

University of Szeged
Albert Szent-Györgyi Medical School
Doctoral School of Clinical Medicine

Recent trends in the management of undescended testes in Hungary

Ph.D. Thesis

Alexandra Varga M.D.



Supervisor: Tamás Kovács M.D., Ph.D.

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Bibliography of the candidate's publications

- I. Varga A, Kardos D, Radványi Á, Vajda P, Sasi Szabó L, Kovács T.** Medium-Term Results of Staged Laparoscopic Traction Orchiopexy for Intra-abdominal Testes: A Multicenter Analysis. *J Pediatr Surg.* 2023; 58: 2020-2026. (IF:2.4)
- II. Varga A, Tardi R, Kovács T.** Current management of undescended testes in Hungary – where are we now? [A hereleszállási zavarok kezelése Magyarországon – hol tartunk most?] *Orv Hetil.* Accepted: 19. November 2023. [Hungarian] (IF:0.6)

List of abbreviations

EAU	European Association of Urology
ESPU	European Society for Paediatric Urology
HAPS	Hungarian Association of Paediatric Surgeons
HIT	High intra-abdominal testis
IAT	Intra-abdominal testis
MHR	Ministry of Human Resources
NPT	Non-palpable testis
PCP	Primary care paediatricians
SLTO	Staged laparoscopic traction orchiopexy
UDT	Undescended testis
US	Ultrasound

Introduction

Undescended testis (UDT) or cryptorchidism is one of the most common disorders in boys concerning approximately 3.5% of male newborns. The aetiology and pathogenesis seem to be multifactorial with potential contribution of several mechanisms, including genetic, hormonal, and mechanical factors. There is a right-sided predominance, and association is possible with comorbidities such as cardiac or genitourinary anomalies, as well congenital syndromes (e.g., Down, Noonan, or prune belly syndrome).

The retained testis can be located along the normal path of descent or in an ectopic position. Generally, 20% of UDTs are non-palpable (NPT) and 15-34.1% of NPTs falling into intra-abdominal category. Testes situated ≥ 2 cm proximal to the ipsilateral internal inguinal ring are defined as high intra-abdominal testes (HITs). Currently, diagnostic laparoscopy has been universally accepted and recommended as gold standard for identifying IATs and to determine the further treatment. Surgical therapy is suggested between 6 and 18 months of age.

Modern management UDTs in children is essential to avoid long-term morbidities including infertility and malignant changes. Although both national and international clinical practice guidelines – e.g., recommendations of The European Association of Urology/ The European Society for Paediatric Urology (EAU/ESPU) and of The

Hungarian Ministry of Human Resources (MHR) – support the appropriate decisions, our clinical experience indicated, that in Hungary a considerable proportion of children with UDT are treated beyond the optimal time frame.

Despite the high prevalence, surgical treatment of intra-abdominal testes (IATs) is still challenging. The main limiting factor is the brevity of testicular vessels, hindering adequate and tension-free placement of the testis into the scrotum. If the vessels are too short for single-stage techniques, two-stage options should be chosen. Staged laparoscopic traction orchiopexy (SLTO) or Shehata technique is a novel method for the treatment of IATs based on elongation of the testicular vessels without separating them. However, surgical results of these technique are mostly single centric, including mainly low number of cases with relatively short-term follow-up.

Objectives

To improve patient care, we evaluated the current treatment of UDTs in Hungary. The aims of our comprehensive study were as follows.

- I. Evaluation of the adherence of primary care paediatricians (PCPs) to current recommendations, regarding screening newborns for cryptorchidism, referral of suspicious cases to paediatric surgical specialists, management of retractile testes, and long-term follow-up after surgical therapy.
- II. To assess the adherence of paediatric surgical specialists to the current EAU/ESPU and Hungarian MHR guidelines regarding the management of UDTs, with particular emphasis on diagnostic imaging, surgical and hormonal therapy.
- III. To investigate, whether surgical procedures currently used by paediatric surgeons, comply with the latest literature recommendations.
- IV. Retrospective analysis of medium-term results of SLTO on a larger cohort in a national multicentre study.
- V. Determination of the effects of traction on the circulation/viability of the testes using Doppler ultrasound (US) examination.
- VI. To investigate the effects of the type of fixation stitch (monofilament or braided) to the success of the surgery.

Methods

The study was approved by the National Scientific and Ethical Committee as well as the ethical committee of our institution (approval numbers: BM/15215-1/2023, 87/2017-SZTE).

In the first part of this investigation a web-based questionnaire on the management of UDTs was completed among the members of The Association of the Hungarian Primary Care Paediatricians and The Hungarian Association of Paediatric Surgeons (HAPS). In addition to sociodemographic data, the survey focused on the patient management including diagnostics, referral of suspicious cases to paediatric surgical specialists, surgical and hormonal therapy, application of new surgical procedures, management of retractile testes, long term follow-up after orchiopexy and adherence to national and international guidelines, principally to the recommendations of Hungarian MHR (2021) and EAU/ESPU (2016).

The second part of our investigation analysed retrospectively data of SLTOs performed in three paediatric surgical centres – University of Debrecen, University of Pécs and University of Szeged – between 2013 and 2020. Furthermore, in 2021, physical and Doppler US examinations were performed to determine the position and viability of testes. Success was defined as an intra-scrotal testicle without atrophy.

Descriptive statistics were used to analyse the outcomes.

Results

Management of undescended testes in Hungary

When managing UDTs, PCPs (n=69) are influenced mostly by their experience during specialty training (65.2%). However, paediatric surgical specialists (n=56) are influenced mainly by international guidelines (66.1%). Most PCPs (98.6%) screen newborns for UDT and refer any suspicious cases (88.4%) in proper time for surgical examination, but only two-third of them know the appropriate time for orchiopexy. Additionally, 59.4% of them consider the management of retractile testes to be primarily conservative, and 60.8% of them offer close follow-up until puberty. After orchiopexy long-term follow-up until puberty is recommended by 39.1% of them. Specialists (98.2%) know the proper time for orchiopexy; however, they recommend ultrasonography relatively often (28.6%) in cases of NPTs. Treatment of HITs occur primarily (82.1%) with minimally invasive Shehata technique.

Medium-term results of Shehata technique

Between 2013 and 2020, SLTO (Shehata technique) was performed on 48 cases (55 testes, 7 bilateral) in the centres participating in the study. Mean age at first stage was 2.9 (0.8-12.6) years. At the first stage the majority (52.1%) of the children was older than 1.5 years. High intra-abdominal testes were found in 16.4% and in 60% morphological

abnormalities were observed. To fix the testes to the abdominal wall monofilament suture was used in 67.3%, braided in 29.1%. Mean time between the two stages was 16.4 weeks; three testes required redo traction. Scrotal testicular position was achieved in 51 (92.7 %) cases, in 70.6 % using Prentiss manoeuvre. Perioperative complications occurred in 21 patients (38.2%) including insufficient fixation (11), testicular atrophy (4), wound complications (4), adhesion of the spermatic cords (1) and hydrocele (1). In case of insufficient fixation monofilament sutures were used in 90.9%.

In 2021 38 patients (43 testes) had physical and 36 patients (41 testes) had US examinations. Mean follow-up was 2.7 (0.34-7.9) years. Altogether five atrophies were identified, and three testicular ascents (7.0%) occurred. The overall success rate was 82.2%.

Discussion

Management of undescended testes in Hungary

In cases of UDTs, early diagnosis, timely referral and optimal surgical therapy are essential to maximize fertility and reduce the risk of malignant changes. Based on our results, current management of cryptorchidism in Hungary is mainly up to date, although, the knowledge of PCPs on some important issues is incomplete. In accordance with the Decree No. 51/1997 (XII. 18.) of the Ministry of Welfare almost all PCPs participating in this survey evaluate of testicular position in newborns at the first time before three months of age. Furthermore, most of them, if a testicle is not palpable in the scrotum, refer the child proper time – on first detection or if there is no change, by the age of 6 months – for paediatric surgical or paediatric urological examination.

Although, main national and international guidelines advocate orchiopexy between 6 and 18 months of age, nearly one-third of PCPs in this study consider that the appropriate time for surgical therapy is over 1.5 years of age. The reason for this can be assumed that their patient management are mainly influenced by the experience during their specialty training instead of current recommendations. This fact can be especially alarming, because most of the participating PCPs have been practising for more than twenty years. In order to modernize

patient management, we consider important to provide nationwide educational programs by paediatric surgeons to PCPs. In addition, dissemination of new recommendations on scientific meetings and conferences as well as publication of current guidelines in paediatric journals would be necessary.

Hungarian paediatric surgical care provides a modern, often minimally invasive approach: most recommendations of EAU/ESPU and Hungarian MHR are being followed by participant HAPS members. Specialists know the proper time for orchiopexy: they offer surgical therapy to their patients before the age of 1.5 years. Besides, minimally invasive Shehata technique was introduced nationwide. However, ultrasonography is performed still often unnecessarily in NPTs. Although it is a non-invasive tool as well as widely available, we must note, that it cannot confirm the presence or absence of the testis and therefore, it does not influence the indication of the surgery. Moreover, it can delay the definitive treatment.

Both MHR 2021 and ESPU/EAU 2016 guidelines offer close follow-up for boys with retractile testes until puberty instead of medical or surgical treatment. Regular monitoring is important because up to 50% of retractile testes may develop to an ascending testis requiring surgical intervention. Long-term follow up after orchiopexy is obligatory to check the viability, position, and structure of the testes. The current recommendation of MHR suggests annual exam until puberty for

children after orchiopexy. Furthermore, the EAU/ESPU emphasize the importance of proper monthly self-examination of the testes. Based on our results, in Hungary, neither the management of retractile testes nor the follow-up after orchiopexy occur according to the current trends: monitoring is not sufficiently coordinated neither at the level of primary health care nor at the level of paediatric surgical specialist care. Currently, the level of monitoring is not clearly defined: clarifying of this would help the precise follow-up until puberty.

The aim of our recommendations is primarily to provide an up to date treatment for UDTs at all levels of patient care in Hungary in accordance with the national and main international guidelines reducing the risk of infertility and the malignant changes.

Medium-term results of Shehata technique

Shehata technique is a safe and feasible alternative to conventional treatments for IATs with excellent medium-term results. Until now, surgical results of this procedure were mainly resulted from a single centre, including relatively low number of cases with short- or medium-term follow-up. Our recent study is the second largest and represent the longest follow-up series of IATs treated with SLTO after Shehata's procedure up to now. In our study, additional colour Doppler US was performed to confirm the viability of the operated testes.

Traction interval passed uneventfully without any serious complications. Perioperative complications occurred altogether in

38.2% of the operations including insufficiency of the fixation suture, adhesion of the spermatic cords, testicular atrophy, wound healing disorders and hydrocele. We have found that the recommended traction period (12 weeks) is sufficient to achieve adequate elongation of the testicular vessels without any signs of inflammation or other drawbacks. Fixation suture insufficiency happened in the majority (90.9%) of cases when monofilament sutures were used: braided suture seems to be better to fix the testicle to the abdominal wall. Frequency of adhesion between the crossed structures was 14.3% in our series causing unilateral testicular atrophy in one case. To avoid this complication, separate traction intervals instead of simultaneous operation should be considered.

Doppler US findings confirmed that preservation of the testicular vessels provides appropriate circulation of the testes with low (11.1%) atrophy rate. Besides, 92% of testes were in adequate scrotal position, while three cases showed evidence of testicular ascents requiring redo open orchiopexy. Success rate was 82.2%, which is comparable to the previously reported series (65-100%) as well as to the results of two-stage Fowler-Stephens technique (67-98%). However, further studies are still needed to evaluate the long-term impact of the surgery on future fertility.

Conclusions and new findings

- I.** Current treatment of UDTs in Hungary is mainly up to date, although, the knowledge of PCPs on some important issues – optimal timing of surgery, follow-up of retractile testes and children after orchiopexy – is incomplete.
- II.** Hungarian paediatric surgical care provides a modern, often minimally invasive approach following most of the actual recommendations. However, ultrasonography is performed often unnecessarily delaying definitive treatment.
- III.** At the examined care levels neither the management of retractile testes nor the follow-up children after orchiopexy occur according to current trends. Clarifying the level of monitoring would help the precise follow-up until puberty.
- IV.** Shehata technique is a safe and feasible method for the treatment of IATs with excellent medium-term results: success rate is comparable with previously described techniques without serious intra- or postoperative complications.
- V.** Doppler US examination is a suitable non-invasive tool for determining testicular viability during the follow-up of children treated with Shehata technique.
- VI.** Braided suture is better to fix the testis to the abdominal wall in the first stage of Shehata technique.

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