

New technique for herniotomy in children: a clinical trial

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Objective This study aimed to assess the necessity of hernial sac ligation after its transection in herniotomy in children and to compare the recurrence and complication rates between two methods of hernial repair in children (the classic method with ligation of the hernial sac and a new method without sac ligation).

Study design This was a randomized-controlled trial (or a randomized comparative trial).

Materials and methods A total of 200 children, newborns to children 12 years of age, with inguinal hernia were admitted to Emam-Reza Hospital, Kermanshah, Iran, between March 2011 and 2012 for elective hernial surgery. Patients who were more susceptible to recurrence such as patients with incarcerated hernia and increased intra-abdominal pressure were excluded from the study. After exclusion of a few patients, 182 children were included in the study. They were allocated randomly to two groups: a study group (herniotomy without sac ligation) and a control group (herniotomy with sac ligation). Both groups were followed up for a period of 1–1.5 years postoperatively for recurrence or other complications.

Introduction

Inguinal hernia is a common cause of patient referral for surgery and in children, it is almost always an indirect type, which is treated by sac dissection, transection, and high ligation (classic treatment) [1]. When the internal ring is very large, its tightening is recommended [2]. Although cutting of the sac, which is the pathway of the viscera into the inguinal canal, is mandatory and logical, the need for its ligation is unclear.

A hernia sac is continuity of the peritoneum into the inguinal canal (process vaginalis) and it has been proved that all defects and laceration and transections of the peritoneum close on their own spontaneously and rapidly without any suture [3,4]. Hence, there should not be any difference between the open peritoneum in herniotomy and other abdominal surgeries in which the peritoneum is left open and not closed separately. It appears that high ligation of the sac is not an essential step in hernial repair. Besides, performing an extra step may predispose to complications, and more time and cost spending. Here, we assess the effect of a nonligation method on the recurrence rate during pediatric herniotomy.

Materials and methods

This prospective study was carried out between March 2011 and 2012. A total of 200 children who were admitted

Results There was only one case of recurrent hernia in the control group and none in the study group. There was no statistically significant difference in the rate of recurrence or other complications between the two groups.

Conclusion This study showed that hernial sac ligation after its transection is not necessary in pediatric herniotomy. Omission of ligation did not result in any significant effect on early and late complications. *Ann Pediatr Surg* 11:197–199 © 2015 Annals of Pediatric Surgery.

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for elective inguinal herniotomy (infants to children 12 years of age) were enrolled and allocated randomly to two groups (100 in each group): study group (herniotomy without sac ligation) and control group (herniotomy with sac ligation). A total of 218 herniotomies were performed in 200 children (137 right side, 45 left side, and 18 cases of bilateral hernia); the mean age of the children in the control group was 23 months and that in the study group was 21 months, with no significant difference between the two groups. The ratio of boys to girl in the control group was 6.1 to 1 and that in the study group was 4.8 to 1 (no significant difference). After the baseline investigations, informed consent was obtained from the parents and the procedure was explained to the parents. All cases of emergent surgery because of incarceration and all patients who were more prone to recurrence (increased intra-abdominal pressure, peritoneal dialysis, ventriculo-peritoneal shunts, ascitis, soft tissue disorders, etc.) were excluded from the study. In the study group (nonligation of hernial sac), the hernial sac was dissected and separated from the spermatic cord and simply transected and excised at the internal ring level, without ligation. After excision, the proximal end of the hernial sac was retracted into the peritoneal cavity without closing it by suture. Then, only the skin was sutured and the operation was terminated. However, in the control group (ligation of hernial sac), the hernial sac, after its dissection and separation from the spermatic cord, was ligated and transfixed by nonabsorbable suture (silk 3-0) material and excised at the internal ring level (classic method). In both groups, in few cases, if the internal ring

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was large and patent (on the basis of the surgeon's judgment, for example by inserting the finger tip into the internal ring), it approximated with one or two absorbable (vicryl 3-0) suture. In our study, this was found in five cases in the control group and four cases in the study group (in one case, we encountered evisceration of the intestine during the nonligation method, which was managed only by replacing the intestine into the abdomen and approximation of the internal ring with two sutures; the patient has developed no recurrence in the 1.5-year follow-up). All operations were performed under general anesthesia by the same pediatric surgeon. Both groups were evaluated and compared during the first few days after surgery for early complications (hematoma, bleeding, pain, wound infection, and spermatic cord inflammation) and after discharge, all patients visited the hospital outpatient clinic periodically for up to 1–1.5 years; they were assessed for signs and symptoms of hernial recurrence. Criteria for the diagnosis of recurrence were based on anamnestic information, parents' observation and medical history, physical exam, and inguinal sonography. All the collected data, after coding, were entered into an Excel sheet using descriptive statistics (average, SD, confidence interval); the χ^2 -test and the *t*-test were used to compare the results. The software used was SPSS, version 18 (SPSS, Chicago, Illinois, USA). This study was approved by the ethical committee of University of Medical Sciences.

Results

Only one recurrent inguinal hernia was detected in the control group during the 1.5-year follow-up period. Other complications showed no significant differences in the two groups (Table 1). All complications were managed conservatively and medically, except for reoperations for one recurrent hernia and two cases of postoperative hydroceles that persisted after aspiration. There was no mortality and no case of testicular atrophy.

Discussion

Although the classic and standard treatment for inguinal hernia in children is excision and suture ligation of the indirect sac, our study found that nonligation of the hernial sac exerted no effect on the recurrence rate. We proved that sac ligation is not absolutely necessary. The hernial sac closes rapidly after transection by metamorphosis of the in-situ mesodermal cells as a part of the peritoneum [5]; thus, there is no need for its ligation. Elimination of the passage of viscera into the inguinal canal and cutting off the continuity of the sac seem to be enough for indirect inguinal hernia treatment. However, adhesion of the sac remnant suture in front of the internal ring makes a fix point and prevent its complete retraction into abdominal cavity, hence increase possibility of recurrence.

Although some reports emphasize that excision and high ligation of the indirect inguinal hernia sac are an essential part of repair, and suggesting that the omission of this step is insufficient treatment and will increase complications and recurrence [6] but it seems over emphasized as an essential part of the repair and it has not been proven yet. Numerous clinical trials have confirmed that it is

Table 1 Comparison of complications in both groups

Complication type	Study group	Control group	P-value
Recurrence	0	1	0.48
Hemorrhage and hematoma	0	1	0.48
Swelling of the spermatic cord	7	8	0.79
Postoperative hydrocele	11	9	0.81
Wound infection	2	3	0.67

Study group (nonligation of the hernia sac) and control group (ligation of the hernia sac).

unnecessary to close the hernial sac that is a part of the peritoneum with sutures. Shulman *et al.* [7] reported the absence of adverse effects on herniorrhaphy without sac ligation in adults. A prospective study of laparoscopic inguinal hernia repair in children by Riquelme *et al.* [8] showed that there was no difference in suturing or not after the peritoneum was incised and the sac was resected. Kumari *et al.* [9] showed that closure of the hernial sac is not necessary in herniotomy associated with orchiopexy. Delikoukos and colleagues [10,11] reported that nonligation of the indirect hernia sac in adults does not increase the chance of recurrence and that the patient experiences less pain with the use of this method. Gharaibeh and Matani [12] also showed that nonligation of the hernial sac in adult herniorrhaphy does not increase recurrence. We believe that, nonligation may be advantageous. It is more rapid with less dissection. It makes the repair safer because it prevents inadvertent ligation of spermatic cord elements and entrapment of viscera between sutures, especially in sliding hernia. Nonligation may reduce the infection and adhesion rate because of the absence of suture material as a foreign body [13,14]. Our experience with pediatric herniotomy without ligation of the sac has been encouraging. This is the largest series that includes younger children, but further studies with more cases and longer follow-up should clarify the issue with or without sac ligation. This should lead to the establishment of evidence-based clinical guidelines of how the operation should be performed.

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Conflicts of interest

There are no conflicts of interest.

References

- 1 Weber TR, Tracy TF Jr, Keller MS. Groin hernia and hydrocele. In: Ashcraft KW, Holcomb GW, Murphy JP, editors. *Pediatric surgery*, 4th ed. Philadelphia, PA: Elsevier Saunders; 2005.
- 2 Fonkalsrud EW. Disorders of inguinal canal. In: O'Neill JAJr, Grosfeld JL, Fonkalsrud EW, Coran AG, Caldamone AA, editors. *Principles of pediatric surgery*. 2nd ed. 2004 St Louis, MO: Mosby Inc.; 1995. p. 440.
- 3 Ellis H, Heddle R. Does the peritoneum need to be closed at laparotomy? *Br J Surg* 1977; **64**:733–736.
- 4 Johnson FR, Whitting HW. Repair of parietal peritoneum. *Br J Surg* 1962; **49**:653–660.
- 5 Mohta A, Jain N, Irniraya KP, Saluja SS, Sharma S, Gupta A. Non-ligation of the hernial sac during herniotomy: a prospective study. *Pediatr Surg Int* 2003; **19**:451–452.

- 6 Postlethwait RW. Recurrent inguinal hernia. *Ann Surg* 1985; **202**:777–779.
- 7 Shulman AG, Amid PK, Lichtenstein IL. Ligation of the hernia sac. A needless step in adult hernia. *Int Surg* 1993; **78**:152–153.
- 8 Riquelme M, Aranda A, Riquelme-Q M. Laparoscopic pediatric inguinal hernia repair: no ligation, just resection. *J Laparoendosc Adv Surg Tech A* 2010; **20**:77–80.
- 9 Kumari V, Biswas N, Mitra N, Konar H, Ghosh D, Das SK. Is ligation of hernial sac during orchiopexy mandatory? *J Indian Assoc Pediatr Surg* 2009; **14**:66–67.
- 10 Delikoukos S, Lavant L, Hlias G, Palogos K, Gikas D. The role of hernia sac ligation in postoperative pain in patients with elective tension-free indirect inguinal hernia repair: a prospective randomized study. *Hernia* 2007; **11**:425–428.
- 11 Smedberg SG, Broome AE, Gullmo A. Ligation of hernial sac? *Surg Clin North Am* 1984; **64**:299–306.
- 12 Gharaibeh KI, Matani YY. To ligate or not to ligate the hernial sac in adults? *Saudi Med J* 2000; **21**:1068–1070.
- 13 Imamoglu M, Cay A, Sarihan H, Ahmetoglu A, Ozdemir O. Paravesical abscess as an unusual late complication of inguinal hernia repair in children. *J Urol* 2004; **171**:1268–1270.
- 14 Calkins CM, St Peter SD, Balcom A, Murphy PJ. Late abscess formation following indirect hernia repair utilizing silk suture. *Pediatr Surg Int* 2007; **23**:349–352.