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Original Article

Comparative Study of Surgical Results with and without Ligation of Hernia Sac in Orchiopexy of Pediatric Patients with Undescended Testis

Omid Amanollahi*[1], Zahra Kashanian[2]

1. Dept. of Surgery, School of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran.
2. General Surgeon, Kermanshah University of Medical Sciences, Kermanshah, Iran.

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***Corresponding Author**:
Pediatric Surgery Specialist, Associate Professor, Kermanshah University of Medical Sciences, Mohammad Kermanshahi Hospital, Helal-e Ahmar crossroad, Kermanshah, Iran.
Tel: 09123168543
Email: oamanollahi@yahoo.com

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Abstract

Introduction: Undescended Testis (UDT) is a congenital anomaly and its common complications include testicular malignancy, infertility, testicular torsion, risk of trauma. Treatment of UDT is surgical (orchiopexy), and since it is always with a hernia sac, one stage of the surgery is separating, cutting and ligation of the hernia sac, in order to avoid an inguinal hernia. In this study, we investigated whether surgical procedure without inguinal hernia sac ligation and only with separating and cutting it at the deep ring level could be a more appropriate alternative to the classic surgical procedure.

Methods: This clinical trial was conducted in march 2012-2013 in kermanshah university of medical sciences, on children of 2 months to 11 years old with UDT. The patients were followed up for 3to 4years.

Result: A total of 109 patients underwent orchiopexy during the study. Among them, 38.33% underwent orchiopexy with ligation of the hernia sac and 61.46% underwent orchiopexy without ligation of the hernia sac and with separating and cutting sac at the deep inguinal ring. No cases of an inguinal hernia were observed in the two groups during the follow-up period of 4-5 years. Other complications such as wound infection, hydrocele, , hematoma, and hemorrhage at the surgical site also did not differ significantly between the two groups.

Conclusions: Regarding the findings of this study, it appears that the use of the non-ligation technique does not increase inguinal hernia, and can be a good alternative to the classical method of hernia sacligation.

Introduction

Undescended testis (UDT) is the absence of testicles in its normal location. This abnormality occurs when the descending process is impaired and the testicle stops along its path. UDT with a 3% prevalence in term infants and 30% in preterm infants is one of the most common congenital disorders in humans. However, 80% of cases spontaneously descend within one year after birth.The mainstay of therapy for undescended testes is operative treatment within the first years of life in order to avoid ongoing testicular degenerative changes. The surgical therapy for the palpable undescended testis is orchiopexy and when the testis is non-palpable, a supplementary laparoscopic approach (1). Common complications of undescended testis include testicular malignancy, infertility, testicular torsion, the risk of testis trauma in the inguinal region, psychological effects, and inguinal hernia (2). However, according to studies, clinical inguinal hernias are found in only 6% of the UDTs, while in 50% to 90% of the cases with an open processus vaginalis, occult inguinal hernias are reported (3), which is a high rate and can be associated with high-risk complications, such as entrapping viscera in the hernial sac. This complication occurs in 12% of children and up to 30% in one-year-olds, which can cause damage to the viscera, intestinal perforation, gangrene, peritonitis, and death if it is not reduced or treated (4). Therefore, therapeutic measures should be performed immediately after diagnosis (5). Surgery, introduced by James Adams at the London Hospital in 1871, is the gold standard treatment for inguinal hernia caused by UDT (6). If inguinal hernia is accompanied by UDT, the result of the surgery depends on the technique employed because of the extremely thin and fragile sac. In these cases, the use of an inappropriate technique and an excessive pull on the peritoneal sac can damage the cord and the vessels in the area and finally testicular atrophie. Therefore, due to the complications and relatively high relapses in classic repair method, it appears necessary to use methods that can have the most therapeutic effects for the patient with the least complications and costs for the patient and the healthcare system. In this regard, research has shown that closure of the peritoneal sac is not necessary, and that cutting of the sac at the deep ring is sufficient (7). Its benefits include the facts that herniotomy technique is simpler and less risky, it is less likely to damage the

elements of the cord and vessels, has a better chance for cutting the sac from higher levels, and has a little chance of the sac remaining and the need for pulling the peritoneal sac to close it, uses fewer sutures, and ultimately, needs a shorter time in surgery. These advantages make the repair method without hernial sac ligation a more appropriate and beneficial way to repair undescended testis. This surgery is especially sensitive in children and has several effects and consequences. Furthermore, few studies are available in Iran, therefore, the present study attempted to find out whether the surgical procedure without inguinal hernia sac ligation in children with UDT can be a more appropriate alternative to the classic surgery, and whether the rate of inguinal hernia in this method is different from the classic method.

Materials and Methods

This blind clinical trial recruited children between 2 months and 11 years old with UDT presenting to Mohammad Kermanshahi Hospital for orchiopexy in Kermanshah, Iran. After briefing parents about the type of surgery and the goals and methods of the patients' procedure, using the random numbers table, the children were divided into two groups of non-ligation of the hernial sac technique (study group) and the classic method with ligation of the hernial sac (control group) and then underwent the surgery. An informed consent was obtained from the parents. Ethics Committee of the University also approved the study.

In the study group (non-ligation), the hernial sac was separated and cutted at the deep ring, simultaneously with orchiopexy, after being separated from the spermatic cord without ligation and suturing. In the second group (control), simultaneously with orchiopexy, separation and cutting and double ligation of the sack at the deep ring level was done through the classic method. A part of the information was collected during the operation using a designed checklist and some of the important complications, including the occurrence of inguinal hernia were controlled and examined during patient visits to the Mohammad Kermanshahi clinic by clinical examination and ultrasound. Patients were followed up for complications and especially the occurrence of hernia by a physician in follow up courses of one, three, and six months after the operation, and in follow-up periods with longer intervals, according to the collection of samples between 2012 and 2013. The last follow-ups were conducted in March 2016. The mean follow-up time was 3-4 years. Since it is expected that most cases of hernia occur after surgery in the early months, it appears that the follow-up time was sufficient. It should be noted that four patients were excluded due to missing to follow up- three from the control group and one from the study group. All surgical procedures were performed by one pediatric surgeon under general anesthesia and in direct collaboration with a surgery resident.

The exclusion criteria were as follows:

- Presence of clinical and symptomatic inguinal hernia with UDT (in this case they were excluded from the study group).
- Increased intra-abdominal pressure for any reason (pritoneal dialysis, ascites,ventriculo pritoneal shunt, etc.) with UDT.
- Any factor that increased the risk of developing hernia, such as connective tissue disease, etc.

The data were analyzed by SPSS V.16 software using Chi-square test. If KS test showed variables with non-normal distribution, equivalent tests were used and $P<0.05$ was considered significant. The results are presented as a final report in the form of tables and charts.

Results

A total of 109 patients underwent orchiopexy during the study, of whom 42 (38.5%) underwent orchiopexy with hernia sac ligation and 67 (61.4%) underwent orchiopexy without hernia sac ligation.

Patients' age ranged from 2 months to 11 years. The highest and lowest prevalence rates were observed in less than two year and 8-11 year age groups. The UDT in 44.9% of cases was on the right side; in 36.6% was on the left side, and in 18.3% was on both sides (Table 1) (Figure 1).

In this study, the following cases were observed among all the patients undergoing surgery with and without hernia sac ligation and orchiopexy: 16 cases (14.6%) of short spermatic cord resulting in testicular suprascrotal fixation, 25 cases (22.9%) of testicular atrophy, 12 cases (11%) of other anomalies with UDT (including vasoepididymal anomalies, spermatic vessel agenesis, cardiac valve abnormality, hypospadias, intestinal atresia, ectopic kidney and dextrocardia), 10 cases (9.17%) of definite hernia with UDT, 3 cases (2.75%) of undersized testis, 4 cases (3.6%) of retractile testis on the opposite side, 5 cases (4.5%) of inguinal anomaly on the opposite side in form of hydrocele, 4 cases (3.66%) of inguinal hernia, and 12 cases (11%) of intra-abdominal testis. Early complications such as hematoma, hemorrhage and wound infection are detected in the short-term and within a few days, and complications such as UDT recurrence and testicular atrophy in the first few months after the operation, and inguinal hernia usually occurs in the early months after the surgery. In our study, no specific complications were observed in the two groups (from March 2013 to March 2016), and no difference was observed between the two groups. However, as expected, the duration of surgery and the consumed materials were insignificantly less in the non-ligation of the hernia sac technique.

Table 1. Frequency distribution of the age group of patients undergoing orchiopexy

Age group of patients undergoing orchiopexy (with or without sac ligation)					
2 Months to 2 years	2 to 4 years	4 to 6 years	6 to 8 years	8 to 10 years	10 to 12 years
69 (63.3%)	22 (20.1%)	8 (7.3%)	4 (3.6%)	2 (1.8%)	4 (3.6%)

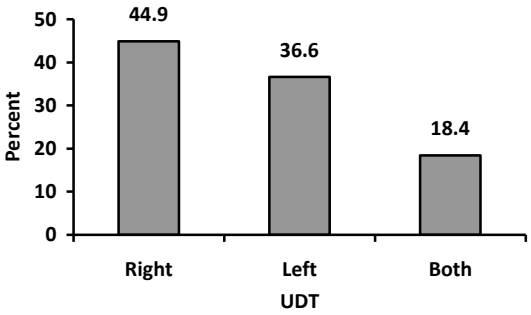

Figure 1. Frequency distribution of UDT in the subjects

In this study, none of the patients undergoing orchiopexy (with and without ligation) had a postoperative complication (recurrence of inguinal hernia, wound infection, hydrocele, swelling and inflammation of the spermatic cord, hematoma, or local hemorrhage).

Discussion

Experimentally, during orchiopexy, the hernial sac is separated, cutted and ligated in order to prevent the occurence of a hernia in the future. Because of the severe adhesion of the sac to spermatic elements, such as vas deferens and spermatic vessels, absence of experience and precision at this stage can cause serious damage to these elements and cause testicular atrophy and increase the risk of infertility. Several studies have questioned the necessity of this stage of the operation. In a study on 50 patients with UDT that underwent orchiopexy without ligation of the sac, patient follow-ups up to several years showed no instance of hernia, and it was concluded that the ligation of the sac were not necessary (8). Hernia sac is the remaining patent processus vaginalis and it closes spontaneously after cutting it . The reason why ligation with suture is questionable is that it can cause complications such as creating a fix point against the deep ring and being prone to recurrence of hernia, or unwanted entrapping of spermatic cord elements such as vas deferens or spermatic vessels in the suture that can cause complications such as testicular atrophy or infertility.

Several studies have been conducted on the need for ligation and suturing hernia sac in pediatric and adult hernia surgeries, most of which have concluded that separation of hernia and disrupting its continuity is enough for indirect hernia repair and there is no need for ligation of the hernia. This was also approved in a study in Iran on 200 children with inguinal hernia who had undergone surgery with and without ligation of hernia sac, where several years of follow-up indicated no increase in hernia recurrence (9).

In a study by Vishal conducted on children of the age range of 6 months to 10 years old undergoing orchiopexy without ligation of hernia sac, there was no short-term complications or hernia sac recurrence (10). In a study by Gharaibeh, patients undergoing herniorrhaphy, the hernia sac was not closed and was immediately separated and no short-term complications or hernia recurrence were observed and there was no significant relationship between the non-ligation of the hernia sac and the rate of recurrence (11). In Mohta's studies, the herniotomy technique without closure of the sac was successful and was not associated with an increase in recurrence compared with the usual method (12). Shulman and Smedberg also reported that non-ligation of the hernia sac had no short-term complications, nor did it cause hernia recurrence in the long run (13). In another study, hernias in 60 patients were treated with laparoscopy. Patients were divided into two groups, one underwent hernia sac separation and ligation, and the other group had hernia sac separated and cutted without ligation. There was no significant difference in recurrence or other postoperative complications (14). In general, several studies on a large number of children with UDT who have undergone orchiopexy without the closure of the sac, and with long-term postoperative follow-ups suggested that the nonligation of the sacs does not increase the incidence of hernia in the future. The sac with undescended testicles is, in fact, an unclosed processus vaginalis, not a true hernia sac and the patent processus vaginalis does not necessarily mean hernia, and over forty percent of children have open processus vaginalis, but less than 10% of them will later manifest inguinal hernia (15). Although nonligation method does not increase the incidence of hernia, it reduces the potential risk of damage to spermatic cord, which is secondary to its dissection for separating the sac. It can decrease the probability of testicular atrophy and infertility caused by damage to the spermatic vessels or vas deferens groups. Reducing expenses and consume that are related to suture material though present, were not meaningful. The reduction in operation time although not examined in this study, can be important considering that the most sensitive and time-consuming part of the operation is the separation of the sac from other spermatic cord elements.

Conclusions

The results of this study showed that non-ligation of the hernia sac in orchiopexy in pediatric patients with UDT does not increase the incidence of inguinal hernia; moreover it is a safe method without more

complications. This method can be a good alternative to the method with the ligation of the hernia sac, and can prevent potential complications, such as unwanted ligation of vas deferens, and possible damage to the spermatic vessels. Further studies with larger sample sizes and longer follow-up periods are recommended to confirm the results of this study.

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