

Factors Associated With Delayed Treatment of Acute Testicular Torsion—Do Demographics or Interhospital Transfer Matter?

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Purpose: Testicular torsion is a true urological emergency. We determined whether a delay in treatment due to hospital transfer or socioeconomic factors would impact the orchiectomy rate in children with this condition.

Materials and Methods: We retrospectively evaluated the records of boys seen at a single institution emergency department who proceeded to surgery for a diagnosis of acute testicular torsion from 2003 to 2008. Charts were reviewed for transfer status, symptom duration, race, insurance presence or absence and distance from the hospital. Orchiectomy specimens were evaluated for histological confirmation of nonviability.

Results: We reviewed 97 records. The orchiectomy rate in patients who were vs were not transferred to the emergency department was 47.8% vs 68.9%, respectively ($p = 0.07$). Symptom duration was greater in the orchiectomy group with a mean difference of 47.9 hours ($p < 0.01$). The mean transfer delay was 1 hour 15 minutes longer in the orchiectomy group ($p = 0.01$). Boys who underwent orchiectomy were 2.2 years younger than those who avoided orchiectomy ($p = 0.01$). Multivariate analysis showed that symptom duration and distance from the hospital were the strongest predictors of orchiectomy.

Conclusions: Data suggest that torsion is a time dependent event and factors that delay time to treatment lead to poorer outcomes. These factors include distance from the hospital and the time delay associated with hospital transfer.

Key Words: testis, spermatic cord torsion, hospitals, emergencies, orchiectomy

Abbreviations and Acronyms

ED = emergency department

Study received internal review board approval.

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† Financial interest and/or other relationship with Oceana.

ACUTE testicular torsion is a true urological emergency in which delay in diagnosis and management can lead to loss of the affected testicle. Orchiectomy rates vary widely in the literature but the factor that most influences survival of the affected testicle is time from torsion onset to definitive surgical exploration.^{1,2} Many children are transferred from 1 hospital to another emergently for treatment for acute scrotum. To our knowledge the delay in management from time of

hospital transfer, if any, has never been evaluated in regard to the testicular orchiectomy rate. Reasons for transfer may be multiple and vary among hospitals. Socioeconomics of patients at these hospitals may also vary greatly among hospitals.^{3,4}

To our knowledge neither the impact of hospital transfer on surgical outcomes in children with torsion nor the demographics of those transferred and treated for torsion have been previously evaluated. We hypothesized

that insurance status and race are potential factors that could affect the surgical outcome in patients with testicular torsion. We tested this theory by reviewing our institutional experience.

METHODS

Using an internal review board approved study protocol we retrospectively evaluated the records of children seen at a single institution ED between 2003 and 2008 who proceeded to surgery due to a diagnosis of acute testicular torsion. The diagnosis was made before surgery and confirmed at surgery. We excluded from analysis 1 child seen initially at the urology clinic who went on to surgery without being seen at the ED as well as children diagnosed with intermittent testicular torsion and neonatal torsion.

We reviewed the charts for demographic information, transfer status, distance from the hospital, time from transfer initiation to hospital arrival, preexisting systemic illness affecting age appropriate expression of pain (secondary diagnosis), symptom duration and whether the child had been seen in the days before surgery for the same or a similar complaint (table 1). Symptom duration was recorded as the time reported to the first ED physician who treated the patient. In transferred boys in whom the actual time of symptom onset was unknown we calculated symptom duration by subtracting transfer time from the reported symptom duration upon arrival at our institution. Race was characterized as white or nonwhite minority. In most cases the reason for transfer could not be determined and, hence, was not included in analysis. Orchiectomy specimens were evaluated for histological confirmation of nonviability. Specimens with only necrotic tissue or extensive hemorrhage with no normal tissue were considered nonviable.

Patients were identified and cross-referenced using 3 databases. 1) The operating room procedure database was searched for patients with CPT codes for scrotal exploration with orchiectomy and testicular fixation (54520, 54600, 54620, 54640, 54690, 55110 and 54530). 2) This patient list was cross-referenced with the ED database of all patients seen in the same period to ensure that all had been triaged in the ED. 3) We used the hospital transfer

center database to identify which patients in the group had been transferred.

Descriptive statistics were calculated for patient cohorts. Categorical data were analyzed using the chi-square distribution. Continuous data were analyzed using the paired independent sample t test with p values considered significant at $\alpha \leq 0.05$. In addition to the univariate analysis, we determined the combined effect of multiple variables on surgical outcome. Variables at univariate $p < 0.15$ were modeled together and assessed by logistic regression. The statistical significance of each regression coefficient was determined using the likelihood ratio statistic. This model was reduced by backward elimination and assessed for lack of fit using cumulative residuals. Interactions were assessed among the parameters remaining in the reduced model. In the final multivariate model each independent variable was assessed and only those significant at 0.05 and interactions significant at 0.10 were retained. Variables of clinical interest were also evaluated in the final model.

RESULTS

During the study period 144 boys underwent surgical exploration for a diagnosis of testicular torsion. We excluded 47 cases from study due to a diagnosis of intermittent torsion, torsion of the appendix testis, surgical exploration revealing epididymitis or neonatal torsion, leaving 97 records available for review. Of the children 62 underwent orchiectomy and 35 underwent orchiopexy. Table 1 lists demographics in boys who were transferred vs those who presented to the hospital initially. Those who were vs were not transferred had a mean age of 11.1 vs 11.7 years ($p = 0.53$) and a mean pain duration of 35.3 vs 40.8 hours ($p = 0.04$). Mean distance from home to hospital was 35.3 vs 20.1 miles ($p = 0.48$). In the transferred vs nontransferred groups 13 of 23 (56.5%) vs 52 of 57 patients (91.2%) had no private insurance ($p = 0.07$) and 13 (56.5%) vs 52 (91.2%) had minority ethnicity ($p = 0.05$). Subgroup analysis of insurance status and race showed that Hispanic patients were less likely to have private insurance than nonHispanic patients (12 of 35 or 34.3% vs 32 of 53 or 60.4%, $p = 0.02$). This insurance discrepancy was not seen when comparing black to nonblack American patients ($p = 0.37$).

Evaluation of distance from the hospital in regard to race revealed that minority patients lived closer to the hospital than white patients (mean distance 37.6 vs 17.8 miles, $p < 0.01$). Having private insurance did not vary by distance (nonprivate vs private 23.7 vs 23.7 miles, $p = 0.29$). When controlling for race, insurance status still did not vary by distance.

The orchiectomy rate in boys who were vs were not transferred to the ED was 47.8% (11 of 23) vs 68.9% (51 of 74) ($p = 0.07$, table 2). When symptom duration was limited to 36 hours or less, the transfer and nontransfer groups had more similar orchiec-

Table 1. Univariate analysis of factors affecting transfer status

Variable	No. Not Transferred (%)	No. Transferred (%)	p Value
Primary language:	68	21	1.00
English	59 (86.8)	19 (90.54)	
Spanish	9 (13.2)	2 (9.5)	
Minority:	67	23	0.05
No	15 (22.4)	10 (43.5)	
Yes	52 (77.6)	13 (56.5)	
Private insurance:	74	23	0.07
No	32 (43.2)	15 (65.2)	
Yes	42 (56.8)	8 (34.8)	
Secondary diagnosis:	74	23	1.00
No	65 (87.8)	21 (91.3)	
Yes	9 (12.2)	2 (8.7)	

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