ORIGINAL RESEARCH

Testicular Salvage After Testicular Torsion Using Tunica Albuginea Fasciotomy with Tunica Vaginalis Flap: A Single Institution Preliminary Experience

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Introduction: Testicular torsion is a true urologic emergency. It occurs when the blood supply to the testis is compromised as the vessels twist along the spermatic cord. Early diagnosis and prompt treatment are critical to prevent prolonged ischemia time which is crucial to its prognosis. This paper aimed to present cases of testicular torsion who underwent testis sparing surgery for torsion.
Methods: Cases of testicular torsion admitted at the institution from January 2023 to July 2024 were reviewed. Demographic data, scrotal ultrasound findings, intraoperative findings and ischemia time were documented. Patients who underwent tunica albuginea fasciotomy with tunica vaginalis flap were monitored post-surgery via scrotal ultrasound, documenting testicular size.
Results: Twenty seven (27) cases of testicular torsion were reviewed. Of these cases, 4 improved after detorsion and orchidopexy, 12 cases with > 72 hours ischemia time and failed detorsion underwent orchiectomy, 11 cases with < 72 hours of ischemia time, tunica albuginea fasciotomy were performed. Five (5) of these 11 cases showed no improvement in appearance and no bleeding was observed and subsequent orchiectomy was performed. Six cases demonstrated improvement in appearance and bleeding after tunica albuginea fasciotomy, tunica vaginalis flap used to cover the resulting defect. Of these 6 cases, 2 cases showed intact testicular size, 1 case had testicular atrophy on monitoring and 3 cases were lost to follow-up.
Conclusion: Testicular torsion remains to be a critical urologic emergency. Prompt diagnosis and immediate surgery required to improve salvage rates. Tunica albuginea incision, with subsequent tunica vaginalis flap may be an option for the urologist to improve salvage, although not consistently prevent testicular atrophy.

Key words: Testicular torsion, tunica albuginea fasciotomy, testicular salvage

Introduction

Testicular torsion is a true urologic emergency. It occurs as the blood supply to the testis is compromised as the vessels twist along the spermatic cord. Early diagnosis and prompt treatment are critical as prolonged ischemia time is crucial since the outcome is time-sensitive. Due to high loss of the testis, testicular torsion carries significant impact among patients.

Younger males, ages 12-17 years old are usually involved. Several factors leading to prolonged diagnosis and subsequent treatment failure are lack of awareness of this disease among the general population as well as embarrassment on the part of the child could lead in a delay in consultation. Rates of testicular salvage with testicular torsion decline as the longer the waiting and ischemia time. A study by Chu, et al noted that orchiectomy rates rise up to 80-90% when ischemia time exceeds 24 hours.

Visser, et al also noted that a prolonged ischemia time exceeding 24 hours has a higher orchiectomy rates. Thus, it is imperative to perform surgical exploration in these cases as soon as a diagnosis is arrived at.

A concept of management of testicular torsion has been proposed, where it is likened to a compartment syndrome. The blockage of the blood supply from the twisting of the spermatic cord causes ischemia as well as congestion from compromising venous drainage. This results in progressive testicular venous occlusion, creating a "closed compartment syndrome" within the tunica albuginea. It has been proposed that release of intra-compartmental pressure by a fasciotomy of the tunica albuginea be done to relieve the pressure and thus reperfusion. Several studies have demonstrated the success of this approach.

Thus, the authors aimed to report their initial experience among patients with testicular torsion who underwent tunica albuginea fasciotomy with tunica albuginea flap as well as their intra-operative and post-operative outcomes.

Methods

This is a descriptive study on the outcomes of patients who underwent tunica albuginea fasciotomy with tunica vaginalis flap. Ethical approval was obtained. From January 2023 to July 2024, Twenty seven (27) cases of testicular torsion were admitted in the institution. Inclusion criteria included: 1) Patients less than 21 years of age, 2) Symptom of acute scrotal pain seen at the ER, and 3) Confirmation of testicular torsion by scrotal doppler ultrasound. Exclusion criteria were: 1) Cases of a testicular torsion on solitary testis, 2) Torsion on an undescended testis and 3) Torsion with symptoms more than 72 hours wherein orchiectomy was performed. The researchers documented demographic data, ischemia time, intraoperative findings and operation performed. Informed consent was obtained and emergency scrotal exploration was performed.

Intra-operatively, detorsion and wrapping with gauze soaked in warm saline were performed. The contralateral testis was assessed and fixed. The affected testis was then reassessed and the change in color of the testis was noted. Orchidopexy was performed on the testis with noted improvement in color and appearance after manual detorsion. For those without improvement, a tunica albuginea fasciotomy was performed noting reperfusion by parenchymal bleeding. The resulting defect was then covered by a tunica vaginalis flap. Post-operative outcomes and scrotal ultrasound with doppler studies 1 – 3 days post-op were then noted and patients were followed up after 1 and 6 months with repeat ultrasound and Doppler studies.

Results

Twenty-seven cases of testicular torsion were seen in the emergency department and eventually admitted for surgery. In 27 cases of testicular torsion, symptoms appeared 72 hours after onset. Twelve cases required orchiectomy after failed detorsion. Four (4) cases had improvement in color after intra-operative manual detorsion. These cases underwent straightforward orchiopexy. Eleven (11) out of 27 cases presented with symptoms within 72 hours of onset. In 5 cases, detorsion did not improve testicular color and no brisk bleeding was noted upon incision of the tunica albuginea. These cases prompted immediate orchiectomy (Figure 1). Six (6) cases showed improvement in color and brisk bleeding was noted upon tunica albuginea fasciotomy (Figure 2). Tunica vaginalis flaps were then used to cover the resultant defect (Figure 3).

The researchers included these 6 cases in the study. Demographic data, ischemia time and intraoperative findings were recorded (Table 1).

Table 1. Demographic data.

Age	11- 18 years of age
Duration of symptoms	
Less than 6 hrs	2 (33%)
More than 6 hours	4 (67%)
Laterality	
Right	3 (50%)
Left	3 (50%)
Degree of torsion	
Less than 180 degress	4 (67%)
More than 180 degress	2 (33%)

The ages of the patients in this study were within the specific age range when testicular

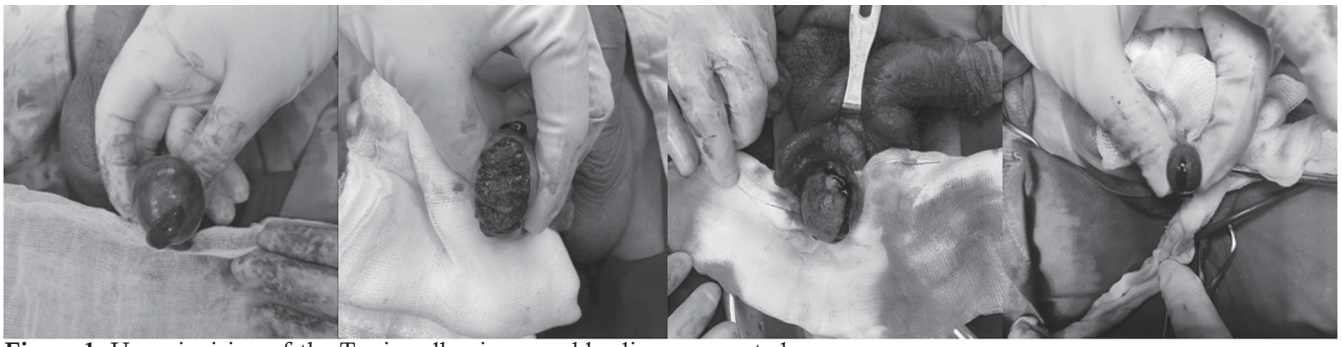

Figure 1. Upon incision of the Tunica albuginea, no bleeding were noted.

Figure 2. Tunica albuginea fasciotomy. Brisk bleeding upon incision was noted, with improvement of color of the testes.

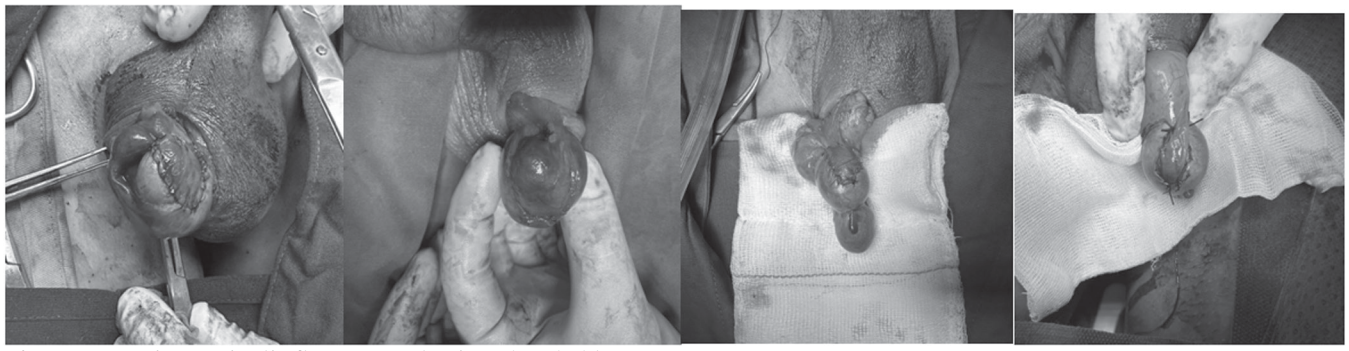

Figure 3. Tunica vaginalis flap, sutured using absorbable sutures.

torsion is most common. Two of the cases in which testicular sparing was performed came in within 6 hours, regarded as the 'golden period'. Most cases came in after 6 hours. This may be due to the patients' reluctance to seek consult due to embarrassment or lack of knowledge of their disease. Torsion may occur in either testicle which means it can occur in both testicles. Most of the cases had less than 180º torsion.

A bedside scrotal ultrasound was done 1-3 days post-operatively, prior to discharge. In all cases, Doppler flow was observed in the affected testis immediately after surgery. Within 1 – 6 months post-operative, the patients underwent repeat clinical reassessment and scrotal ultrasound. However, only 3 patients returned and 3 patients were lost to long term follow-up after surgery. Of these 3 patients, 1 patient showed decrease in testicular size clinically at 1.3 cm x 0,5 cm and 2 cases showed intact testicular size in comparison with their normal contralateral testis.

Discussion

Testicular torsion is a serious urological emergency that requires immediate action. Prompt diagnosis and surgical intervention are crucial for testicular salvage. Several factors contribute to delayed surgical management including patient-related issues, such as limited access to health care

Table 2. Ultrasound and clinical findings.

	Ischemia Time (hours)	Laterality	Degree of Torsion:	Scrotal ultrasound 1-3 days post-op	Scrotal ultrasound with doppler 1-6 Months Post-op	Testicular sizes 1-6 Months post- op
Patient A	18 hours	Right testis	180 degrees	(+) doppler flow	Lost to follow-up	Lost to Follow-up
Patient B	24 hours	Left testis	360 degrees	(+) doppler flow	Lost to follow-up	Lost to follow-up
Patient C	60 hours	Left testis	180 degrees	(+) doppler flow	Left sided epididymo-orchitis, with ipsilateral scrotal wall thickening..	Right testis: 3.6 cm x 3.3 cm x 2.7 cm (16.7 gm) Left testis: 2.9 cm x 2.2 cm x 1.9 cm (6.6 gm)
Patient D	17 hours	Right testis	180 degrees	(+) doppler flow	Small sized right testes color doppler study shows minimal vascular flow significantly lesser than the contralateral side.	Left testis: 3.4 x 2.5 x 2.1 cm (9.2 gm) Right testis: 3.5 cm x 2.3 cm x 2.0 cm (8.2 gm)
Patient E	6 hours	Right testis	90 degrees	(+) doppler flow	Atrophied right testes, with hydrocele in the right hemiscrotum, thickening of the overlying scrotum notes.	Left testis: 3.2 x 2.1 x 1.3 cm (4.5 gm) Right testis: 1.3 x 0.5 cm
Patient F	7 hours	Left testis	270 degrees	(+) doppler flow	Lost to follow-up	Lost to follow-up

and lack of general awareness. These delays impact patient outcomes, and even increase the need for orchiectomy. The population's poor health seeking behavior may also be a factor.

Only four out of 27 (15%) showed improvement in testicular appearance after detorsion. All 4 cases who underwent detorsion and orchidopexy had onset of symptoms within 24 hours upon arrival at the emergency department (Mean: 11 hours). Twelve of 27 cases (44%) presented at the emergency department with onset of symptoms at more than 72 hours. Orchiectomy was performed in these cases after detorsion failed to improve the appearance of the testis.

A study by Chu, et al revealed that viability was 95% using tunica vaginalis flap for patients with ischemia time of 24 hours. Patients with ischemia time greater than 24 hours had viability of 67%. Sixty seven percent (67%) of patients with ischemia times of 24 hours or less experienced atrophy, compared to 83 percent of cases in which ischemia times were greater than 24 hours.

Eleven of the 27 cases with ischemia times less than 72 hours underwent tunica albuginea incision. The concept of releasing intratesticular pressure via tunica albuginea fasciotomy leads to reperfusion of the testis. This could potentially increase testicular salvage rates in torsion. Five of the 11 cases in whom tunica albuginea fasciotomy was performed showed no improvement in appearance. No bleeding was noted in the affected testis, hence orchiectomy was performed (Figure 2). In six out of 11 cases of testicular torsion, the affected testis showed improvement in appearance and bleeding after tunica albuginea fasciotomy indicating potential salvage. In these cases, tunica vaginalis flap was used to cover the defect created during the fasciotomy.

In a study by Figueroa, et al salvage rate was defined by testicular volume greater than 50% as compared to the normal contralateral testis. The study reported that salvage rates were 54.6% for the tunica albuginea incision with tunica vaginalis flap group, as compared to 62.5% for the detorsion and orchidopexy group. In this current series, of 2 cases had testicular atrophy with testicular volume less than 50% as compared to the contralateral testis and 3 cases were lost to follow-up.

Conclusion

Testicular torsion remains to be one of the common urological emergencies encountered by urologists. Prompt recognition and immediate surgical intervention are crucial for testicular salvage. Delays in management leads to prolonged ischemia time, which increases risks for orchiectomy. Tunica albuginea incision with a tunica vaginalis flap offers an option for improved testicular salvage rates. Although testicular atrophy occurs invariably among patients in short term follow-up.

Limitation of the Study

The study's limitation is that it only involves data from a single institution and cases were managed by different surgeons. Moreover, the limited number of study participants may restrict the generalizability of the findings in the study. High rates of non-compliance to follow-up among the cases also limits the study, which may also be reflective of poor health seeking habits of the population. Causal inferences cannot be drawn from the study.

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