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Original Article

Hidden risks, timely solutions: pediatric penoscrotal trauma and clinical outcomes

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ABSTRACT

Objective: Pediatric penoscrotal trauma, though relatively uncommon, can lead to significant clinical consequences. These injuries, predominantly caused by blunt mechanisms, can also result from penetrating trauma, potentially leading to severe complications. Ultrasonography serves as a critical diagnostic tool, with timely surgical intervention being crucial, particularly in testicular rupture. This study aimed to evaluate the injury mechanisms, diagnostic processes, and treatment outcomes in pediatric patients sustaining penoscrotal trauma.

Material and Methods: This retrospective observational study included 31 male patients under 18 years old treated for isolated penoscrotal trauma from October 2020 to July 2024. Data collected included demographics, trauma type, injury mechanisms, ultrasonographic findings, and treatment methods. Patients were categorized into blunt and penetrating trauma groups, with age distribution and ultrasonographic follow-up comparisons conducted. SPSS version 25.0 was used for statistical analysis, and $p<0.050$ was considered statistically significant.

Results: The mean patient age was 8.94±3.52 years. Scrotal trauma accounted for 64.5% of cases, penile trauma 32.3%, and combined penoscrotal trauma 3.2%. Penetrating trauma (58.1%) was more prevalent than blunt trauma (41.9%), with bicycle accidents being the most frequent cause (38.7%). Most penetrating injuries required surgical intervention (15 patients), while blunt injuries were typically managed conservatively (10 patients). No significant difference in testicular volume was observed during follow-up ultrasonography among blunt trauma patients ($p=0.068$).

Conclusion: Management strategies for pediatric penoscrotal trauma differ based on trauma type. Early diagnosis and appropriate intervention appear essential for preserving testicular function and morphology.

Keywords: Chilhood trauma, doppler, genitourinary injury, ultrasonography

INTRODUCTION

Penoscrotal trauma is a rare but potentially severe condition among children. Although uncommon, scrotal injuries bear significant clinical importance, accounting for less than 1% of all trauma cases (1,2). However, conditions like testicular rupture may jeopardize future fertility and require prompt and appropriate intervention (2–4).

The most common causes of penoscrotal trauma in children include blunt mechanisms such as falls, sports-related injuries, and bicycle accidents, although penetrating injuries also constitute a significant portion (4–6). Intratesticular hematomas from blunt trauma can progress to testicular rupture, often requiring surgical intervention (7,8).

Physical examination is vital in diagnosing scrotal trauma but can be hindered by acute-phase pain, swelling and edema (1). Ultrasonography, however, remains an invaluable diagnostic tool, identifying key indicators of testicular rupture such as heterogeneous echotexture and disrupted testicular contours (4,9,10). Doppler ultrasound additionally provides crucial information on testicular perfusion (11,12).

Numerous studies emphasize the importance of early surgical intervention in the management of penoscrotal trauma (4,13).

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Conservative management of testicular rupture is generally discouraged due to the risk of severe complications, including infection and testicular atrophy (7,8).

This study aimed to evaluate the injury mechanisms, diagnostic processes, and treatment outcomes in pediatric patients sustaining penoscrotal trauma.

MATERIALS and METHODS

Patients under 18 treated for isolated penoscrotal trauma between October 2020 and July 2024 were included. Exclusion criteria encompassed patients with incomplete medical records, significant concomitant injuries, or unavailable follow-up data.

Collected data included patient age, injury location (penile, scrotal, or penoscrotal), trauma type (blunt or penetrating), injury mechanism (fall, collision, bicycle accident, direct blow, traffic accident, animal bite), treatment method (surgical or conservative), ultrasonography (US) findings, follow-up duration, and if available, control US results.

Patients were categorized into blunt and penetrating trauma groups, and the age distribution was compared statistically. Testicular volume changes post-blunt trauma was also assessed using US follow-up.

Data were analyzed using IBM Statistical Package for the Social Sciences, version 25.0 (SPSS Inc., Armonk, NY, IBM Corp., USA). Continuous variables were reported as mean±SD; categorical variables were expressed as frequencies and percentages. The relationships between trauma type, mechanism, treatment modality, and ultrasonographic findings were assessed using the chi-square test. A comparison of the age of participants was conducted using an independent sample t-test according to trauma type, and an analysis of variance (ANOVA) test according to trauma mechanism. A p-value of less than 0.050 was considered statistically significant.

RESULTS

Thirty-one male patients were included, with an average age of 8.94 ± 3.52 years. Injury distribution comprised scrotal trauma (64.5%), penile trauma (32.3%), and combined penoscrotal trauma (3.2%). Penetrating trauma (58.1%) surpassed blunt trauma (41.9%), with bicycle accidents being the primary cause (38.7%). No significant associations were found between trauma type or mechanism and patient age (p=0.933 and p=0.342) (Table I).

Ten blunt trauma cases were conservatively managed; three required surgical intervention. Conversely, most penetrating trauma patients underwent surgery, with only three receiving conservative care. Among blunt trauma cases, US revealed normal or unnecessary imaging in five patients, while in penetrating trauma, eight had normal imaging, and six required no US.

Table I: Comparison of patient age according to trauma type and trauma mechanism

	Age*	p†
Trauma type		
Blunt trauma	9±4.5 (3-16)	0.933
Penetrating trauma	8.9±2.7 (4-14)	
Trauma mechanism		
Motor-vehicle accident	7.5±6.3 (3-12)	0.342
Bicycle accident	9.3±2.7 (6-14)	
Direct blow (Knee, Punch)	11.2±4.8 (6-16)	
Fall/collision	7.5±3.1 (3-13)	
Animal bite	11 (11)	

**: mean±SD (min-max), †: ANOVA test used*

Table II: Comparison of testicular volume after trauma and at follow-up in patients with blunt scrotal trauma

	Testis volume (ml)		follow up (month)*	p†
	After trauma	Control		
Age‡				
6	1.73	1.75	5.44±0.8	0.068
14	10.23	10.18		
14	9.68	9.62		
6	2.12	2.23		
16	16.34	16.38		
12	4.82	4.9		
14	11.45	11.61		
10	2.88	2.93		
7	2.67	2.8		

**: (month) (mean ±SD), †: paired sample t test used, ‡: year*

Testicular volume measurements conducted in nine blunt trauma patients showed no significant difference from initial to follow-up ultrasounds (p=0.068), suggesting minimal long-term impact on testicular volume (Table II). This finding suggests that blunt scrotal trauma does not result in significant long-term impact on testicular volume. Furthermore, in the 3 patients who underwent surgical intervention, the absence of significant changes in testicular volume supports the notion that timely surgical management plays a critical role in preserving testicular function and morphological integrity.

DISCUSSION

This study thoroughly evaluated demographic and clinical characteristics of pediatric penoscrotal trauma cases. Contrary to literature indicating predominantly blunt trauma (75-80%), our cohort showed a higher incidence of penetrating trauma (58.1%), possibly due to regional factors influencing injury mechanisms (14,15).

Penetrating trauma typically requires surgical intervention, aligning with our findings (16,17). Consistent with these findings, our study also demonstrated that most patients with

penetrating injuries required surgical management. Furthermore, similar to previous reports, our results showed that the majority of patients with blunt trauma could be successfully managed through conservative treatment approaches (18,19).

Consistent with global studies, bicycle accidents were the predominant trauma mechanism, emphasizing the need for protective gear use (14,20). This highlights the need to raise awareness regarding the importance of protective equipment use during bicycle riding.

Finally, the absence of significant changes in testicular volume during follow-up suggests that early and appropriate intervention positively influences long-term outcomes. Similar findings have been reported in the literature, indicating that testicular volume and function are preserved in pediatric patients who receive timely and appropriate management (2,21).

Limitations include retrospective design, limited sample size, and short follow-up, restricting long-term functional and fertility assessments. Future prospective studies with larger cohorts are recommended to enhance result reliability.

CONCLUSION

The study suggests trauma type significantly influences treatment strategies for pediatric penoscrotal injuries. US emerges as a valuable diagnostic tool, and early, appropriate intervention appears critical for preserving testicular morphology and function.

Ethics committee approval

This study was conducted in accordance with the Helsinki Declaration Principles. This study has been approved by the Ankara Bilkent City Hospital Ethics Committee (TABED: 2-24-476/18.09.2024).

Contribution of the authors

Bostancı SA: Constructing the hypothesis or idea of research and/or article, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in necessary literature review for the study, Taking responsibility in the writing of the whole or important parts of the study. ***Erten EE:*** Constructing the hypothesis or idea of research and/or article, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments. ***Ertürk A:*** Planning methodology to reach the conclusions, Reviewing the article before submission scientifically besides spelling and grammar. ***Öztorun Cİ:*** Planning methodology to reach the conclusions, Reviewing the article before submission scientifically besides spelling and grammar. ***Çayhan VS:*** Taking responsibility in logical interpretation and conclusion of the results. Akbaş İ: Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments. ***Abay AN:*** Taking responsibility in logical interpretation and conclusion of the results. ***Demir S:*** Constructing the hypothesis or idea of research and/or article, Taking responsibility in the writing of the whole or important parts of the study. ***Azılı MN:*** Organizing, supervising the course of progress and taking the responsibility of the research/study. ***Şenel E:*** Organizing, supervising the course of progress and taking the responsibility of the research/study.

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Conflict of interest

The authors declare that there is no conflict of interest.

REFERENCES

1. Randhawa H, Blankstein U, Davies T. Scrotal trauma: A case report and review of the literature. Can Urol Assoc J. 2019;13(6 Suppl4):67-71. https://doi.org/10.5489/cuaj.5981.
2. Sadjo SA, Destinval C, Lemelle JL, Berte N. Testicular rupture after blunt scrotal trauma in children: A case report and literature review. Trauma Case Rep. 2021;33:100482. https://doi.org/10.1016/j.tcr.2021.100482.
3. Liguori G, Pavan N, d'Aloia G, Bucci S, de Concilio B, Mazzon G, et al. Fertility preservation after bilateral severe testicular trauma. Asian J Androl. 2014;16(4):650-1. https://doi.org/10.4103/1008-682X.126016.
4. Li M, Chen J, Li F. Management of testicular rupture following blunt scrotal trauma. Asian J Surg. 2024;47(2):1021-2. https://doi.org/10.1016/j.asjsur.2023.10.088.
5. Sallami S, Khouni H, Ichaoui H, Ben Atta M, Abou El Makarim S, Ben Rhouma S. Blunt scrotal trauma in adults: A multi-institution study evaluating the American Association for the Surgery of Trauma organ injury grading scale About 107 cases. Tunis Med. 2017;95(5):331-5.
6. Hunter SR, Lishnak TS, Powers AM, Lisle DK. Male genital trauma in sports. Clin Sports Med. 2013;32(2):247-54. https://doi.org/10.1016/j.csm.2012.12.012.
7. Bowen DK, Gonzalez CM. Intratesticular hematoma after blunt scrotal trauma: a case series and algorithm-based approach to management. Cent European J Urol. 2014;67(4):427-9. https://doi.org/10.5173/ceju.2014.04.art24.
8. Papathanassiou ZG, Michalopoulou K, Alexopoulos V, Panagidis A. Testicular Rupture: Clinical, Sonographic, and Surgical Correlation in an Adolescent Patient. Cureus. 2025;17(2):e78688. https://doi.org/10.7759/cureus.78688.
9. Guichard G, El Ammari J, Del Coro C, Cellarier D, Loock PY, Chabannes E, et al. Accuracy of ultrasonography in diagnosis of testicular rupture after blunt scrotal trauma. Urology. 2008;71(1):52-6. https://doi.org/10.1016/j.urology.2007.09.014.
10. Buckley JC, McAninch JW. Use of ultrasonography for the diagnosis of testicular injuries in blunt scrotal trauma. J Urol. 2006;175(1):175-8. https://doi.org/10.1016/S0022-5347(05)00048-0.
11. Owen CA, Winter T. Color Doppler Imaging of the Scrotum. Journal of Diagnostic Medical Sonography. 2006;22(4):221-30. https://doi.org/10.1177/8756479306290483.
12. Gupta A, Dogra V. Role of color flow Doppler ultrasound in the evaluation of acute scrotal pain. Andrology. 2021;9(5):1290-7. https://doi.org/10.1111/andr.13058.

13. Kim MJ, Lee DH, Park DH, Lee IJ. Multivariate analysis of early surgical management factors affecting posttraumatic penoscrotal avulsion injury: a level I trauma center study. BMC Urol. 2021;21(1):7. https://doi.org/10.1186/s12894-020-00763-7.
14. Grigorian A, Livingston JK, Schubl SD, Hasjim BJ, Mayers D, Kuncir E, et al. National analysis of testicular and scrotal trauma in the USA. Res Rep Urol. 2018;10:51-6. https://doi.org/10.2147/RRU.S172848.
15. Lynch TH, Martínez-Piñeiro L, Plas E, Serafetinides E, Türkeri L, Santucci RA, et al. EAU guidelines on urological trauma. Eur Urol. 2005;47(1):1-15. https://doi.org/10.1016/j.eururo.2004.07.028.
16. Pogorelić Z, Jurić I, Biočić M, Furlan D, Budimir D, Todorić J, et al. Management of testicular rupture after blunt trauma in children. Pediatr Surg Int. 2011;27(8):885-9. https://doi.org/10.1007/s00383-011-2873-9.
17. Wald M. Scrotal Trauma Treatment and Outcomes. WMJ. 2024;123(4):166-71.
18. Dalton DM, Davis NF, O'Neill DC, Brady CM, Kiely EA, O'Brien MF. Aetiology, epidemiology and management strategies for blunt scrotal trauma. Surgeon. 2016;14(1):18-21. https://doi.org/10.1016/j.surge.2014.06.006.
19. Redmond EJ, Mac Namara FT, Giri SK, Flood HD. Blunt testicular trauma - is surgical exploration necessary? Ir J Med Sci. 2018;187(4):1109-13. https://doi.org/10.1007/s11845-017-1724-7.
20. Terrier R, Degache F, Fourchet F, Gojanovic B, Forestier N. Assessment of evertor weakness in patients with chronic ankle instability: Functional versus isokinetic testing. Clin Biomech (Bristol). 2017;41:54-9. https://doi.org/10.1016/j.clinbiomech.2016.12.002.
21. Patterson K, Hennessey DB, O'Kelly F. A scoping review of historical and contemporary management strategies for paediatric scrotal trauma. Ir J Med Sci. 2025. https://doi.org/10.1007/s11845-025-03929-0.