

ORIGINAL ARTICLE

Prognostic Factors for Pediatric Testicular Torsion Outcomes

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ABSTRACT

Introduction: Testicular torsion is a urological emergency causing spermatic cord twisting. Delayed management can cause poor outcome, i.e. orchiectomy. Here, we investigated several prognostic factors, including age, onset, clinical symptoms, leukocyte count, for testicular torsion outcomes (orchiectomy vs. orchiopexy) in children in Indonesia. **Methods:** A retrospective review of 23 patients with testicular torsion who underwent scrotal exploration from July 2013 to November 2018 at our institution was done. **Results:** The age at testicular torsion diagnosis was 12.8 (interquartile range, 4.6-15.1) years. Only fever showed strong significant prognostic factor for orchiectomy (OR=20; 95% CI=1.6 – 248; $p=0.017$), while other factors were not, with p -value of 0.54, 1.0, 1.0, 0.19, 1.0, 0.62, 0.62, 0.58, and 0.62, for age, onset, scrotal pain, abdominal pain, hyperemia, edema, nausea, vomitus and white blood cells count, respectively. Furthermore, logistic regression test also revealed that fever is a strong prognostic factor for orchiectomy (OR=22.6; 95% CI=1.3 – 394.2; $p=0.033$). **Conclusion:** The patient with testicular torsion with fever tends to undergo orchiectomy. Further multicenter studies with a larger sample size are necessary to confirm our findings.

Keywords: Fever, Orchiectomy, Prognostic factors, Testicular torsion

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INTRODUCTION

Testicular torsion is a urological emergency, which occurs when the spermatic cord becomes twisted resulting in decreases of the testicular vascularization and causing ischemia and infarction. Occlusion of gonadal blood vessels can cause testicular necrosis (1). Delay in surgical treatment can increase the risk of decreased testes viability and lead to a poor prognosis (2).

There are several prognostic factors that affect the testicular torsion outcomes (1-3). Here, we investigated several prognostic factors, including age, onset, clinical symptoms, leukocyte count, for testicular torsion outcomes (orchiectomy vs. orchiopexy) in children in Indonesia.

MATERIALS AND METHODS**Subjects**

We retrospectively reviewed the medical records of testicular torsion patients under 18 years who admitted to our institution, Indonesia from July 2013 to November 2018. The Medical and Health Research Ethics Committee of our institution gave approval for this study with number: (KE/FK/1371/EC/2018).

Prognostic factors and outcomes

We divided the onset of clinical manifestation as early (<6 hours) and delayed (≥ 6 hours) according to the onset of symptoms until surgery performed. We preferred this classification because previous studies showed that the rate of salvaged testes was approximately 90-100% if the treatment was performed at 6 h from onset of symptoms (2,4). The outcomes of this study were classified as orchiopexy (good) and orchiectomy (poor).

Statistical analysis

Data were presented as number and percentages for categorical variables and analyzed using the Fisher exact test. Multivariate analysis was conducted using a logistic regression test. Significant levels of difference were defined as $p < 0.05$ with 95% confidence intervals (CI). Data processing was done with IBM Statistical Package for Social Science (SPSS) software version 16 for Windows (IBM Corp., Chicago).

RESULTS

During the 5-year study period, we recruited 23 patients with testicular torsion, with the average age at testicular torsion diagnosis of 12.8 (interquartile range [IQR], 4.6-15.1) years. All patients have various clinical symptoms with most involving scrotal pain, edema and hyperemia in the scrotal area (Table I).

Among prognostic factors, only fever showed strong significant association as a prognostic factor for orchiectomy with Odds Ratio (OR) of 20 (95% CI=1.6

– 248; $p=0.017$), while other factors were not, with p -value of 0.54, 1.0, 1.0, 0.19, 1.0, 0.62, 0.62, 0.58, and 0.62, for age, onset, scrotal pain, abdominal pain, hyperemia, edema, nausea, vomitus and white blood cell counts, respectively (Table I).

Table I: Association between prognostic factors and testicular torsion outcomes in our institution

Characteristics	Outcomes		p	OR (95% CI)
	Orchiectomy (N, %)	Orchiopexy (N, %)		
Age (years)				
▪ <1	1 (20)	1 (5.6)	0.54	2.0 (0.1 – 28.0)
▪ 1-5	1 (20)	3 (16.7)		
▪ 5-10	0	2 (11.1)		
▪ 10-<18	3 (60)	12 (66.6)		
Onset (hours)				
▪ ≥ 6	5 (100)	17 (94.4)	1.0	0.9 (0.03 – 26.6)
▪ <6	0	1 (5.6)		
Scrotal pain				
▪ Yes	5 (100)	15 (83.3)	1.0	2.5 (0.1 – 56.2)
▪ No	0	3 (16.7)		
Abdominal pain				
▪ Yes	2 (40)	2 (11.1)	0.19	5.3 (0.5 – 54.0)
▪ No	3 (60)	16 (88.9)		
Hyperemia				
▪ Yes	3 (60)	10 (55.6)	1.0	1.2 (0.2 – 9.0)
▪ No	2 (40)	8 (44.4)		
Edema				
▪ Yes	3 (60)	13 (72.2)	0.62	0.6 (0.1 – 4.6)
▪ No	2 (40)	5 (27.8)		
Nausea				
▪ Yes	2 (40)	5 (27.8)	0.62	1.7 (0.2 – 13.7)
▪ No	3 (60)	13 (72.2)		
Vomitus				
▪ Yes	2 (40)	4 (22.2)	0.58	2.3 (0.3 – 19.2)
▪ No	3 (60)	14 (77.8)		
Fever				
▪ Yes	4 (80)	3 (16.7)	0.017*	20 (1.6 – 248)
▪ No	1 (20)	15 (83.3)		
White blood cell count (/mm ³)				
▪ $\geq 10,000$	3 (60)	13 (72.2)	0.62	0.6 (0.1 – 4.6)
▪ <10,000	2 (40)	5 (27.8)		

*, significant ($p<0.05$); OR, odds ratio; CI, confidence interval

Next, we performed a multivariate analysis and revealed that fever is also a strong prognostic factor for orchiectomy ($p=0.033$), with OR of 22.6 (95% CI=1.3 – 394.2), whereas other factors were not (Table II).

Table II: Multivariate analysis of prognostic factors and testicular torsion outcomes in our institution

Characteristics	p	OR (95% CI)
Abdominal pain	0.16	12.4 (0.4 – 416.7)
Vomitus	0.21	8.1 (0.3 – 214)
Fever	0.033*	22.6 (1.3 – 394.2)

*, significant ($p<0.05$); OR, odds ratio; CI, confidence interval

DISCUSSION

We are able to find fever as a strong prognostic factor for testicular torsion patients to undergo an orchiectomy (i.e. poor prognosis). Interestingly, fever has been shown to be a strong predictor factor for genital infection rather than testicular torsion (5). However, the study also noted that combination of variables instead of single variable can predict the cause of acute scrotum infection (5).

Our study only showed fever as a significant variable to predict the poor prognosis of testicular torsion.

Testicular torsion is an acute condition of the scrotum and an emergency case, and still a challenge in early diagnosis and management (6). Delay in diagnosis causes severe tissue damage resulting in the risk of removal of the testicles (i.e. orchiectomy) due to testicular necrosis. The incidence of torsion according to previous studies was 4.5 cases per 100,000 males younger than 18 years per year with rates of orchiectomy in these cases as much as 28% of all cases of testicular torsion (4). Other research reported that for a large number between 32-48% of cases of testicular torsion, an orchiectomy will be performed (3). In this study, the frequency of testicular torsion was 3.8 cases per year with the rate of orchiectomy being 21.7%.

The testicular torsion may occur at any age, with the most common age as neonates and adolescents in puberty (4). According to previous studies, the average age of testicular torsion events is between 11-17 years old (7). In this study, the average age at testicular torsion diagnosis was 12.8 years and the highest frequency (65.2%) was at puberty (10-<18 years). These findings are in line with a study by Boettcher et al. (2015), which reported that the median age of torsion testis occurs at the age of ten years (8).

In this study, the onset was calculated from the beginning of the complaint until the operation was performed. We found that only one patient came to the emergency unit of our hospital less than 6 hours (Table I). Interestingly, the onset of clinical manifestation until surgery performed was not associated with the outcome (Table I). These results are not compatible with previous studies (2-4). Research showed that the risk of orchiectomy increases three-fold higher in cases of delay compared to early surgical cases (2).

Most of our patients (87%) suffered from scrotal pain, although this variable did not significantly affect the outcome. These results were consistent with previous study that 95% of patients had some pain (4). In testicular torsion, abdominal pain can result from referred pain. Abdominal pain due to testicular torsion can cause misdiagnosis with acute abdomen due to appendicitis or incarcerated hernia, which may then delay the scrotal explorative surgery. Therefore, a thorough examination is needed to distinguish the abdominal pain due to testicular torsion or other causes. Inguinal pain may also occur in cases of testicular torsion with undescended testes (4). Our study showed that four patients had some abdominal pain (Table 1), but this finding did not correlate significantly with the outcome.

Nausea and vomitus may occur during testicular torsion (9). We found that seven (30.4%) and six (26.1%) patients presented with nausea and vomitus, respectively. Both

symptoms were not significantly associated with the outcome. These findings were consistent with previous studies that showed the frequency of nausea and vomitus were approximately 23% and 32-48%, respectively (4,9).

We also did not observe the association between edema and hyperemia and the outcomes of testicular torsion. According to previous study, hyperemia and edema are the most frequent complaints of testicular torsion (8,9). We found 13 (~60%) and 16 (~70%) patients had hyperemia and edema, respectively.

White blood cells (WBC) count was not significantly associated with the outcomes of testicular torsion in our study. Previous reports showed that WBC count is significantly greater in testicular torsion patients (10), however, most research did not differentiate between testicular torsion and epididymo-orchitis (11,12).

In addition, the average length of stay of our patients after orchiectomy was 4.6 days, while for those patients following orchiopexy it was 3.5 days. This finding is similar with a previous report revealing the mean length of stay after scrotal surgery is 3 (range, 2-5) days (4).

It should be noted that our study was a retrospective design, becoming a weakness of our study. Therefore, we did not have any data on: 1) the length of waiting time for patients between arrival in the emergency unit to have the operation conducted, and 2) diagnostic procedure (e.g. ultrasound) resulted in the delayed surgery. In addition, we have not routinely performed manual detorsion for testicular torsion before surgery.

CONCLUSION

The patient with testicular torsion with fever tends to undergo orchiectomy. Further multicenter studies with a larger sample size are necessary to confirm our findings.

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