaneous plane to be removed at the initial incision site. (E) The needle is then passed through the same stab incision around the neck of the hernia sac where the vas and vessels coalesce. The needle dissects a plane between the vas/vessels and the peritoneum, or else it is momentarily intraperitonealized then pierced back into the pre-peritoneal plane to bypass these structures. (F) Once through the skin, the needle is grasped with a driver and pulled through until the swage encircles the defect and enters the subcutaneous space. (G) The driver is used to push the swage through the subcutaneous space to re-emerge out of the initial incision. (H) A driver is used to grasp the swage and the needle is pulled out of the wound entirely and the needle is cut off. (I) The suture ligature is complete and the suture is tied with multiple knots (at least eight, to avoid slippage). The knot is buried in the subcutaneous sutures, and the skin defect closed.

1. Methods

After obtaining IRB approval, a retrospective review was performed of all patients who underwent this procedure between October 2009 and August 2014. Three pediatric surgeons with 0–10 years of independent unsupervised experience performed the procedures with the assistance of a pediatric surgery fellow. Follow-up was by chart review of postoperative clinic visits and standardized telephone conversations with parents. Data collection included demographics, laterality of hernia, evidence of recurrence, complications, and time to follow-up. Operative times (skin to skin) were extracted from the operating room database.

All preoperatively clinically diagnosed hernias were repaired with transfixation ligature. Exclusion criteria included children greater than 10 years of age and the morbidly obese. We did not encounter any morbidly obese patients but anticipate that the needle would not be long enough to negotiate the internal ring. We performed open mesh repairs on children greater than 10 years of age. Contralateral defects found at operation were fixed with transfixation ligature if the sac was greater than 3 mm diameter and 1.5 cm in depth (gauged by insertion of a