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Research Article

Evaluation and Treatment of Pediatric Patients with Undescended Testes at The Clinic for Children's Surgery Sarajevo Over a Period Of 10 Years

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Abstract:

Introduction: Undescended testis (cryptorchidism) is one of the most common congenital anomalies in male children, with a prevalence of approximately 3–5% in full-term newborns.If not treated, it can lead to infertility, testicular atrophy, and an increased risk of malignancy.The aim of this study was to analyze the frequency, diagnosis, and treatment of undescended testis over a ten-year period (2015–2024), with special attention to surgical methods, postoperative complications, and hospitalization duration.

Material and Methods: This research was designed as a retrospective, descriptive clinical-epidemiological study. The data were collected from hospital records of male patients diagnosed with cryptorchidism, retentio testis, and ectopic testis. All data were organized by year and analyzed statistically. Descriptive statistical methods were applied to determine frequency, mean values, and ranges for key variables, including age at surgery, type of surgery performed (orchidopexy, orchidectomy, laparoscopy), testicular position (inguinal or intra-abdominal), and occurrence of complications.

Results: The most common diagnosis was retentio testis, followed by cryptorchidism and ectopic testis. Orchidopexy was the most frequently performed procedure, with a predominance of inguinal testis positions. The average patient age at surgery ranged between 1 and 3 years, with a few exceptions. The average length of hospital stay was two days, and complications were rare and mostly minor. A significant drop in the number of cases was recorded in 2020, likely due to reduced surgical activity during the COVID-19 pandemic.

Conclusions: The results indicate an overall alignment with modern guidelines regarding the timing and type of treatment, with early interventions showing positive clinical outcomes. This study emphasizes the importance of timely diagnosis and adequate surgical management of undescended testes in preventing long-term reproductive consequences.

keywords: cryptorchidism; orchidopexy; retained testis; ectopic testis; surgical management of undescended testes

Introduction

Undescended testis is one of the most common urological anomalies in the pediatric population, with a frequency of approximately 3-5% in newborn boys, with the number decreasing to about 1% at the age of one year due to spontaneous testicular descent. [1,2] This anomaly occurs when the testicle does not migrate from the abdominal cavity to the scrotum during fetal development, which may be the result of hormonal, mechanical or genetic factors. [3,4] In most cases, it is detected in the first year of life, but it can also be diagnosed later, during systematic examinations or at the onset of the first symptoms. Three basic forms of this anomaly are distinguished: Kryptorchismus (testis is located on the descent path; hidden testis), Retentio testis (testis retention along the normal descent path), and Ectopio testis (testis is located outside the normal anatomical descent path). In addition to a clear anatomical classification, these forms also differ in their treatment approach and long-term outcomes. The most common and most effective method of therapy is surgical descent of the testicle into the scrotum – orchidopexy (lat. orchidopexio), which, according to modern guidelines, is recommended to be performed between the 6th and 12th months of life

[5] in order to reduce the risk of infertility and malignant diseases. Undescended testicle is of exceptional clinical importance because, if untreated, it can lead to serious consequences such as testicular atrophy, reduced fertility, increased risk of torsion, trauma, as well as an increased risk of developing testicular cancer. Timely diagnosis and therapeutic approach are crucial for preserving reproductive function and preventing complications. [6] Modern recommendations of the American Urological Association (AUA) [7] and the European Society of Pediatric Urology (ESPU) [8] emphasize the importance of early detection and treatment. Diagnosis is based on clinical examination, and in the case of non-palpable testicles, ultrasound and laparoscopy [9] are used as diagnostic and possibly therapeutic methods. This paper explores ten years of experience with the diagnosis and treatment of undescended testicles at the clinical level, analyzing the frequency of diagnoses, applied surgical procedures, average age of patients at surgery, postoperative outcomes and complications. The aim is to provide insight into treatment trends and assess compliance with modern guidelines. Undescended testis remains a clinical challenge despite the existence of clear guidelines for diagnosis and treatment, especially in the context of timeliness of intervention and achieving optimal reproductive outcomes.

Are the treatments of undescended testicles in the analyzed population consistent with the recommended guidelines and what are the clinical outcomes in terms of complications, age at intervention and length of hospitalization?

Aim of study:

Aim of study was to analyze the frequency, types of diagnoses, surgical treatments, complications, and other clinical characteristics in pediatric patients with undescended testicles, hospitalized in the period from 2015 to 2024.

Specific objectives:

-To determine the frequency of individual diagnoses of undescended testicles (cryptorchism, testicular retention, testicular ectopia) in the specified period.

-To analyze the most commonly used surgical methods (orchidopexy, orchidectomy, laparoscopy) and their association with the type of diagnosis.

-To determine the average age of patients at the time of surgery, as well as the average length of hospitalization.

-To examine annual trends in diagnoses, surgeries, and postoperative complications.

-To examine the position of the testicle (inguinal, intra-abdominal) and its association with the type of surgery and complications.

Hypothesis

Research hypothesis: During the analyzed period, testicular retention is the most common diagnosis of undescended testicles, while orchidopexy is the most common surgical treatment method. Most patients have an inguinal position of the testicles and do not have postoperative complications.

Materials And Methods

This final paper is designed as a systematic literature review (review part) with the addition of a clinical-epidemiological retrospective descriptive study based on the processing of data from patients with a diagnosis of undescended testicles, treated at the Clinic for Pediatric Surgery of the Clinical Center of the University of Sarajevo in the period from January 2015 to December 2024. The data were collected from available medical documentation. The aim of the study was to analyze the frequency of different forms of undescended testicles, types of surgeries performed, length of hospitalization, presence of postoperative complications, and the relationship of the age of patients with the above parameters. The study included all male patients aged 0 to 17 years who were diagnosed with one of the three diagnoses in the period from 2015 to 2024: Kryptorchismus (unilateral or bilateral), Retentio testis (unilateral or bilateral), Ectopio testis (unilateral or bilateral), and who underwent surgical intervention: Orchidopexia (standard Schoemaker, Böhn, Fonklsrud, transscrotalis, Torek method), Orchidectomia (for atrophic testicles, most often intra-abdominal localization or Laparascopia (applied for impalpable testicles) at KCUS. The total number of subjects is 804, which includes all cases documented in the institution during a ten-year period. The study included all male patients aged 0 to 17 years, and cases with incomplete documentation, i.e. those lacking basic data necessary for analysis, and patients with diagnosed congenital malformations that may affect the course of treatment. Sampling was complete (total sampling of all patients who met the criteria in the defined period). In addition to the above types of diagnoses and surgical procedures, the patient's age at the time of surgery, the position of the testicles preoperatively (inguinal or intra-abdominal localization), the length of hospitalization (expressed in days), and whether complications were present (fever, infections, allergic reaction, cough) were recorded for each patient. All collected data were grouped by years of treatment (from 2015 to 2024). After that, all descriptive variables were recoded into numerical form, in order to enable statistical data processing.

For descriptive analysis, the following functions were used: MODE, to determine the most frequently occurring value (frequency), AVERAGE, to calculate the mean value (e.g. patient age), COUNTIF to count cases by criteria (diagnoses, surgeries, complications).

For each The following variables were analyzed:

- Diagnosis: total number and frequency by type, by year,

- Type of surgery: total number and frequency by type, by year,

- Age of patients: mean value, minimum and maximum value, frequency, by year,

- Testicular position: number of cases by type (inguinal/intra-abdominal), by year,

- Complications: number and frequency of postoperative complications,

- Length of hospitalization: analysis of the frequency of hospital stay.

For the purpose of further analysis, tabular and graphical representations of the relationship between variables were created, as follows:

- Year of treatment vs. Type of diagnosis,

- Year of treatment vs. Type of surgery,

- Year of treatment vs. Testicular position,

- Year of treatment vs. Complications,

- Year of treatment vs. Length of hospitalization.

The statistical analysis was descriptive. It is important to note that data were not fully available for all patients, which is why some variables were partially analyzed. Incomplete or inconsistent medical documentation prevented complete processing for each the case. However, the available data were analyzed to the greatest extent and provided a representative insight into the characteristics of the population covered by the study.

The results of statistical processing of data collected over a ten-year period (2015-2024) in accordance with the set research objectives. All results are presented in tabular and graphical form, in a format that facilitates interpretation and comparison.At the beginning, a summary of the collected data is presented via an aggregated table, while the results are presented in detail in relation to variables by year.

Results

Year	Diagnosis	Age in years	Surgery	Lenght of hospitalis.	Complication	Testical position
2015	Retentio testis	3	Orchidopexio	8	No	inguinalis
2016	Retentio testis	6	Orchidopexio	2	No	inguinalis
2017	Retentio testis	3	Orchidopexio	3	No	inguinalis
2018	Retentio testis	2	Orchidopexio	2	No	inguinalis
2019	Retentio testis	2	Orchidopexio	2	No	inguinalis
2020	Retentio testis	1	Orchidopexio	2	No	inguinalis
2021	Retentio testis	2	Orchidopexio	2	No	inguinalis
2022	Retentio testis	3	Orchidopexio	2	No	inguinalis
2023	Retentio testis	1	Orchidopexio	2	No	inguinalis
2024	Retentio testis	9	Orchidopexio	2	No	inguinalis

Table 1: Tabelar presentation of the frequencies of variables observed over the ten-year period (2015-2024).

Based on the analysis of the collected data (diagram 1), it was found that the most common diagnosis during the entire observed period was Retentio testis, followed by Kryptorchismus and Ectopio testis. The largest number of diagnoses was recorded in 2015 (a total of 109 cases), while the smallest number was in 2020. This decrease in the number of recorded cases during 2020 can be explained by the SARS-CoV-2 virus (COVID-19) pandemic, which significantly affected the reduction in the volume of planned and elective surgeries, as well as general access to health services in that year.

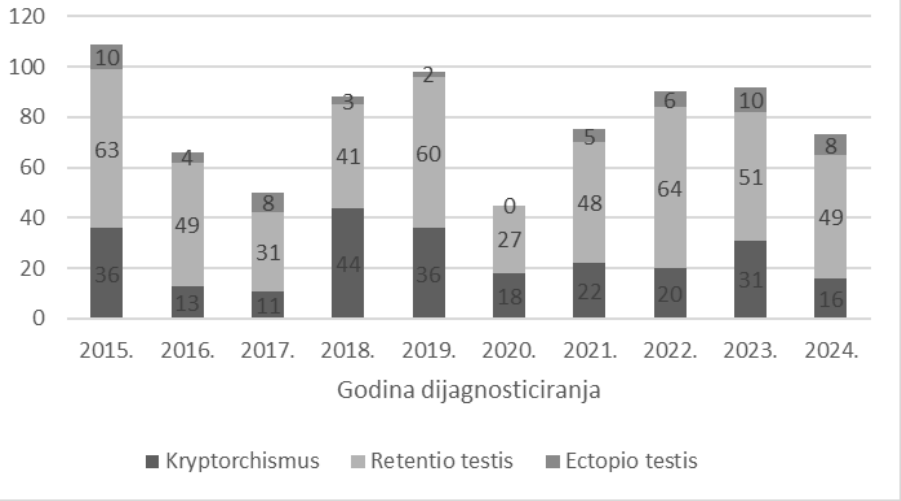

Diagram 1: Frequency of certain diagnoses by year (2015–2024).

The most common operation during the observed period was orchidopexy (lat. orchidopexio) (diagram 2). Orchidectomy (lat. orchidectomio) and laparoscopic treatment approach (lat. laparascopio) were performed less frequently, which were recorded in a minimal number of cases and mainly in years with a higher number of total interventions (2015, 2018-2019).

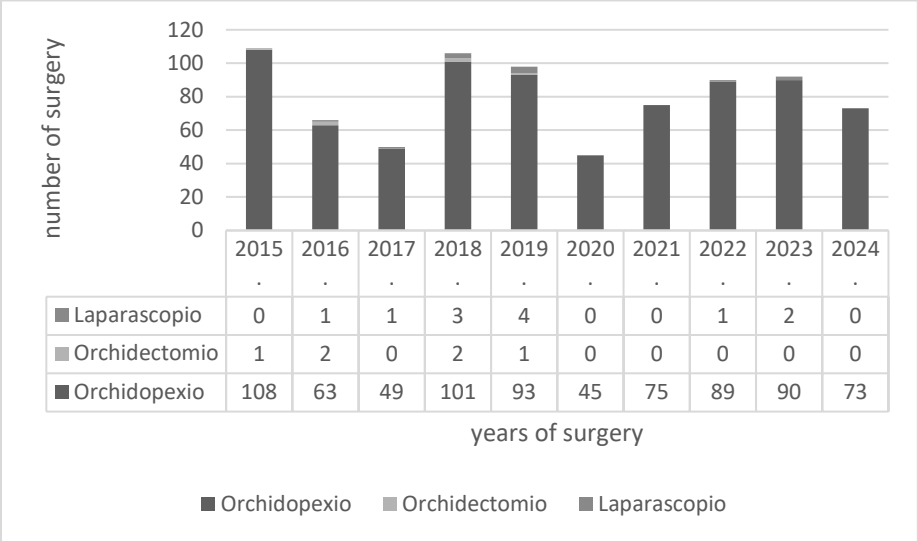

Diagram 2: Distribution of types of operations by year (2015–2024).

Analyzing the age of patients during the period 2015-2024 (diagram 3), a slight decrease in the average age can be observed during most years, with the exception of 2016 and 2024, when values above the average were recorded (6 and 9 years). It has been established that most operations are performed in early childhood, most often between the ages of 1 and 3. The average age of the patients during the entire period was around 2.5 years.

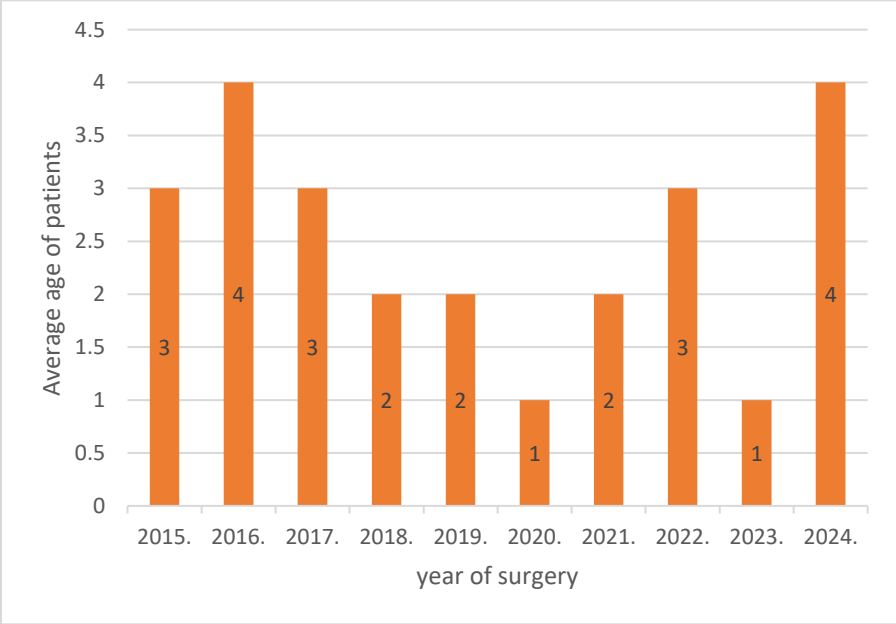

Diagram 3: Average age of patients by year (2015–2024).

The average length of hospitalization (diagram 4) during all years was about 2 days. Year 2015. omitted due to lack of adequate documentation.

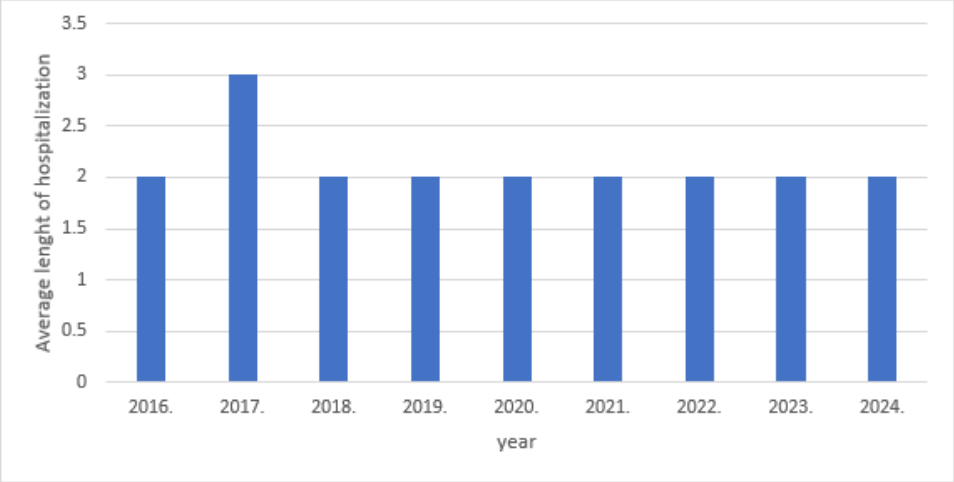

Diagram 4: Average length of hospitalization in the treatment of undescended testicles by year (2015–2024) *2015 is not included due to lack of documentation.

As shown in diagram 5, the largest number of testicles were in the inguinal position. In a few cases (most in 2019), the testicle was in the intra-abdominal position. Lack of documentation was noted only in 2015 and 2016.

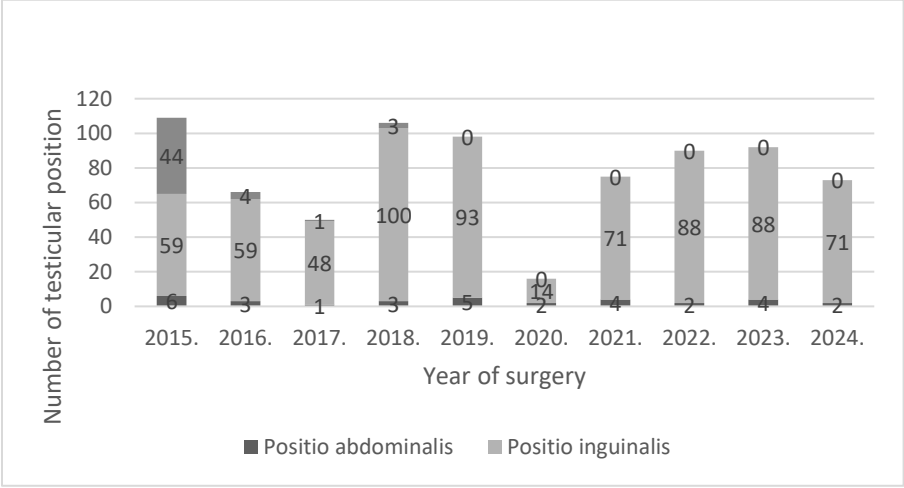

Diagram 5: Testicular position in operated patients by age.

Based on the data, most operations were without complications. The highest number of complications was recorded in 2015 (12 cases), while in 2017, 2022, 2023 and 2024, a minimal number of complications were recorded. Complications included postoperative febrile conditions, mild infections and allergic reactions. Overall, the results indicate a stable trend in the number of diagnoses, the dominant use of orchidopexy as the operative method, a low complication rate, and an average length of hospitalization of 2 days. The analysis also indicates relatively early surgical management of patients, with some exceptions in years with a smaller sample or specific cases.

Discussion

The results of a retrospective descriptive study conducted at the Clinical Center of the University of Sarajevo over a ten-year period (2015-2024) show that the most common diagnosis among pediatric patients with undescended testicles was Retentio testis, followed by Kryptorchismus and Ectopio testis. The most frequently performed surgery was Orchidopexia, while Orchidectomia and Laparascopia were recorded in a smaller number of cases.The largest number of cases was diagnosed in 2022, while a significant decrease in the number of interventions was observed in 2020, which can be attributed to the COVID-19 pandemic and the decrease in elective surgical procedures during that period, as confirmed by international studies (Pulia et al., 2021). Most patients were operated on between 1 and 3 years of age, although some were at a younger age. The length of hospital stay was generally 1-3 days, and complications were rare and mild. The American Urological Association (AUA, 2022) guidelines and the American Pediatric Surgical Association (APSA) systematic review strongly recommend that orchidopexy be performed no later than 12 months of age. Early surgical treatment is associated with better testicular development and a higher likelihood of fertility preservation (Gates et al., 2022 [22]). In this study, although most operations were performed in early childhood, a significant number of patients were still operated on at an age well above the recommended limit, indicating the need for earlier identification and referral of patients for treatment (see Figure 3). The study by Puri and Holwarth (Pediatric Surgery International) highlights that Retentio testis and Kryptorchismus are the most common forms of undescended testicles, which is fully consistent with the findings of this study (see diagram 1). The same study

also states that the most common position of the testicle is in the inguinal region, which was confirmed in this analysis, where positio inguinalis dominated in more than 80% of cases (see diagram 5). Regarding complications, data from the literature (Cleveland Clinic, 2016 [23] state that postoperative complications are rare, and when they occur, they are mostly mild and transient – which is confirmed by this study (see Table 2). The most frequently reported complications in patients in this study were febrile conditions and mild infections, with a low overall complication rate. One of the important findings is the decrease in the number of surgeries in 2020, which correlates with the pandemic period of the SARS-CoV-2 virus, when there was a decrease in elective surgeries globally. Similar trends have been observed in international studies, which confirm a significant decline in the provision of non-urgent urological services during the pandemic (Pulia et al., 2021). All defined objectives of the study were achieved. The frequency of diagnoses of undescended testicles over a ten-year period was presented, the most common surgical procedures, the age structure of patients, the duration of hospitalization and the presence of postoperative complications were analyzed (see Table 1). The research hypothesis set – that undescended testicles are most often treated with orchidopexy in early childhood, without serious complications – was largely confirmed. However, discrepancies in terms of patient age (see diagram 3) indicate the need for systematic education of parents and primary health care providers about the importance of timely diagnosis and referral.Finally, the results of this study largely coincide with the available literature and guidelines of leading medical associations, with certain discrepancies that represent room for future improvement of clinical practice.

Conclusion

The most common form of undescended testis is Retentio testis, followed by Kryptorchismus and Ectopio testis. The lowest number of cases was recorded in 2020, probably due to epidemiological restrictions during the COVID-19 pandemic. The most commonly performed surgical procedure is orchidopexy. The average age of patients undergoing treatment is between one and three years of age, which is in line with recommendations for the optimal time of intervention. Surgical procedures for undescended testes are short-term and effective in postoperative recovery. Most testicles are localized in the inguinal region, while intra-abdominal positions have been reported in a smaller number of cases. Complications are rare, and most often include fever and mild infections. This confirms that the surgical methods used are safe and that the postoperative course is generally without significant problems.

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