



ARTICLE

A retrospective multicentric analysis on testicular torsion: is there still something to learn?

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ABSTRACT

Introduction and aim: Speedy diagnosis are mandatory in testicular torsion, nevertheless some cases of irreversible ischemia still occur. In this study we analysed the results of patients undergoing surgical exploration for acute scrotum.

Materials and methods: A multicentric retrospective clinical evaluation was carried out on patients who underwent urgent scrotal exploration at 12 different departments in North-Eastern Italy. Data included complete anagraphic information, clinical presentation, numeric pain rating scale, previous testicular surgery, Doppler serial ultrasonography (US) evaluation and concordance with surgical findings, testicular mobility, surgical treatment, staged or concurrent treatment of the contralateral gonad. Statistical analysis was conducted both for descriptive and inferential statistics with SPSS v26.

Results: Three hundred and sixty-eight cases were collected between January 2010 and June 2019. The time between symptom onset and ER access time was within 6 h in majority of patients. However, 17.4% of subject presented after more than 12 h. In patients undergoing US, this showed signs of ischemia in 237 patients (77.2%) and normal vascularisation in 70 (22.8%) of whom 26 had signs of testicular torsion at surgical exploration. Overall, the US data were concordant with the surgical findings in 254 cases (82.7%). A significant association was found between time-to-evaluation and time-to-treatment and the need for orchiectomy ($p < 0.01$).

Conclusion: Testicular torsion management is still challenging in terms of time-saving decision making. Scrotal US is helpful, but even in the contemporary its sensitivity is low even in a non-neglectable number of cases, therefore surgical exploration is warranted in acute scrotum when torsion cannot be ruled out, even when US shows vascularisation.

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Introduction

Testicular torsion (TT), the twisting of the testicle on a man's spermatic cord, is a frequent cause of acute scrotal pain in young men. Acute scrotal pain presents several differential diagnoses, such as epididymo-orchitis, torsion of hydatid of Morgagni, inguinal hernia, trauma or tumour. Torsion of the spermatic cord is the only emergent cause of acute scrotal pain and the mandatory diagnosis to rule out in this clinical setting.

As reported by Williamson in the Bristol area, the annual incidence of this urologic emergency is about one case in 4000 males at risk and 1:160 boys will have developed a torsion by the age of 25 [1]; more recently, Lee et al. [2] reported an incidence of 2.9 per 100,000 males younger than 25 years. As is widely known, fast diagnosis and treatment are mandatory, with the aim to prevent ischemic necrosis.

Unfortunately, some cases of irreversible ischemic damage can still occur and leads to orchiectomy, in turn affecting fertility and quality of life of the patients. The overall survival rate of the testis is largely dependent on the correct diagnosis, ranging from 23% in a 1957 study [1] to 75.7% in the 2000s [2]; a prompt recognition and treatment of this condition is crucial. In this study we analysed the diagnostic and the therapeutic results of patients undergoing surgical exploration for acute scrotum in a collaborative multicentric study, with the aim of understanding the results of surgical treatment as well as identifying possible predictors of outcome.

Materials and methods

We retrospectively collected data regarding patients who underwent urgent testicular exploration for clinical suspicion

of testicular torsion in 12 different urologic departments in North-Eastern Italy between 2010 and 2019. All patients provided informed consent and the principles of Helsinki Declaration were followed in all activities involving human patients. The protocol generally followed for patient evaluation was composed of ER evaluation, urinalysis, urological evaluation, doppler serial ultrasonography (US) and re-evaluation by the urologist. US were performed by experienced radiologists. Valid and symmetrical doppler signal in the two testes, together with normal US appearance of testicular parenchyma, were considered the main signs of normal testicular vascularisation. Multiple parameters were gathered: demographic features of the patients, side of pain, previous testicular surgery, testicular mobility, testicular appendage torsion, symptomatic side, concomitant hydatidectomy, numeric pain rating scale (NPRS), timing (Symptom onset, ER access, urologic evaluation, begin of surgery, duration of surgery and pain-to-treatment time), deferred contralateral treatment, complications (within six months) and their treatment, contralateral testicle torsion at follow-up. Preoperative US evaluation was compared to surgical exploration in terms of testicular blood flow and the characteristics of the parenchyma. Continuous variables were reported as the median value $\pm$ interquartile range (IQR); while categorical variables were presented as frequencies and percentage. The association between categorical variables and treatment success was analysed with the Pearson chi-square (along with non-parametric tests when appropriated) and $p < 0.05$ was considered significant. Statistical analysis was carried out using IBM SPSSv26 (IBM SPSS Statistics, Armonk, NY).

Results

Three hundred and sixty-eight cases were retrospectively collected from January 2010 to June 2019. The preoperative features are reported in Table 1. Median age of the patients was 17 years (IQR 14–23); only 14 patients (3.8%) had undergone previous scrotal surgery. Seventy-three percent of patients reported high level of pain (NPRS > 6). The time between symptom onset and ER access time was within 3 h in majority of patients, however, 17.4% of subject presented after more than 12 h from the onset of pain. The surgical treatment was performed within 6 h from symptom onset in 40.8%, while 30.4% of patients were treated after more than 12 h. In the patients who underwent US, the US data were concordant with the surgical findings in 254 cases (82.7%). Table 2 lists the intra- and postoperative results. Surgical treatment consisted of orchiopexy (with preoperative manual detorsion) in 147 subjects (39.9%), operative detorsion + orchiopexy in 178 (48.4%) and orchiectomy for necrotic testicle in 43 (11.7%). Concurrent orchiopexy of the contralateral gonad was carried out in 89 patients (24%), while deferred treatment for torsion of the contralateral gonad occurred in 22 subjects (6%). When analysing specific subgroups, the need for orchiectomy was only 2.8% in patients presenting to ER 3 h after the onset of the pain, while it reached 22.4% in patients presenting after more than 10 h. In patients with NPRS = 0 at urological evaluation

Table 1. Diagnostic pathway and preoperative features.

Subjects (N)	368
Age at surgery (years), median (IQR)	17 (14–23)
Previous scrotal surgery (n, %)	14 (3.8)
Testicular hypermobility (n, %)	117 (31.8)
Side (n, %)	
Right	199 (54.1)
Left	166 (45.1)
Bilateral	3 (0.8)
Numeric pain rating scale	
0	68 (18.5)
1–5	30 (8.1)
6–10	270 (73.4)
Time between symptom onset and ER (n = 340)	
0–1 h	37 (10.9)
1–2 h	58 (17.2)
2–3 h	47 (13.8)
3–6 h	52 (15.3)
>6 h	31 (9.1)
>12 h	59 (17.4)
Uncertain-not reported	56 (16.5)
Time between symptom onset and treatment	
0–6 h	150 (40.8)
6–10 h	63 (17.1)
>10 h	112 (30.4)
Uncertain-not reported	43 (11.7)
Preoperative doppler ultrasound	
Not performed	61
Normal vascular signal	70 (22.8)
Abnormal/absent vascular signal	237 (77.2)

Table 2. Intra- and postoperative results.

Surgical treatment	
Orchiopexy (+/- preoperative manual detorsion)	147 (39.9)
Operative detorsion + orchiopexy	178 (48.4)
Orchiectomy	43 (11.7)
Concordance between US and intraoperative findings (N = 307)	
Yes	254 (82.7)
No	53 (17.4)
Torsion of hydatid	
No	308 (83.7)
Yes	60 (16.3)
Concurrent hydatidectomy	
No	211 (57.3)
Yes	136 (36.9)
Not reported	21 (5.7)
Concurrent treatment of contralateral gonad	
Yes	89 (24)
No	279 (76)
Deferred treatment of contralateral gonad (n = 342)	
Yes	22 (6.4)
No	320 (93.6)
Postoperative complications	
Yes	66 (18)
No/not reported	302 (82)
Recurrent torsion in the treated gonad	
Yes	27 (7.3)
No	269 (73.1)
Unknown	72 (19.6)
Torsion of contralateral gonad	
Yes	22 (6)
No	308 (83.7)
Unknown	38 (10.3)

(N = 68) 17 (25%) received manual preoperative detorsion and fixation, 45 (66%) operative detorsion and fixation and 6 (8.8%) orchiectomies. The number of these patients that received Doppler US were 67.6% and, among them, 29/46 (63%) had US signs of ischemia, concordance between US and surgery was 51.1%. Remarkably, time from symptoms to treatment in this subgroup was 0–6 h in 46%, 6–10 h in 16% and more than 10 h in 38%.

Univariate analysis showed a significant association between time-to-evaluation and time-to-treatment and the need for orchiectomy ($p < 0.01$); while NPRS or other clinical preoperative variables did not have a significant impact on treatment outcome. The concordance between preoperative US and intraoperative findings showed a significant correlation with the treatment ($p < 0.01$), in particular one patient undergoing orchiectomy were correctly detected by preoperative US. When analysing the subgroup of 26 patients with no signs of ischemia at preoperative US and intraoperative findings of torsion/ischemia, it might be noted that among these patient's preoperative hypermobility was significantly more frequent ($p = 0.015$), as well as concurrent treatment of contralateral testis ($p < 0.01$), while no differences were seen in other pre- or post-operative variables, including time-to-evaluation and time-to-treatment. No patient in this subgroup required orchiectomy for a necrotic gonad. Surgery was complicated by hematoma or scrotal swelling, requiring no further intervention, in 66 patients (17.9%-Clavien 1). Testicular atrophy developed in six patients (1.6%), of whom three patients required orchidectomy for persistent pain or infective complications (Clavien 3 b).

Discussion

Testicular torsion represents a frequent urological emergency, with an incidence of one in 4000 in boys younger than 25 years, and, if unrecognized, can lead to clinical and legal consequences. Several approaches have been proposed to the diagnosis and management of the testicular torsion. Some author prefer an 'interventional' approach; Tajchner et al. [3] evaluated a retrospective series of 119 patients undergoing scrotal exploration for testicular pain and according to the age, the most frequent finding in prepuberal, puberal and post-puberal patients was Morgagni cyst torsion (63%), spermatic cord torsion (46.8%) and Morgagni cyst torsion (50%), respectively, thus highlighting that an immediate surgical exploration is mandatory in all patients with a suspicion of spermatic cord torsion. In addition, in 2010 Molokwu et al. [4] evaluated the data regarding 173 consecutive patients, with an age ranging from 0–92 years, presenting with acute scrotum and undergoing scrotal exploration without previous imaging. In their series, 51% of patients had testicular torsion, supporting the immediate surgical approach in patients with acute scrotum; moreover 24% of the patients showed torsion of the testicular appendages and only 9% epididymo-orchitis; in addition, only 9% of the patients required an orchiectomy. In our series, the US data were concordant with the surgical findings in 74.2% of the cases, confirming the hypothesis of Molokwu et al. [4] that a surgical exploration is mandatory in patients with acute scrotum. Our data, nevertheless, are almost overlapping with the findings of Kalfa et al. [5] that reported that intratesticular vascularisation was absent in the affected testis in only 158/208 cases with spermatic cord torsion (76%) in a paediatric cohort. Moreover, as reported by Bandarkar et al., the presence of flow does not completely exclude a testicular

torsion, and in some cases the vascularisation seems to be symmetrical. On the other hand, Yang et al. [6] analysed a retrospective series of 1228 children hospitalized for acute scrotum, where ultrasound examination showed decreased or absent blood flow in 91.3% of the patients with testicular torsion; moreover, enlarged epididymis was found in 91.1 and 91.3% patients with torsion of the testicular appendix and epididymitis, respectively. At the moment, data regarding the concordance between US findings and clinical findings are sparse and not conclusive; nevertheless, as reported by Vargas-Blasco et al. [7], the scrotal-testicular pathology is the most frequent cause of medico-legal claims in the field of urology (34%). Since a misdiagnosis of a testicular torsion can lead both to clinical and medico-legal consequences, we think that a prompt surgical exploration could be considered mandatory in patients with acute scrotum. It is important, moreover, to highlight, that also timing represents a crucial point. Classically, the time window for testicular salvage is considered to be 6–8 h; in our cohort, 57% of the patients referred to ER department within 6 h from the onset of pain, but about 26% after more than 6 h. Mellick et al. [8] conducted a systematic review of the literature regarding the relationship between time to treatment and survival of the testis on 2116 patients, documenting that in the first 12 h this outcome reaches 90.4%, from 13 to 24 h the survival is 54% and beyond 24 h survival is 18.1%. These data, together with the other experiences in literature, highlighted the importance of an aggressive approach to the acute scrotum patients. Interestingly, 18.5% of the patients did not report pain at the time of evaluation (NPRS = 0). The reason for not reporting pain at the evaluation are variable and not fully assessed in the present study (might include: pain at home but not in the moment of hospital evaluation, painkillers before or upon ER access, self-detorsion of the testicle etc.). The indication for surgery, as for the rest of the patients, was pain (present or recent) plus objective and/or US suspicion of torsion.

As it might be noticed in our results, a high percentage of patients underwent fixation at the time of surgical procedure. In fact, most surgeons believe that when exploring a patient with an acute scrotum, it is advisable to perform a testicular fixation even in case no signs of torsion are found; this is the explanation of the relatively high percentage of patients who received fixation.

The main limitation of this study is the retrospective design. Moreover, the multicentric nature of the study might have impaired our ability to follow the same steps in patient's care. Although the same diagnostic-therapeutic protocol for acute scrotum was adopted, the logistic organisation differed in the individual centres. Not all patients have undergone the same investigations (e.g. US) and this represents an additional limit, as is the lack of data relating to pre and post-operative fertility. Anyhow, we tried to present differentiated analyses when possible, in order to clarify possible differences between groups of patients. Moreover, the present study is based on patient who underwent urgent surgical exploration, for this reason the study design was not adequate to evaluate different therapeutic pathways or to

provide meaningful insights on patients initially presenting to ER for acute scrotal pain who did not eventually undergo surgical exploration (for example with a diagnosis of acute epididymitis or epididymo/orchitis). Finally, our ability to fully assess the role of UC in acute scrotum was partially hindered by the purely surgical nature of the series, therefore further studies addressing the results of US in all patients presenting with acute scrotal pain would be helpful.

Conclusion

Testicular torsion management can be challenging in terms of time-saving decision making. Our data suggest that the sensitivity of scrotal US might be low in a non-neglectable number of cases, even in the contemporary era, therefore surgical exploration may be preferred in diagnosis and treatment of acute scrotum even when US shows vascularisation.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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