



# Open Journal of Pediatrics & Neonatal Care

## Research Article

# Testicular Loss following Orchidopexy for Unilateral Testicular Torsion in Children: A 5-Year Experience - ②

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**Submitted:** 26 April, 2022; **Approved:** 04 May, 2022; **Published:** 05 May, 2022

**Citation this article:** Chukwubuiké KE, Anijunsi LP, Eze TC. Testicular Loss following Orchidopexy for Unilateral Testicular Torsion in Children: A 5-Year Experience. Open J Pediatr Neonatal Care. 2022; May 05;7(1): 001-05.

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## ABSTRACT

**Background:** Testicular torsion is a urological emergency necessitating emergent intervention. It occurs when the testis twists around its spermatic cord leading to impaired blood supply and may result in testicular atrophy (loss).

**Materials and Methods:** This was a prospective study of children aged 15 years and below who were managed for unilateral testicular torsion between January 2016 and December 2020 at the pediatric surgery unit of Enugu State University Teaching Hospital (ESUTH) Enugu, Nigeria. A total of 82 cases of unilateral testicular torsion were managed during the study period. The mean age of the patients was 11 years with a range of 1 month to 15 years. On presentation with clinical features of testicular torsion, the patients were clinically evaluated and an ultrasound to evaluate the volumes of both testes was performed. Bilateral orchidopexy was done and at least 6 months post orchidopexy, a repeat ultrasound was again performed to assess for any change in testicular volume relative to the contralateral testis.

**Results:** Testicular pain was a consistent symptom in all the patients and 360 degrees of testicular torsion was the most common extent of the twist. All the patients had bilateral orchidopexy. About 20% of the patients had a significant reduction in testicular volume. Surgical site infection was the most common post-operative complication and none of the patients expired.

**Conclusion:** Although detorsion and orchidopexy corrects and stabilizes the torsed testis, this study has shown that about one-fifth of the patients may come down with testicular atrophy despite the orchidopexy.

**Keywords:** Atrophy; Children; Orchidopexy; Testicular loss; Ultrasound

## INTRODUCTION

Testicular torsion is a urological emergency necessitating emergent intervention. It occurs when the testis rotates around its spermatic cord leading to impaired blood supply and possible permanent testicular atrophy [1]. The severity of testicular ischemia varies and is dependent on the time period from onset of symptom to the reduction of the torsion as well as the extent of the spermatic cord rotation. These are the important factors determining testicular damage [2]. Testicular torsion has a peak presentation in adolescence, between 12 years and 16 years [3, 4]. However, testicular torsion can occur at any age. The classic presentation of testicular torsion is acute and alarming testicular pain at rest. However, the presentation of testicular torsion may be variable. Nausea and vomiting may also occur [5]. Testicular tenderness is a consistent finding in testicular torsion. Abnormal testicular lie and absence of cremasteric reflex are also common. For testicular salvage, time is of the essence—the earlier the surgical intervention, the higher the likelihood of testicular salvage. Due to the fact that time of treatment of testicular torsion is related to the success of testicular salvage. Efforts have been made to treat torsion promptly while decreasing the number of negative explorations. Some scoring systems have been postulated to assist in the early treatment of testicular torsion. One of such scoring system is the one proposed by Barbosa and his colleagues [6]. Color Doppler ultrasound provides a rapid assessment of the vascularity of the testis and it is highly sensitive and specific in diagnosing testicular torsion [5]. The aim of this study was to evaluate the incidence of testicular loss following testicular torsion in children. For the purpose of this study, testicular loss or atrophy is defined as loss of testicular volume of more than 50% when compared to the contralateral testis [7].

## MATERIALS AND METHODS

This was a prospective study of children aged 15 years and below who were managed for unilateral testicular torsion between January 2016 and December 2020 at the pediatric surgery unit of Enugu State University Teaching Hospital (ESUTH) Enugu, Nigeria. Only children who had unilateral testicular torsion were recruited; those with bilateral testicular torsion were excluded. Consecutive patients with unilateral testicular torsion who presented during the study period were recruited into the study. A total of 82 cases of unilateral

testicular torsion were managed during the study period. Children who had orchidectomy for gangrenous testis and those older than 15 years of age were also excluded. ESUTH is a tertiary hospital located in Enugu, South East Nigeria. The hospital serves the whole of Enugu State, which according to the 2016 estimates of the National Population Commission and Nigerian National Bureau of Statistics, has a population of about 4 million people and a population density of 616.0/km<sup>2</sup>. The hospital also receives referrals from its neighboring state.

### Pre-operative protocol

On presentation with clinical features of testicular torsion, the patients were clinically evaluated and an ultrasound to evaluate the volumes of both testes was performed. The ultrasound machine used was a commercially available, real time scanner with 5-MHz linear transducer (TITAN; Sonosite Inc, Bothell, WA, USA). The ultrasound measurement of testicular volume were calculated using the Lambert formula: Length (L) x Width (W) x Height (H) x 0.71, where L is the longitudinal diameter, W is the anteroposterior diameter and H is the transverse diameter. At least, two measurements of each of the diameters were made and the average taken. This minimized observer variations. The testicular volume was calculated automatically by the ultrasound machine and documented in centimeter<sup>3</sup> (cm<sup>3</sup>). The follow-up period was 6 months. Ethical approval was obtained from the ethics and research committee of ESUTH and informed consent was obtained from the patients' caregivers. Statistical Package for Social Science (SPSS) version 21 (manufactured by IBM Corporation Chicago Illinois) was used for data entry and analysis. Data were expressed as percentages, median, mean, and range.

### Operative procedure

Under general anesthesia and through a scrotal incision, both testes were fixed to the scrotum. The wound was closed in layers

### Post-operative protocol

Analgesics and antibiotics were given and scrotal support provided. The patients were discharge home following adequate wound healing. At least, 6 months post orchidopexy, a repeat ultrasound was performed to assess for any change in testicular volume relative to the contralateral testis. Any loss of testicular

volume of more than 50% when compared to the contralateral testis is considered testicular atrophy.

### Data collection

The information extracted included the age of the patient, presenting symptoms, duration of symptoms before presentation, time interval between presentation and surgery, intra-operative finding (degree of torsion), operative procedure performed, complications of treatment, duration of hospital stay and outcome of treatment.

## RESULTS

### Patients' demographics

The mean age of the patients was 11 years with a range of 1 month to 15 years. The mean duration of symptoms prior to presentation was 18 hours (range: 6-92 hours) and the mean duration from presentation to surgery was 1 hour (range: 1-2 hours). The median duration of hospital stay was 72 hours.

### Presenting symptom and side of the torsion

All the patients had testicular pain. In addition, non-specific symptoms such as vomiting, lower abdominal pain and fever were documented in 23 (28%) patients. Fifty-one (62.2%) patients had left testicular torsion while 31 (37.8%) had right testicular torsion.

### Intra-operative finding (degree of torsion)

The degree of testicular torsion is shown in table 1.

### Operative procedure performed

All the patients had bilateral orchidopexy. Patients who had orchidectomy for non-viable testis were excluded from the study.

### Testicular volumes

These are reflected in table 2.

### Complications of treatment

Wound infection occurred in 11 (13.4%) patients, stitch abscess happened in 5 (6.1%) and an unusual prolonged bleeding was documented in 2 (2.4%) patients.

**Table 1:** Degree of testicular torsion.

| Degree of torsion | Number of patients (%) |
|-------------------|------------------------|
| 180°              | 6 (7.3)                |
| 270°              | 18 (22)                |
| 360°              | 41 (50)                |
| 450°              | 9 (11)                 |
| 720°              | 8 (9.7)                |

**Table 2:** Testicular volumes (pre-op and post-op).

| Mean testicular volume             |                           |
|------------------------------------|---------------------------|
| At presentation [all the patients] | 1.7 ± 0.4 cm <sup>3</sup> |
| At least 6 months post-op          |                           |
| 66 (80.5%) patients                | 1.7 ± 0.2 cm <sup>3</sup> |
| 16 (19.5%) patients                | 0.8 ± 0.3 cm <sup>3</sup> |

### Outcome of treatment

All the patients achieved good recovery and were discharged home. There was no mortality.

## DISCUSSION

Historically, in 1810, Hunter described a typical case of testicular torsion and in 1840; Delasiauve presented the first case of surgically treated testicular torsion [8]. In ancient times, survival rate of a testis that underwent torsion was extremely low [8]. However, currently, early detected testicular torsion can be cured in almost every case whereas late presentation leads to testicular loss.

Several factors make torsion an active area of litigation. These factors include the urgency needed in its diagnosis and treatment, the diagnostic uncertainties and errors, delays in presentation, a relatively common rate of testicular loss and the psychological impact related to the loss of a testis [9]. Despite orchidopexy for testicular torsion, testicular atrophy/loss can still occur [10]. Lian, et al. [10] reported that the testis that looks viable at the time of orchidopexy may be found to have undergone atrophy during follow up.

In the present study, the mean age of the patients was 11 years. This is comparable to the report of Zhao, et al. [11]. However, Sauvat et al reported an average age of 5 years [12]. The cohort of patients recruited into a particular study may determine the mean age of the patients. The age distribution of testicular torsion is bimodal, with one peak in the neonatal period and the second peak around puberty [13]. The median duration of symptoms prior to presentation to the hospital was 18 hours. This finding is consistent to the report of a study from Paris, France [12]. Howbeit, Mukendi, et al. [14] documented a median duration of 12 hours prior to presentation to the hospital. Parental awareness, distance from the hospital and severity of the symptoms may determine the time of presentation to the hospital. Testicular viability significantly decreases 6 hours after onset of symptoms. Early diagnosis is important to salvaging the testis [15]. However, a systemic literature review on testicular torsion by Mellick, et al. [16] demonstrated that survival percentages of torsed testis are significant even after 24 hours of testicular torsion. All the patients had emergent bilateral orchidopexy. The very short interval before orchidopexy was the time required to perform the scrotal ultrasound for the assessment of the testicular volume. It noteworthy to state that this ultrasound scan did not delayed surgical intervention. The duration of hospitalization following orchidopexy for testicular torsion may be related to the age of the patient and the post-operative course. Neonates stayed longer in the hospital than older children.

Ipsilateral testicular pain is the consistent symptom of testicular torsion. One hundred percent of our patients had testicular pain. Infants may express pain by excessive crying and irritability. One study from Amman Jordan, also reported scrotal pain as a consistent symptom of testicular torsion [17]. In neonates, the only symptom of testicular torsion may be scrotal swelling and scrotal discoloration [18]. It is worthy to note that abdominal pain may be the initial and sole symptom of testicular torsion in young males [19]. Nausea, vomiting and fever are other non-specific symptoms of testicular torsion. Other series also reported these non-specific symptoms [20,21].

Half of the patients in the index study had a 360° of testicular torsion. One study from New York, USA reported that the median



degree of testicular torsion is 360° [22]. Guo et al documented that testicular torsion of less than 360 degrees mainly develops in children aged 2-3 years [23]. However, Sharp et al reported that the testis typically twists more than 360° [13].

Bilateral orchidopexy was the operative procedure performed in the patients. Bilateral orchidopexy is recommended because of the risk of subsequent torsion in the contralateral testis [24]. However, recurrent testicular torsion can still occur in a fixed testis especially when absorbable sutures are used [25].

At least, 6 months post orchidopexy, about one-fifth (20%) of the patients exhibited a 50% reduction in testicular volume. Tian et al reported the association between testicular atrophy in children with testicular torsion [26]. The authors analyzed the factors that may be responsible for the testicular torsion and concluded that age at surgery, delayed surgery and echogenicity of testicular parenchyma on ultrasonography could predict the risk of testicular atrophy [26].

Following orchidopexy, surgical site infection was the most common post-operative complication. Other post-operative complications that may occur following orchidopexy include scrotal abscess and stitch abscess [27]. Some early post-operative features such as scrotal edema and hematoma resolve over time and strictly speaking may not be regarded as post-operative complications. The outcome of surgery (orchidopexy) for testicular torsion is generally good. None of the patients expired in the current study.

## CONCLUSION

Although detorsion and orchidopexy corrects and stabilizes the torsed testis, this study has shown that one-fifth of the patients may come down with testicular atrophy. Future studies will consider the factors that may be involved in this testicular loss.

## REFERENCES

- Korkes F, Cabral PR, Alves CD, Savioli ML, Pompeo AC. Testicular torsion and weather conditions: analysis of 21,289 cases in Brazil. *Int Braz J Urol.* 2012 Mar-Apr;38(2):222-8; discussion 228-9. doi: 10.1590/s1677-55382012000200010. PMID: 22555045.
- Visser AJ, Heyns CF. Testicular function after torsion of the spermatic cord. *BJU Int.* 2003 Aug;92(3):200-3. doi: 10.1046/j.1464-410x.2003.04307.x. PMID: 12887467.
- Fujita N, Tambo M, Okegawa T, Higashihara E, Nutahara K. Distinguishing testicular torsion from torsion of the appendix testis by clinical features and signs in patients with acute scrotum. *Res Rep Urol.* 2017 Aug 28;9:169-174. doi: 10.2147/RRU.S140361. PMID: 28920055; PMCID: PMC5587186.
- Mäkelä E, Lahdes-Vasama T, Rajakorpi H, Wikström S. A 19-year review of paediatric patients with acute scrotum. *Scand J Surg.* 2007;96(1):62-6. doi: 10.1177/145749690709600112. PMID: 17461315.
- Hyun GS. Testicular Torsion. *Rev Urol.* 2018;20(2):104-106. doi: 10.3909/riu0800. PMID: 30288149; PMCID: PMC6168322.
- Barbosa JA, Tiseo BC, Barayan GA, Rosman BM, Torricelli FC, Passerotti CC, Srougi M, Retik AB, Nguyen HT. Development and initial validation of a scoring system to diagnose testicular torsion in children. *J Urol.* 2013 May;189(5):1859-64. doi: 10.1016/j.juro.2012.10.056. Epub 2012 Oct 24. Erratum in: *J Urol.* 2014 Aug;192(2):619. PMID: 23103800.
- Grimsby GM, Schlomer BJ, Menon VS, Ostrov L, Keays M, Sheth KR, Villanueva C, Granberg C, Dajusta D, Hill M, Sanchez E, Harrison CB, Jacobs MA, Burgu B, Hennes H, Baker LA. Prospective Evaluation of Predictors of Testis Atrophy After Surgery for Testis Torsion in Children. *Urology.* 2018 Jun;116:150-155. doi: 10.1016/j.urology.2018.03.009. Epub 2018 Mar 20. PMID: 29572055; PMCID: PMC6291205.
- Nöske HD, Kraus SW, Altinkilic BM, Weidner W. Historical milestones regarding torsion of the scrotal organs. *J Urol.* 1998 Jan;159(1):13-6. doi: 10.1016/s0022-5347(01)63997-1. PMID: 9400427.
- DaJusta DG, Granberg CF, Villanueva C, Baker LA. Contemporary review of testicular torsion: new concepts, emerging technologies and potential therapeutics. *J Pediatr Urol.* 2013 Dec;9(6 Pt A):723-30. doi: 10.1016/j.jpuro.2012.08.012. Epub 2012 Oct 6. PMID: 23044376; PMCID: PMC3566290.
- Lian BS, Ong CC, Chiang LW, Rai R, Nah SA. Factors Predicting Testicular Atrophy after Testicular Salvage following Torsion. *Eur J Pediatr Surg.* 2016 Feb;26(1):17-21. doi: 10.1055/s-0035-1566096. Epub 2015 Oct 28. PMID: 26509312.
- Zhao LC, Lautz TB, Meeks JJ, Maizels M. Pediatric testicular torsion epidemiology using a national database: incidence, risk of orchiectomy and possible measures toward improving the quality of care. *J Urol.* 2011 Nov;186(5):2009-13. doi: 10.1016/j.juro.2011.07.024. Epub 2011 Sep 23. PMID: 21944120.
- Sauvat F, Hennequin S, Ait Ali Slimane M, Gauthier F. Un âge pour la torsion testiculaire ? [Age for testicular torsion?]. *Arch Pediatr.* 2002 Dec;9(12):1226-9. French. doi: 10.1016/s0929-693x(02)00112-4. PMID: 12536102.
- Sharp VJ, Kieran K, Arlen AM. Testicular torsion: diagnosis, evaluation, and management. *Am Fam Physician.* 2013 Dec 15;88(12):835-40. PMID: 24364548.
- Mukendi AM, Kruger D, Haffejee M. Characteristics and management of testicular torsion in patients admitted to the Urology Department at Chris Hani Baragwanath Academic Hospital. *Afr J Urol.* 2020;26:34. doi: 10.1186/s12301-020-00044-7.
- Schick MA, Sternard BT. Testicular Torsion. 2021 Aug 2. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 28846325.
- Mellick LB, Sinex JE, Gibson RW, Mears K. A Systematic Review of Testicle Survival Time After a Torsion Event. *Pediatr Emerg Care.* 2019 Dec;35(12):821-825. doi: 10.1097/PEC.0000000000001287. PMID: 28953100.
- Aisbou I. Acute scrotum in children and the role of early exploration. *Alexandria Journal of Medicine.* 2012;48:273-275. doi: 10.1016/j.ajme.2012.06.002.
- Hawtrey CE. Assessment of acute scrotal symptoms and findings. A clinician's dilemma. *Urol Clin North Am.* 1998 Nov;25(4):715-23, x. doi: 10.1016/s0094-0143(05)70059-8. PMID: 10026777.
- Wang F, Mo Z. Clinical evaluation of testicular torsion presenting with acute abdominal pain in young males. *Asian J Urol.* 2019 Oct;6(4):368-372. doi: 10.1016/j.ajur.2018.05.009. Epub 2018 May 26. PMID: 31768324; PMCID: PMC6872765.
- Laher A, Ragavan S, Mehta P, Adam A. Testicular Torsion in the Emergency Room: A Review of Detection and Management Strategies. *Open Access Emerg Med.* 2020 Oct 12;12:237-246. doi: 10.2147/OAEM.S236767. PMID: 33116959; PMCID: PMC7567548.
- Komarowska MD, Pawelczyk A, Matuszczak E, Dębek W, Hermanowicz A. Is Testicular Torsion a Real Problem in Pediatric Patients With Cryptorchidism? *Front Pediatr.* 2021 Jan 12;8:575741. doi: 10.3389/fped.2020.575741. PMID: 33511091; PMCID: PMC7837403.
- Sessions AE, Rabinowitz R, Hulbert WC, Goldstein MM, Mevorach RA. Testicular torsion: direction, degree, duration and disinformation. *J Urol.* 2003 Feb;169(2):663-5. doi: 10.1097/01.ju.0000047381.36380.0e. PMID: 12544339.
- Guo X, Sun L, Lei W, Li S, Guo H. Management of testicular torsion <360° in children: a single-center, retrospective study. *J Int Med Res.* 2020 Apr;48(4):300060519895861. doi: 10.1177/0300060519895861. Epub 2019 Dec 31. PMID: 31891289; PMCID: PMC7645356.



24. Kuntze JR, Lowe P, Ahlering TE. Testicular torsion after orchiopexy. *J Urol.* 1985 Dec;134(6):1209-10. doi: 10.1016/s0022-5347(17)47689-0. PMID: 2865381.
25. Alnadhari I, Abdulmuhsin A, Ali O, Shamsodini A, Salah M, Abdeljaleel O. Recurrent Testicular Torsion of a Fixed Testis. *Case Rep Urol.* 2019 Jul 15;2019:8735842. doi: 10.1155/2019/8735842. PMID: 31392070; PMCID: PMC6662488.
26. Tian XM, Tan XH, Shi QL, Wen S, Lu P, Liu X, Li XL, He DW, Lin T, Wei GH. Risk Factors for Testicular Atrophy in Children With Testicular Torsion Following Emergent Orchiopexy. *Front Pediatr.* 2020 Nov 11;8:584796. doi: 10.3389/fped.2020.584796. PMID: 33262963; PMCID: PMC7686235.
27. Moore CP, Marr JK, Huang CJ. Cryptorchid testicular torsion. *Pediatr Emerg Care.* 2011 Feb;27(2):121-3. doi: 10.1097/PEC.0b013e318209af36. PMID: 21293219.