



Original Article

Testicular torsion in undescended testis: A persistent challenge



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KEYWORDS

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Abstract *Objective:* To evaluate the management and outcomes of patients who presented with torsion of an undescended testis and review the reported series in the literature.

Methods: The case records of 13 patients operated for testicular torsion involving undescended testis were retrospectively reviewed. The medical records included age at presentation, medical history, physical examination, operative findings and the results of follow-up. The diagnosis of torsion of undescended testis was made clinically and confirmed by inguinal exploration.

Results: In six cases the testis was preserved and orchiopexy was performed, while in seven cases orchidectomy was performed due to testicular gangrene in six patients and testicular tumor discovered peroperatively in one case. Mean duration of symptoms at time of surgery in the orchiopexy group was 6.5 h and in the orchidectomy group was 21.2 h. From six patients treated by orchiopexy, two patients suffered from testicular atrophy at a mean of 24 months.

Conclusion: Testicular torsion in undescended testis is still diagnosed with delay which may affect testicular salvage. The importance of examination of external genital organs is highlighted which should be routinely included by emergency physicians in physical examination for abdominal or groin pain.

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1. Introduction

Cryptorchidism or undescended testis (UDT) is one of the most common pediatric disorders of the male endocrine glands and the most common genital disorder identified at birth. The incidence of cryptorchidism is 1%–4% in full-term newborns and in up to 45% of preterm male babies [1]. The literature concerning UDT mainly concentrates on the increased risks of infertility and germ cell tumor

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development as the primary sequelae of this condition. The UDT is also at higher risk for torsion [2–5]; misdiagnosis or delayed diagnosis of testicular torsion with subsequent testicular loss is a relatively common subject of litigation. Only a few cases of torsion in UDT have been reported in the current literature and are mostly limited to case reports [6]. The aim of this study was to evaluate the management and outcomes of patients who presented with torsion of a UDT and review the reported series in the literature.

2. Materials and methods

We reviewed and analyzed 13 cases of testicular torsion involving UDT operated at our Department of Urology, from January 1999 to January 2015. The medical records included age at presentation, medical history, physical examination, operative findings and the results of follow-up. The diagnosis of torsion of UDT was made clinically and confirmed by inguinal canal exploration. Color-Doppler ultrasound (CDU) was performed before surgery in only one case. Immediate CDU examination was not available for the other cases and it was thought to delay surgery. Surgical exploration was carried out through inguinal incision. In all cases immediate detorsion of the spermatic cord was performed. If the testis remained vital after manual detorsion, orchiopexy and fixation of the testis in a dartos pouch were performed. If the testis remained dark it was wrapped with warm saline-soaked towels for at least 5 min. Subsequently, if no recovery in the color of the testicle was seen, the tunica albuginea was incised. When no bleeding was detected after 10 min, an orchidectomy was performed. All removed testes underwent histopathological examination.

The patients were followed up at 1, 3 and 12 months postoperatively, and then examined once a year. Ultrasonography was performed 3 and 12 months after surgery to assess testicular volume. The latter was calculated using the formula $0.52 \times \text{length} \times \text{width} \times \text{thickness}$ of the testicular ellipsoid. Testicular atrophy was defined as a difference $>50\%$ between the affected and the contralateral testes. Testicular hypotrophy was defined as a difference $>20\%$.

3. Results

Patient age ranged from 1 to 49 years (median 10.8 years). Twelve patients were children, one patient was 49 years old. Torsion affected the left side in seven cases and the right side in six cases. Physical examination showed bilateral cryptorchidism in three patients with unilateral testicular torsion; associated contralateral inguinal hernia was noted in one case. No patient had a significant past medical history. Clinical symptoms mainly included the appearance of inguinal swelling with firm mass palpated in the groin region in 11 cases, erythematic in two cases. Periumbilical and right iliac fossa pain was reported in the adult patient mimicking appendicitis. Inconsolable crying was noted in a one-year-old patient. Symptoms were accompanied by nausea and vomiting in three patients. Only four patients (30.7%) were admitted to the hospital within 6 h after symptoms appearance. Unfortunately, nine

patients were referred to our department 6–48 h after the onset of symptoms. Two children were initially admitted in surgical department due to misdiagnosis of incarcerated inguinal hernia; scrotum was not examined by physician in the emergency room. Surgery was performed after unsuccessful attempts of manual reduction and the diagnosis of testicular torsion was made peroperatively. Mean duration of symptoms at time of surgery in the orchiopexy group was 6.5 h (range 3–12 h) and in the orchidectomy group was 21.2 h (range 8–48 h). On physical examination, painful inguinal mass with empty ipsilateral hemiscrotum was identified in 12 patients. Tenderness on palpation of the right iliac fossa was noted in the adult patient with not palpable testis and empty ipsilateral hemiscrotum. Contralateral testis was palpable in the inguinal canal in three cases. Five patients had a fever. CDU was performed before surgical exploration in one case showing no vascular flow within the UDT with surrounding hyperemia. Patients' characteristics and operative findings are presented in Table 1. Exploration was universally performed through an inguinal approach. In six patients with apparently long-standing necrosis, orchiectomy was performed because no testicular viability was observed despite appropriate salvage attempts. In one patient (the adult patient) orchiectomy was performed because of associated suspected testicular mass discovered peroperatively. The six remaining patients (46.15%) initially exhibited ischemic effects but achieved some improvement in testicular color following detorsion and warming of the tissue. In these cases the testes were preserved and one-stage orchiopexy was performed. Concomitantly contralateral orchiopexy was performed in 10 patients with unilateral cryptorchidism. In the three cases of bilateral cryptorchidism, contralateral orchiopexy was performed, via inguinal approach, at the same time of initial surgery. Diagnosis of testicular hemorrhagic infarction and necrosis was confirmed on histological examination of the six excised testes. In the adult patient, a limited pure seminoma was revealed without vascular invasion. Patients were followed up for a mean of 33.8 months. From six patients treated by orchiopexy, two patients suffered from testicular atrophy at a mean of 24 months. Three patients had testicular hypotrophy at a mean of 8 months. In one case, the testis was normal in size 4 years postoperatively.

4. Discussion

Testicular torsion is a well known urologic emergency that needs to be diagnosed and treated rapidly for the salvage of testis. It was first described in 1840 by Delasiauve, and this happened to be in a 15-year-old boy with UDT [4].

A UDT may be located in the abdomen, the inguinal canal, the superficial inguinal pouch, and the upper scrotum. Approximately 70% of UDT are palpable. For testes that are not palpable, approximately 30% will be found in the inguinal-scrotal area, 55% will be intra-abdominal, and 15% will be absent or vanishing [7]. The most serious complications of cryptorchidism are a high rate of infertility and a high incidence of testicular cancer [8]. Orchiopexy is ideally performed prior to the first year of age with the

Table 1 Characteristics, operative findings and postoperative outcome in patients presenting with testicular torsion in UDT.

Patient no.	Age (year)	Side	Symptoms duration (h)	Intraoperative finding	Torsion degree (°)	Outcome	Final outcome	Follow-up (month)
1	1	R	3	Torsion	180	Orchiopexy	Normal size	48
2	7	L	8	Necrosis	360	Orchidectomy	—	—
3	9	R	4	Torsion	720	Orchiopexy	Hypotrophy	36
4	4	R	48	Necrosis	360	Orchidectomy	—	12
5	6	L	5	Torsion	360	Orchiopexy	Hypotrophy	48
6	13	R	13	Necrosis	360	Orchidectomy	—	24
7	9	L	5	Torsion	720	Orchiopexy	Hypotrophy	48
8	13	L	10	Torsion	360	Orchiopexy	Atrophy	36
9	6	L	24	Necrosis	180	Orchidectomy	—	12
10	11	R	18	Necrosis	360	Orchidectomy	—	36
11	49	R	20	Torsion + testicular mass	180	Orchidectomy	—	60
12	5	L	18	Necrosis	360	Orchidectomy	—	—
13	8	R	12	Torsion	360	Orchiopexy	Atrophy	12

R, right; L, left; —, lost; UDT, undescended testis.

intent of preventing these issues. Gaudio et al. [9] demonstrated the decrease of germ cell density in cryptorchidism after 1 year of age. However, management with orchiopexy has not been proven for risk reduction of testicular cancer, but detection by self-examination is eased with orchiopexy [10].

The incidence and relative risk of torsion in a UDT is still unknown. Several studies have shown that torsion is more common with a UDT compared with a completely descended testis. There are articles proposing 10 times higher risk of torsion in cryptorchid testis [3–6]. Johnson [11] reported an incidence of 21% of torsion in cryptorchid testes. Even though it is more frequent, the literature of torsion of UDT is mostly limited to case reports.

The mechanism which causes spermatic cord torsion in the UDT is not clearly understood; however, a number of possibilities have been postulated. Abnormal contractions or spasms of the cremasteric muscles and adduction contractures of the hips called “scissor-leg deformity” that block the entrance to the normal scrotum or force normal testes out of the scrotum are two theories that have been described. These theories could be supported by a 53.8% incidence of cryptorchidism noted in patients with cerebral palsy, and some reports refer to torsion of cryptorchid testis in patients with spastic neuromuscular disease [12]. The size of the UDT was also thought to be associated with the risk of testicular torsion. It was explained by some reports indicating that torsion of a UDT often occurs in association with the development of a testicular tumor, presumably caused by increased weight and distortion of the normal dimensions of the organ [5,13,14].

Diagnosis is more difficult because it can mimic several entities such as acute abdomen, incarcerated inguinal hernia, and inguinal lymphadenitis [5,15–17]. Genital examination should be routinely included in abdominal examination for suspected appendicitis, when the right hemiscrotum is found not to contain a testis [17]. In our series, two children were initially admitted in surgical department due to misdiagnosis of incarcerated inguinal hernia, leading to delay in surgery.

The clinical symptoms of UDT torsion include nonspecific abdominal or groin pain, poor oral intake, vomiting, and restlessness. Physical examination findings include inguinal swelling and erythema with a firm, tender mass in the inguinal region and an empty ipsilateral hemiscrotum. The diagnosis of torsion of a UDT should be considered in every child presenting with unexplained groin or abdominal pain in the presence of tender groin swelling and an empty ipsilateral hemiscrotum [4,18,19].

Imaging studies such as CDU, computed tomography (CT), and technetium Tc-99m scrotal scintigraphy can offer more detail; however, they may be misleading [20]. Doppler findings include decreased or absent blood flow to the affected testis as compared to the normal testis. Echogenicity of the torsed testis may initially be decreased as a result of edema but may appear increased after infarction has occurred. However, in cases of intermittent torsion or early torsion when arterial inflow is still preserved, the sonographic appearance may be normal. Ultrasound may also be useful in ruling out the possibility of incarcerated hernia and other testicular diseases like tumors [21,22]. CT showed a well-circumscribed, isodense or heterodense mass and had proper fine anatomic detail in locating the undescended testis [20]. Technetium Tc-99m scrotal scintigraphy revealed a complete avascular image, called a cold spot, both on flow and static phase, but no sufficient evidence exists in the diagnosis of torsion of UDTs [20]. Diffusion-weighted MRI has been established as a useful functional diagnostic tool in the evaluation of various scrotal pathologies such as detection and localization of impalpable testes, diagnosis of testicular torsion and detection of the malignant degeneration in cryptorchid testis [23]. These modalities are recommended only if clinical suspicion is low, as surgical exploration remains the preferred method of investigation in probable cases.

While the reported salvage rate in testicular torsion ranges from 20% to 92% [21,24], there are no such data available concerning UDT; it is thought to be poor. Zilberman et al. [4] reported a final salvage rate of 10% in a series of 11 patients. This rate was of 37% in a series of 13 children

reported by Pogorelić et al. [25]. Our series also demonstrates poor final rate of surgical salvage (30.7%).

Delayed presentation of torsion continues to be an inherent obstacle to testicular salvage. In contrast, 27% of the patients undergoing orchiopexy within 4 h of onset of symptoms developed testicular atrophy during follow-up [26]. Two other variables could account for the different effects of torsion on testicular outcome, the degree of torsion and the thickness of the cord [27]. When rotation is $>360^\circ$, torsion as short as 4 h may facilitate testicular atrophy. If the torsion is not complete ($<360^\circ$), testicles with torsion within 24 h may be salvaged [28]. Thicker cords lead to formation of longer helices with a minor degree of blood flow impairment than thinner cords do for the same degree of twisting [27]. One patient of our series with a complete torsion had testicular atrophy, although symptoms duration was 10 h.

The treatment of choice for suspected, acute, testicular torsion is immediate surgical exploration, regardless of the location of the testis. Once the diagnosis has been established, the clinician can be faced with a dilemma, whether or not to remove the testis. This decision is usually taken fact that no objective criteria exist to assess testicular viability. Cimador et al. [29] have studied three parameters which can be helpful in treatment choice. When the history longer than 10 h, there is no flow on CDU and there is no bleeding 10 min after incision of the tunica albuginea, then orchietomy is the appropriate option. Orchidopexy is appropriate when all these variables are negative. Recently, a second-look exploration was demonstrated to be more effective to assess testicular viability. Rouzrokh et al. [30] have performed a second-look exploration in 70 cases of testicular torsion, 48 h after emergency surgical exploration and intraoperative bleeding test; orchiopexy was performed in 44 (63%) and orchietomy in 26 (37%) cases after second-look exploration.

The surgeon is confronted with another dilemma of whether to try to mobilize the testis and perform scrotal orchiopexy or postpone this definitive surgical treatment [12,21,24]. Prophylactic fixation of the scrotum to the contralateral testis is recommended by the majority of authors [20].

5. Conclusion

UDT is associated with a higher risk of infertility, testicular cancer and torsion; therefore, awareness regarding this entity should be increased among primary care physicians and pediatricians. Testicular torsion in UDT is still diagnosed with delay which may affect testicular salvage. This series clearly demonstrates poor rates of surgical salvage (30.7%) compared to the higher figures reported in patients with torsion of a normally descended testis. Authors highlight the importance of examination of external genital organs which should be more considered by emergency physicians in abdominal examination for abdominal or groin pain.

Conflicts of interest

The authors declare no conflict of interest.

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