Comparison of Orchidopexy in children, with or without Hernia Sac Ligation: One Center Experience

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Abstract

Introduction: One of the common procedures performed by pediatric surgeons around the world is cryptorchidism (undescended testis). The closure of the hernial sac during orchidopexy is regarded to be necessary to prevent the development of a hernia after surgery. Some studies stated that they had adopted the method of orchidopexy without hernia sac ligation at their institution.

The goal of our study is to look back on our experiences and analyze the outcomes of the non-ligation technique of the hernial sac during the orchidopexy.

Methods: From January 2014 to April 2020, a retrospective cross-sectional study was conducted in Taif, Saudi Arabia, to determine the efficiency of orchidopexy without hernial sac ligation in pediatric males aged 9 months to 12 years.

Results: In the study of 99 patients (115 testicles), orchidopexy without sac ligation was performed in 52 patients (61 testicles), while orchidopexy with hernia sac ligation was performed in 47 patients (54 testicles). During the early stages of follow-up, we never encounter complications such as hydrocele or inguinal hernias.

Conclusion: The results of our study validate the feasibility and safety of the hernia sac non-ligation technique during orchidopexy in children since it had no negative effects on early complications, particularly the incidence of hernia or recurrence rate.

Keywords: Undescended Testicles, Orchidopexy, Hernia Sac, Processus Vaginalis, Non-ligation, cryptorchidism .

Introduction

One of the most common congenital abnormalities is cryptorchidism, also known as undescended testis (UDT), affecting the urogenital system and has a 3–4% incidence in full-term infants and a 30% incidence in preterm boys, usually on the right side (1). UDT can be classed as palpable (80 percent) or impalpable (the other 20%) (2).
In most congenital UDTs patients, the testis will descend on its own during the first three months of life. However, UDT will affect 0.8–1.1 percent of boys for the rest of their lives (3). In males, the presence of UDTs is linked to infertility and cancer, so surgical repair at an early stage is considered the hope of reducing these outcomes (4).

UDT, also known as cryptorchidism, is a popular procedure performed by pediatric surgeons globally. The main factors affecting the treatment strategy of UDTs are the patient's age at the time of surgery, as well as the condition of the testis on the other side. Laparoscopy is often used to treat impalpable testis and palpable cases that are difficult to move to the scrotum without causing tension (5, 6).

Herniotomy is a surgical procedure used in conjunction with orchidopexy to close a patent processus vaginalis (PV). The hernial sac is typically believed to be ligated during orchidopexy to prevent the onset of a hernia following surgery (7).

Non-ligation of the hernial sac has no side effects and has a lower recurrence risk during herniotomy in cases of inguinal hernia in children, according to Mohta et al. (8).

Ceccanti et al. conducted a series of research and concluded that the new surgical approach is being adopted by some of their surgeons who are currently not ligating the PV, and he shows that cutting the PV without tying it during the operation of orchidopexy does not increase the chance of developing an inguinal hernia later on (9). He stated that for the previous three years, they had been doing orchidopexy without closure of the hernia sac at their institution.

The study goal is to look back on our experiences and examine the outcomes of the non-ligation technique of the hernial sac during the operation of orchidopexy.

Patients and Methods

Study design: The research was done in the form of a retrospective cross-sectional study among male pediatric patients in one centre in Taif, Saudi Arabia from January 2014 to April 2020 for estimating the efficacy of orchidopexy without hernial sac ligation.

Study population: The study population was pediatric male patients of age group 9 months to 12 years with a diagnosis of UDT. After a thorough explanation of the study and its procedures, the parents of patients who participated in the study gave their informed consent.
Inclusion and exclusion criteria: Male pediatric patients with palpable undescended testis were included in the study. Those patients experiencing surgery for intra-abdominal testis, or redo orchidopexy were excluded from the study.

Procedure:
Baseline investigations were done for all children before carrying out orchidopexy. Conventional inguinal incision technique was used for complete immobilization of testis. The hernia sac was handled by opening and dividing it followed by peeling off the proximal end with the help of dissecting forceps very gently and with the maximum depth possible; this step is completed to ensure that the cord is long enough.

The technique of hernia sac without ligation was developed by some surgeons working in the center, which involves dissection of the hernia sac without ligation and pushing it into deep ring. Patients who have ipsilateral hernia or hydrocele will go through a hernia sac ligation followed by orchidopexy with a typical technique with sub-dartos pouch.

All operated children were monitored regularly for a duration from 1 to 4 years for recurrence and presence of hydrocele or inguinal hernia.

Data collection tools and instruments:
Patient medical records were retrieved and evaluated for demographic characteristics of the patient, details of surgical procedure, and postoperative morbidity rate.

Statistical Analysis
Version 25 of the Statistical Package for Social Science (SPSS) was used to code, enter, and analyze the patient data that was collected retrospectively. Qualitative data values were expressed in numbers (percentage) and the Chi-square X2 test was applied to analyze it. The quantitative data was provided as mean ± standard deviation or median (range) and evaluated using the Mann-Whitney test or t-test, whatever was needed. Significance was defined as a P value of less than 0.05.

Ethical consideration: The study was approved by the hospital's ethics committee. All patient information was kept totally confidential and only used for the sake of study and statistical analysis.

Results

During the study period, 117 patients suffering from UDT underwent orchidopexy; among these 117 patients, 18 patients had a missed medical record. Of the 99 patients (115 testicles) included in the study, orchidopexy without sac ligation was done in 52 patients (61 testicles), whereas orchidopexy with hernia sac ligation was done in 47 patients (54 testicles). The same surgical procedure was used for both sides in the bilateral cases.

Table 1: The age of the patients at the surgery

Parameter	Hernia sac not ligated (n = 52)	Hernia sac ligated (n = 47)	p-value
9 m - 2 y (n=79)	42 (80.8%)	37 (78.8%)	0.1
2 y - 6 y (n= 14)	9 (17.3%)	5 (10.6%)	
6 y - 12 y (n=6)	1 (1.9%)	5 (10.6%)	

m; months, y; years. Values are number (%). A p-value of less than 0.05 is considered statistically significant.

Treatment protocol in this center for management of UDTs surgically is started at the age of 9 months. So, in this study, the selection criteria of age ranged from 9 months to 12 years.

In the non-ligation group, 42 (80.8%) patients were of age 9 months to 2 years, 9 (17.3%) patients were of age between 2 years to 6 years and 1 (1.9%) patient was between 6 years to 12 years. While in the ligation group, 37(78.8%) patients were of age between 9 months to 2 years, 5 (10.6%) patients were aged between 2 years to 6 years and 5 (10.6%) patients were aged between 6 years to 12 years. The difference between the ligation and non-ligation groups was not significant (p=0.1) (Table 1).

Table 2: Demographic Variables

Side of UDT	Hernia sac not ligated (n = 52)	Hernia sac ligated (n = 47)	p-value
Right (n=50)	28 (53.9%)	22 (46.8%)	0.6
Left (n=33)	15 (28.8%)	18 (38.3%)	
Bilateral (n=16)	9 (17.3%)	7 (14.9%)	

UDT; undescended testicles, Values are number (%). A p-value of less than 0.05 is considered statistically significant.

There were 16 bilateral cases, 50 right-sided cases, and 33 left-sided cases out of a total of 99 cases, with no significant difference between the two groups (p=0.6) (Table 2).

Table 3: Clinical and operative Variables

Parameter		Hernia sac not ligated (n=61 testicles)	Hernia sac ligated (n=54 testicles)	p-value
Testis position	Inguinal (n=85)	48 (78.7%)	37 (68.5%)	0.2
	Prescrotal (n=30)	13 (21.3%)	17 (31.5%)	
Operative time (min)		39 (±15)	43 (±20)	0.2

Values are number (%) & (mean±SD). A p-value of less than 0.05 is considered statistically significant.

When testis position was evaluated under anesthesia before surgery, we found that 48 (78.7%) of the testicles were canalicular and 13 (21.3%) testicles were prescrotal in the group without ligation. While in the other group with ligation, 37 (68.5%) of the testicles were canalicular and 17 (31.5%) testicles were prescrotal. Between the two groups, there was no significant difference (p=0.2) (Table 3).

The average operation time for patients undergoing sac ligation was 39 (±15) and for patients without sac ligation was 43 (±20) which showed that the technique without ligation of the sac took less time. However, between the two groups, there was no significant difference (p=0.2) (Table 3).

Fortunately, there were no complications during the operations. One of the patients in the group who had the sac ligated had an infection in the surgical area immediately after surgery and was cured completely after taking antibiotic treatment before discharge from the hospital.

Patients were monitored postoperatively from 1 year to 4.5 years, as we started the orchidopexy (without ligation of the sac) surgical technique in our institution in January 2017. In the group without sac ligation, the average period of follow-up was 32 months (range, 12 – 52 months) and in the group of patients who had their sacs ligated, the median survival time was 50 months (range, 12–88 months) (Table 4).

During the follow-up duration, five patients in the group did not have their sacs ligated and three patients in the sac ligation group were unable to comply with follow-up. Of the remaining 91 patients who properly complied with follow-up (47 with non-ligation and 44 with sac ligation), 104 testicles were operated on (54 cases in the non-ligation group and 50 cases in the sac ligation group) (Table 4).

Table 4: Postoperative follow-up

Parameter	Hernia sac not ligated	Hernia sac ligated	p-value
Follow-up (months)	32 (12–52)	50(12–88)	0.0001
Total UDT available for follow up	54 (88.5%)	50 (92.6%)	0.8
Testis at the scrotal inlet	1 (1.8%)	2 (4%)	0.4
Ascending of the testicles	2 (3.7%)	1 (2%)	0.6
Hernia/ hydrocele	0	0	0.9
Testicular atrophy	0	1 (2%)	0.4

UDT; undescended testicles, Values are number (%) & median (range). A p-value of less than 0.05 is considered statistically significant.

Clinical evaluation during follows up of the patients showed that 51 testicles from the group without sac ligation and 47 testicles from the sac ligation group were located at the scrotum. One testicle (1.8%) from the without ligation group and two testicles (4%) from the ligation group were palpable at the scrotal inlet. Between the two groups, there was no significant difference (p = 0.4). While two testicles (3.7%) from the group without ligation and one testicle (2%) from the ligation group were palpable in the inguinal canal, there was no significant difference between the two groups (p =0.6) (Table 4).

Redo orchidopexy was performed on three testicles present in the inguinal canal, The operational report found that none of these cases had a patent PV, hence no ligation was required. Testicular atrophy during the follow-up period was found only in one testicle (2%) from the ligation group which was further confirmed by ultrasonography.
In the present study, no other complications such as hydrocele or inguinal hernias were found during the early follow-up period.

Discussion

Bevan performed a study in 1899 and for the first time, documented the typical orchidopexy procedure, which included mobilization of the testis and spermatic vessels, as well as hernia sac ligation, and testicular immobilization in a sub-dartos pouch in the ipsilateral hemiscrotum. Hernia sac has been normally addressed by precisely separating it from the cord structures followed by high ligation with suture during orchidopexy. This technique is done to ensure that the cord is long enough to move the testicles down to their proper position in the scrotum and to avoid the formation of a hernia after surgery (10).

Obviously the most important factor for bringing down the testicles to their normal position in the scrotum is the testicular vessel's length. So, by adopting our technique of peeling off the peritoneum as much as possible we obtained an extra length of the testicular vessels successfully without ligating the sac.

Indeed all major published guidelines recommended that orchidopexy should be done between 6 months and 12 months of patient age (11, 12).

In most of the studies, orchidopexy was performed before 12 months of patient age, and according to the guidelines recommendation, that orchidopexy should be done earlier than 18 months of life (13-16).

Conventionally, PV ligation during orchidopexy is due to the hypothesis that the palpable UDT is linked to a patent PV, which can lead to inguinal hernias. However, the invention of the laparoscopic technique has made this belief questionable (9).

Handa et al. discovered that the internal ring does not need to be closed during laparoscopic orchidopexy. On the other hand, the presence of a raw peritoneum and the pulled-through spermatic cord, together with the mobilization of UDTs, can promote a successful internal inguinal ring closure (17).

In a study performed by Schier F. in children when a laparoscopic inguinal hernia repair was done, the peritoneum was incised and the hernia sac was removed, there was no difference in suturing the internal ring (18). Also, an open internal inguinal ring, he said, should not be mistaken for an inguinal hernia (19).

In the event of a child with an inguinal hernia, non-ligation of the hernia sac during herniotomy in children has no negative effects on the early development of complications or the rate of recurrence, according to Mohtaet al. The research was based on the observation that metamorphosis of in situ mesodermal cells closes the peritoneal defect (8).

It should be noted that the peritoneum heals quickly, which leads the internal ring to close completely. This is confirmed by the fact that many surgeons consider that closing the hernial sac during herniotomy is unnecessary (8, 20-22). In their investigation, Shulman et al. concluded that the closure of the hernia sac during adult herniorrhaphy was determined to be unnecessary (20).

Kumari et al (10) recently published a study that used a similar technique. They also concluded that the closure of the hernia sac during adult herniorrhaphy was determined to be unnecessary.

In situations of hernia alone or hernia with UDT, hernia sac ligation is not required according to various numbers of recent research (8, 10, 21, 22). This evidence suggests and supports that the hernia sac could be left without ligation during inguinal orchidopexy.

In other research on the same topic, cases follow-up lasted anywhere from 4 to 12 months (23) and 3 years (9), whereas in the current study, the median follow-up period is 12 to 52 months. This longer period in the follow-up made us more sure about the complications and as noticed in the current study, there was no hernia or hydrocele developed during the follow-up.

In a study of factors impacting recurrence after inguinal hernia repair surgery in children done by Grosfeld et al (24), found that the majority of cases (76%) would recur within two years of the first operation.

Obviously, the procedure could be advantageous in terms of time-saving, surgery cost minimization, minimal anesthetic complications, and unnecessary stress of drugs and surgery (25).

It also prevents any unintended harm to nearby tissues, that could occur during the ligation of the thin sacs, such as the cord and spermatic vessels (26).

Non-ligating the PV may also help to reduce suture-related problems such as abscess development and persistent granuloma. In fact, there are reported cases of children who have developed late paravesical abscesses following inguinal hernia ligation, which has been linked to the use of silk sutures to transfix the hernial sac (27).

Conclusion

The results of our study validated the safety and validity of the hernia sac non-ligation technique during orchidopexy in children since it has no negative impact on early complications, particularly the incidence of hernia or recurrence rate.

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