



## The Importance of Surgical Timing in Inguinoscrotal Surgical Pathologies

### İnguinoskrotal Cerrahi Patolojilerde Cerrahi Zamanlamannın Önemi


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#### ABSTRACT

**Aim:** Various inguinal pathologies can occurred if the processus vaginalis cannot closed fully. The aim of this study was to evaluate all patients who underwent inguinoscrotal surgery operations between 2011 and 2018 in our clinic, in terms of age, gender and accompanying with another operation, retrospectively.

**Material and Methods:** In this study, records of 807 patients who were performed inguinal surgery operations including 558 inguinal hernia repair, 184 orchiopexy and 65 hydroselectomy between 2011 and 2018 at Duzce University, Faculty of Medicine, Pediatric Surgery Department were evaluated retrospectively.

**Results:** Mean age of the 558 patients who underwent inguinal hernia operation was 3.0±3.6 years, and 288 (51.6%) patients were older than 2 years of age. Of the patients who performed inguinal hernia operation, 411 (73.7%) were male and 147 (26.3%) were female. There was a statistically significant difference in terms of inguinal hernia repair side according to gender (p=0.038), and left inguinal hernia repair rate in females was detected higher than in males. Mean age of the 184 patients who performed orchiopexy operation was 4.0±3.4 years old, and only 46 patients (25.0%) who underwent orchiopexy were younger than 2 years of age. Mean age of the 65 patients who performed hydrocele operation was 4.6±4.1 years old.

**Conclusion:** According to the results of this study, it is seen that the community does not have enough information about the right operation time of inguinal hernia and undescended testis, and that the society should be informed about this issue.

**Keywords:** Inguinal hernia; cryptorchidism; testicular hydrocele; infertility.

#### ÖZ

**Amaç:** Processus vaginalisin tam olarak kapanmaması durumunda çeşitli inguinal patolojiler ortaya çıkabilir. Bu çalışmanın amacı kliniğimizde 2011 ve 2018 yılları arasında inguinoskrotal cerrahi operasyonu yapılmış olan tüm hastaları geriye dönük olarak yaş, cinsiyet ve başka bir operasyonla birliktelik durumu açısından değerlendirmektir.

**Gereç ve Yöntemler:** Bu çalışmada Düzce Üniversitesi Tıp Fakültesi Çocuk Cerrahisi kliniğinde 2011 ve 2018 yılları arasında 558 inguinal herni onarımı, 184 orşiopeksi ve 65 hidroselectomi olmak üzere inguinal cerrahi operasyonu yapılmış olan toplam 807 hastanın kayıtları geriye dönük olarak incelendi.

**Bulgular:** İnguinal herni operasyonu yapılmış olan 558 hastanın ortalama yaşı 3,0±3,6 yıl olup bu hastaların 288'i (%51,6) 2 yaşından daha büyük idi. İnguinal herni operasyonu yapılmış olan hastaların 411'i (%73,7) erkek ve 147'si (%26,3) ise kız idi. Cinsiyete göre inguinal herni onarım yönü bakımından istatistiksel olarak anlamlı bir farklılık vardı (p=0,038) ve kızlarda sol inguinal herni onarım oranının erkeklere göre daha yüksek olduğu tespit edildi. Orşiopeksi operasyonu yapılmış olan 184 hastanın ortalama yaşı 4,0±3,4 yıl idi ve orşiopeksi operasyonu yapılmış olan hastaların sadece 46'sı (%25,0) 2 yaşından daha küçük idi. Hidrosel operasyonu yapılmış olan 65 hastanın ortalama yaşı ise 4,6±4,1 yıl idi.

**Sonuç:** Bu çalışmanın sonuçlarına göre, toplumun inguinal herni ve inmemiş testisin doğru operasyon zamanı hakkında yeterli düzeyde bilgi sahibi olmadığı ve toplumun bu konuda bilgilendirilmesi gerektiği görülmektedir.

**Anahtar kelimeler:** İnguinal herni; kriptorşidizm; testiküler hidrozel; infertilite.

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## INTRODUCTION

A peritoneal extension which begins to occur in the male fetus at the third month of pregnancy goes down the scrotum through the inguinal ring. This peritoneal extension, called the processus vaginalis; normally disappears as the obliteration of in the last trimester of pregnancy after the testes to fall to scrotum. In girls, the same structure enters the inguinal canal following the ligamentum teres uteri and named as Nuck diverticulum. If the processus vaginalis remains fully or partially open, it therefore forms the basis of various inguinal pathologies (1,2).

Clinical diagnosis of inguinal hernia is usually easy. It is possible to identify with anamnesis only. Occurrence of an inguinal or scrotal swelling from time to time, and suppression of it or loss of it by lying on its back is sufficient for the diagnosis of hernia. Treatment of inguinal hernia in children, morbidity and mortality is very low and technically quick and easy surgical procedure. However, delaying the treatment for various reasons may cause hernia suffocation, the most important and dangerous complication of hernia. Therefore; if the child does not have a condition that prevents him from taking anesthesia, such as an upper respiratory tract infection, the procedure should be performed as soon as possible; not urgent but without waiting (3). The most feared complication of pediatric inguinal hernia is incarceration. The smaller the child's age and the size of the hernia, the greater the risk of incarceration (2,3).

In hydrocele, instead of the organ the only liquid enter inside the processus vaginalis. Since there are no intra-abdominal organs, there is no risk of incarceration. If the hydrocele sac is related to peritoneum, it is called communicating hydrocele, but not related with the peritoneum, it is called non-communicating hydrocele. In the anamnesis there is scrotal mass since birth and on physical examination, a cystic mass is palpated in the scrotum. In the pediatric age group, large parts of the hydrosels are the communicating hydrocele type. A special type of hydrocele; of the proximal and distal parts of the processus vaginalis to be obliterated. On physical examination, 1-2 cm cystic mass is palpated in the inguinal canal. When the ipsilateral testis is pulled down, this mass moves downward together with testis and this condition is called cord hydrocele (cord cyst).

Cryptorchidism may be due to one of four reasons; anorchidia, ectopic testis, retractile testis and undescended testis. Cremasteric reflex is more active in children than in adults. This reflex causes the testis to be pulled up by the stimulation or cold effect of the perineum. In the case of retractile testis, the testis cannot be found in the scrotum. However, testis can be easily lowered to its normal position from high scrotal position in the superficial inguinal pouch or in inguinal canal. There is no indication for surgical treatment even after retractile testis that escaped again after a while. It improves spontaneously until adolescence (4).

Normally, the testes descend to the scrotum and are present in the scrotum for life. Intraabdominal testes in the fetus enter the inguinal canal in the intrauterine 7th month and settle into the scrotum near the birth. This migration of the testis at one end of the testis at the other end adhering to the scrotum of the gubernaculum contracted shrink is

thought to be effective. In 30% of premature babies and in about 3% of babies born at term, the testes have not yet reached the scrotum. However, when the same children were re-examined at the end of the first year, it was seen that 5% of premature infants and only 0.5% of those who were born at term of one or two sided testis were still not fall (5). Diagnosis of undescended testis can be made at the earliest 3 months of age. Embryologically, the undescended testis is more common on the right because the left testis has already been failed to the scrotum. Up to 10% of all undescended testes are bilateral.

The following points are considered in the differential diagnosis of retractile testis with undescended testis. The testes can be lowered to the bottom of the scrotum without difficulty. After the examination, the testis does not immediately retract and remains in the scrotum for a while. The testis was sometimes seen in the scrotum by the family. The testis is of normal size and the hemiscrotum on the same side is fully developed. Care should be taken in the ambient and hand temperature during the examination. Follow-up is recommended in cases that cannot be clear diagnosed. In cases where one or both of the testes cannot be palpated in the scrotum; the retractile testis and ectopic testis must be distinction from the undescended testis using the above-mentioned features (3). Anorchidia is not possible to distinguish by physical examination. Because of the need for surgical exploration for definitive diagnosis of anorchidia, there is no condition for differential diagnosis with undescended testis before surgery.

The aim of this study was to retrospectively evaluate age, gender and accompanying operation data of patients with surgical pathologies of inguinoscrotal region (inguinal hernia, undescended testis and hydrocele) who operated in Duzce University Faculty of Medicine, Department of Pediatric Surgery between 2011 and 2018, and to show the severity of the undescended testis operation timing with the possibility of causing infertility.

## MATERIAL AND METHODS

In this study, 807 patients who performed inguinal hernia (n=558), undescended testis (n=184) or hydrocele (n=65) operations between 2011 and 2018 in Duzce University, Faculty of Medicine, Department of Pediatric Surgery were included. Patients with incomplete file information and operated for other reasons were excluded. Ethical approval was obtained from the local ethics committee of Duzce University Medical Faculty (15.05.2019, 2019/101). Operations was performed by three surgeons. The age of the patient, the gender of the inguinal hernia patient and presence of accompanying surgical pathology (circumcision, etc.) were investigated retrospectively. Informed consent was obtained from all patients. Patients were generally examined by anesthesia specialist with hemogram and coagulation (Protrombin Time; PT, International Normalized Ratio; INR, Parsiyel Tromboplastin Time; aPTT) results one day before the operation and American Society of Anesthesiologists (ASA) score and anesthesia risks were determined. Patients who received anesthesia approval were brought by families with a minimum of 4 hours fasting period on the day of operation. After the vascular access was opened in the service, his mother and father were brought to the

operating room to ensure that the child is not afraid. In the operating room door after premedication with (iv) midazolam, the child was taken to the operating room while he was in a quiet state. After a period of anesthesia by the child followed in the wake-up department followed and then he was taken to the service with his father and his mother. Oral feeding was started at 2-3 hours postoperatively and he was discharged on the same day when oral tolerance was good.

### Statistical Analysis

Statistical analyses were performed using IBM SPSS® Statistics for Windows®, version 23.0 (IBM Corp., Armonk, NY, USA). Pearson chi-square test with post hoc Bonferroni method was used to analyze categorical data. Continuous data were expressed as mean±standard deviation (minimum, maximum), and categorical data were summarized as frequency and percentage. Statistical significance level was considered as 0.05.

### RESULTS

Of the 558 patients who performed inguinal hernia operation, 411 (73.7%) were male and 147 (26.3%) were female. The mean age of the patients who performed inguinal hernia operation was 3.0±3.6 (range, 0-17) years. Of the patients who performed inguinal hernia operation, 270 (48.4%) were <2 years of age (Table 1). Three hundred and thirty-nine patients (60.8%) had no additional surgical pathology. The most common surgical additional operation was circumcision (n=212, 38.0%). Appendectomy was performed in 7 patients (1.3%) during the inguinal hernia operation because of they had Amyand's hernia. Of the 558 patients undergone inguinal hernia operation, 325 (58.2%) had right inguinal hernia repair, 167 (29.9%) had left, and 66 (11.8%) had bilateral (Table 2). Of the 411 male patients, 248 (60.3%) were performed right inguinal hernia repair, 111 (27.0%) were left and 52 (12.7%) were bilateral. And of the 147 female patients, 77 (52.4%) were performed right inguinal hernia repair, 56 (38.1%) were left and 14 (9.5%) were bilateral. There was a statistically significant difference between males and females according to the operation side (p=0.038). It was found that the left inguinal hernia rate was higher in females, and there was no statistically significant difference between males and females both in right and bilateral inguinal hernia (Table 3).

The mean age of the 184 patients who performed orchiopexy operation was 4.0±3.4 years old (range, 0-16). This age was much higher than the 2-year-old age at which the orchiopexy operation was performed at the latest to avoid the development of infertility. Only 46 patients (25.0%) who performed orchiopexy operation were <2 years of age (Table 1). There was no additional surgical pathology in 80 patients (43.5%) who performed orchiopexy operation. The most common surgical additional operation was circumcision (n=100, 54.3%). Hypospadias repair was performed in 4 (2.2%) patients who performed orchiopexy operation. Twelve (6.5%) of the orchiopexy operations were performed laparoscopically with the diagnosis of nonpalpable testis. Of the patients, 88 (47.8%) had right orchiopexy, while 50 (27.2%) had left and 46 (25.0%) had bilateral (Table 2).

The mean age of the 65 patients who performed hydrocele operation was 4.6±4.1 years (range, 0-17). Thirty three

**Table 1.** Inguinoscrotal surgical pathologies by age

Age	Inguinal Hernia (n=558)	Undescended Testis (n=184)	Hydrocele (n=65)
≤2	270 (%48.4)	46 (%25.0)	9 (%13.8)
3-4	106 (%19.0)	63 (%34.2)	29 (%44.6)
5-6	73 (%13.1)	31 (%16.8)	12 (%18.5)
7-8	41 (%7.3)	14 (%7.7)	4 (%6.2)
>8	68 (%12.2)	30 (%16.3)	11 (%16.9)

**Table 2.** Inguinoscrotal surgical pathologies by side

Side	Inguinal Hernia (n=558)	Undescended Testis (n=184)	Hydrocele (n=65)
Right	325 (%58.2)	88 (%47.8)	39 (%60.0)
Left	167 (%29.9)	50 (%27.2)	26 (%40.0)
Bilateral	66 (%11.8)	46 (%25.0)	0 (%0.0)

**Table 3.** Comparison of operation side by gender

Side	Inguinal Hernia		P
	Male (n=411)	Female (n=147)	
Right	248 (%60.3) <sup>a</sup>	77 (%52.4) <sup>a</sup>	<b>0.038</b>
Left	111 (%27.0) <sup>a</sup>	56 (%38.1) <sup>b</sup>	
Bilateral	52 (%12.7) <sup>a</sup>	14 (%9.5) <sup>a</sup>	

(50.8%) patients performed hydrocele surgery had no additional surgical pathology. The circumcision as most common surgical additional operation was performed in 32 (49.2%) patients. Right hydrocele repair was performed in 39 (60.0%) patients and left hydrocele repair was performed in 26 (40.0%) patients (Table 2).

### DISCUSSION

The inguinal hernia occurs when the distal portion of the processus vaginalis closes and the proximal portion of the inguinal canal remains open; the small intestines in both boys and girls, and ovaries in girls can entered into the sac and it is characterized by a swelling in the inguinal region. When the processus vaginalis remains completely open, the organs underlie to the scrotum and named as scrotal hernias. In the pediatric age group, hernias are almost always of the indirect type unlike adults. Of inguinal hernias, 60% are seen in the right, 30% in the left and 10% in the bilateral. The incidence of normal children is 2% and gradually decreases with age. It is 10 times more common in boys than girls (2).

According to our current study, of the 558 patients with inguinal hernia operation, 411 (73.7%) were male and 147 (26.3%) were female. This was inconsistent with the classical knowledge that indirect inguinal hernias were 10 times more common in boys than in girls. The mean age of patients performed inguinal hernia operation was 3.0±3.6

years. Two hundred and eighty-eighth (51.6%) patients who performed inguinal hernia were >2 years of age. In order to avoid incarceration, the incidence of inguinal hernia is the most feared and smaller as the age decreases but this contradicted with "inguinal hernia operations should be done as soon as possible" knowledge (3). Appendectomy was performed in 7 (1.3%) patients during the inguinal hernia operation because of they had Amyand's hernia (6). Of the 147 female patients, 77 (52.4%) were performed right inguinal hernia repair, while 56 (38.1%) were left and 14 (9.5%) were bilateral.

It is unethical to perform hydrocele surgery within the first year because of the possibility that the hydrocele may recover spontaneously (1). In surgery, the drainage of fluid in the pouch and the interruption of the peritoneum with high ligation, as in the inguinal hernia repair are sufficient. According to our current study, the mean age of the 65 patients who performed hydrocele operation was 4.6±4.1 years.

Cryptorchidism is that one or both of the testis are not present in the scrotum (non-palpable testis). Why do testes need to be lowered to the scrotum?

Fertility protection; normally, intrascrotal heat is about 2°C below the body temperature. Continuous body temperature remaining undescended testis; it has been shown experimentally that serious disorders occur in the seminiferous tubules. Due to the fact that these disorders occurred after 5 years of age in light microscopy studies; until the 1980s, it was believed that the surgery should be done at the age of 5 years. However, in the ultrastructural investigations possible by the use of electron microscopy; in fact, it shows that spermatogenesis disorders began to appear much earlier, around 2 years of age (7-9). According to our current study; only 46 (25.0%) patients who performed orchiopexy operation were <2 years of age. This showed that these patients were at risk for infertility in the future and that families were still unaware of the fact that the undescended testis operation had to be operated by no later than 2 years of age. It is very clear that the society should be informed more about the undescended testis operations should be done without delay and on time.

Prevention of malignancy; studies in men with testicular tumors have shown that 10% of them develop in undescended testes. In patients with undescended testis, the risk of developing testicular tumors is 40 times higher than in the normal population (10). The tumors that develop in undescended testes are of germ cell origin, most of them being seminomas (11).

Trauma and torsion protection; torsion is easier in intraabdominal undescended testes. Testicular torsion should also be included in possible diagnoses in children who have abdominal pain and who are found to have undescended testis. A testis in the inguinal canal can be more easily traumatized from the outside (12).

Surgical treatment is essential in undescended testis. The surgery should be performed after the end of the first age, before the second age, around 1.5 years old (13). The aim of surgical treatment is to down the testis to normal scrotal position in one or sometimes two sessions. When faced with dysgenetic and atrophic testicular tissue, it is more appropriate to perform orchiectomy instead of orchiopexy (14).

According to our current study; the mean age of the 184 patients who performed orchiopexy operation was 4.0±3.4 years. This age was much higher than the 2-year-old age at which the orchiopexy operation was performed at the latest to avoid the development of infertility. Of the patients, 88 (47.8%) had right orchiopexy, 50 (27.2%) had left, and 46 (25.0%) had bilateral.

According to our current study; in inguinal hernia, undescended testis and hydrocele operations in the inguinoscrotal surgical pathologies group, the most common additional operation was circumcision performed in 344 (42.6%) patients. When inguinal hernia, undescended testis and hydrocele in inguinoscrotal surgical pathologies group were compared in terms of repair side of pathology, there was a statistically significant difference because of the left inguinal hernia was more common in girls and the hydrocele operation was not performed bilaterally in any patient.

## CONCLUSION

This study shows that the community is not well informed about the treatment of inguinal hernia and undescended testis is not possible without the choice of surgical treatment and the correct time of operation and that the community should be informed about these issues.

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