Pediatric Testicular Torsion: Demographics of National Orchiopexy Versus Orchiectomy Rates

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Purpose: While the timely diagnosis and management of pediatric torsion can lead to testicular salvage, limited data exist on rates of orchiopexy vs orchiectomy and associated factors. Thus, we examined the Pediatric Health Information System database for torsion outcomes and demographics at American pediatric hospitals.

Materials and Methods: Using the Pediatric Health Information System database we performed a 7-year retrospective cohort study in children 1 to 17 years old with a primary ICD-9 diagnosis of torsion, assessing CPT codes for orchiopexy and orchiectomy. Data were analyzed with SPSS®, version 17.0.

Results: Of 2,876 patients who underwent surgery for an ICD-9 diagnosis code of testicular torsion 918 (31.9%) underwent orchiectomy at a mean age of 10.7 years and 1,958 (68.1%) underwent orchiopexy at a mean age of 12.6 years ($p < 0.0001$). In the age groups 1 to 9, 10 to 13 and 14 years or greater 274 (49.9%), 311 (29.4%) and 333 patients (26.2%), respectively, underwent orchiectomy. A higher orchiectomy rate was seen at age 1 to 9 vs 10 years or greater. Torsion and orchiectomy rates did not vary by season or geographic region. A higher orchiectomy rate was seen in black vs white children (37.6% vs 28.1%) and in patients without vs with private insurance (36.7% vs 27.0%). Multivariate analysis revealed an association of age ($p < 0.0001$), race ($p < 0.0001$) and insurance status ($p < 0.001$) with orchiectomy.

Conclusions: Nationally an average of 32% of the 411 pediatric torsion cases explored annually result in orchiectomy. Identified factors increasing the orchiectomy risk included age 1 to 9 years, black race and lack of private insurance. Efforts should continue to identify modifiable variables that can increase testicular salvage in patients with testicular torsion.

Key Words: testis, spermatic cord torsion, orchiectomy, orchiopexy, demography

Abbreviations and Acronyms

NC = north central
NE = northeast
NIS = Nationwide Inpatient Sample
NW = northwest
PHIS = Pediatric Health Information System database
SC = south central
SE = southeast
SW = southwest

Study received institutional review board approval.

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TESTICULAR torsion is a surgical emergency that is unfortunately common with an incidence of 1/4,000 males younger than 25 years.[1] With prompt recognition appropriate management can lead to testicular salvage via detorsion and orchiopexy. However, barriers to a timely diagnosis can result in testicular loss and orchiectomy. Limited data exist on the rates of orchiopexy vs orchiectomy for torsion management and associated risk factors predisposing a patient to orchiectomy. Previous groups have attempted to link the risk of testicular loss to factors such as age, race, insurance status, season and region of presentation with mixed results and an

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inability to define risk factors.[2–5] For example, a recent study using a national database to investigate this issue showed that age greater than 10 years was a risk factor for orchiectomy[3] while another study showed that younger patients were more likely to undergo orchiectomy.[2] Using PHIS we identified demographic factors predisposing patients to testicular torsion and subsequent orchiectomy or orchiopexy.

MATERIALS AND METHODS

Patient Population

Using institutional review board approved methods we performed a retrospective cohort study between 2003 and 2009. PHIS was queried for visits with a primary ICD-9 code diagnosis of testicular torsion (608.2). CPT codes were then assessed for orchiopexy or testicular torsion reduction (54600, 54620, 54640, 54650 and 54800) and orchiectomy (54520). Patients 1 to 17 years old were included in analysis but we excluded infants younger than 1 year since this study did not focus on neonatal torsion.

Data Source

PHIS consists of data contributed by 42 nonprofit, freestanding pediatric hospitals. The primary ICD-9 code is designated in PHIS as the diagnosis that led to presentation to the facility.

Study Design

We extracted data on patients who met our study criteria, including hospital admission and discharge dates, admission site, race, age and insurance status. These variables were selected since they were previously linked to testicular torsion and the risk of orchiectomy or orchiopexy, and were extractable from PHIS.[2–4] The study end point was orchiopexy vs orchiectomy.

Age was categorized as prepubertal (9 years or less), pubertal (10 to 13 years) and postpubertal (14 years or greater) based on a prior study of the rate of orchiectomy for torsion[3] and existing data on puberty timing.[6] Each case was assigned to a season of presentation, including winter, spring, summer or fall. Insurance status was categorized as private insurance vs governmental aid or nonfunded. Presentation site was assigned to regions, including NE, NC, NW, SE, SC and SW. PHIS comprises 7 hospitals (16.7%) in the NE, 12 (28.6%) in the NC, 3 (7.1%) in the NW, 11 (26.2%) in the SE, 5 (11.9%) in the SC and 4 (9.5%) in the SW region.

Data Analysis

Using these demographic factors we compared children who underwent orchiopexy vs orchiectomy for testicular torsion. Using SPSS, version 17.0 all data were compared by nonparametric statistical analysis with the Mann-Whitney test for continuous variables and the chi-square test for categorical variables to calculate the OR. After univariate analysis any statistically significant variable was added to multivariate Cox regression analysis to calculate the adjusted OR. In all analyses $p < 0.05$ or a 95% CI not crossing 1.0 was considered significant.

RESULTS

We identified 2,876 unique patients diagnosed with torsion in the 7-year study period, that is 411 cases annually. Mean age was 11.9 years, including 1 to 9, 10 to 13 and 14 years or greater in 549 (19.1%), 1,059 (36.8%) and 1,268 patients (44.1%), respectively. Of patients who underwent exploration orchiectomy was done in 918 (31.9%) at a mean age of 10.7 years and orchiopexy was done in 1,958 (68.1%) at a mean age of 12.6 years, demonstrating a significant difference for younger age in those with orchiectomy ($p < 0.0001$). To investigate this further we analyzed each age group. Of those 1 to 9 years old 274 (49.9%) underwent orchiectomy vs 311 (29.4%) 10 to 13 years old and 333 (26.2%) 14 years or older, demonstrating a higher orchiectomy rate in patients 1 to 9 vs 10 years or older (OR 2.6, 95% CI 2.15–3.15, see figure). Thus, children 1 to 9 years old represented 19.1% of those with torsion overall but 29.8% of those with orchiectomy for torsion in our cohort.

We investigated the role of seasonal variation. Of the patients 792 (27.5%), 827 (28.8%), 616 (21.4%) and 641 (22.3%) presented in the winter, spring, summer and fall, respectively ($p > 0.05$). A total of 264 (33.3%), 265 (32.0%), 180 (29.2%) and 209 cases (32.6%) were managed by orchiectomy, respectively ($p > 0.05$).

When assessing for regional variation, 381 (13.2%), 743 (25.8%), 55 (1.9%), 881 (30.6%), 553 (19.2%) and 263 patients (9.1%) presented with testicular torsion in the NE, NC, NW, SE, SC and SW regions, respectively ($p > 0.05$). Of these cases 138 (36.2%), 218 (29.3%), 22 (40.0%), 261 (29.6%), 186 (33.6%) and 93 (35.4%) were managed by orchiectomy, respectively ($p > 0.05$).

The racial distribution was 1,671 patients (58.2%) identified as white, 872 (30.3%) identified as black and 333 (11.5%) identified as other or with unavailable racial/ethnic information. At surgery a higher rate of orchiectomy was seen in black than in white patients (37.6% vs 28.1%, OR 1.55, 95% CI 1.29–1.84).

When assessing insurance status, 2,193 children (76.3%) had data available, including 1,063 with private insurance while 1,130 had no coverage, were self-payors or had government assistance. We found a higher orchiectomy rate in patients who had no coverage, were self-payors or had government assistance than in those with private insurance (36.7% vs 27.0%, OR 1.57, 95% CI 1.31–1.88).

After identifying on univariate analysis the statistically significant risks as age 1 to 9 vs 10 years or greater, nonprivate vs private insurance and black vs white race we performed Cox regression multivariate analysis in the 1,939 patients (67.4%) with complete PHIS data. A significant association was