



Collagen fleece (Tachosil®) for treating testis torsion: A case report

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Abstract

BACKGROUND

Testicular torsion is an emergent disease in urology, and there has been discussion of the treatment of testicular torsion. Testicular decompression has been established as a critical treatment for testicular compartment syndrome (TCS), which occurs after detorsion in a patient who is diagnosed with testis torsion. Until now, testicular fasciotomy and incision of tunica albuginea with tunica vaginalis flap (TVF) graft have been suggested for decompression, and some studies about the efficacy of TVF were reported. However, this method is time consuming and needs meticulous technique, so other methods such as orchio-septopexy are suggested. The objective of this clinical case report was to propose new surgical method using collagen fleece (Tachosil®) instead of tunica vagina flap.

CASE SUMMARY

A 5-year-old boy with scrotal pain visited our hospital 24 h after symptom onset. After history taking, physical examination, and scrotum ultrasonography, he was diagnosed with testis torsion. Emergency surgery was performed after diagnosis. Following the incision of scrotum and fasciotomy, we covered his tunica albuginea with collagen fleece called Tachosil® instead of covering with TVF.

CONCLUSION

Short-term follow-up showed normal blood flow in testis without a TCS. This is the first case report of using Tachosil® in testicular torsion surgery, and its advantages were already reported in other surgeries like Peyronie's disease. Our case suggests this new technique is an appropriate method because of its advantages including its cost-effective and time-saving characteristics. The main limitation is the short follow-up, so more studies are needed to provide a high level of evidence about its efficacy and safety.

Key Words: Testicular torsion; Testicular compartment syndrome; Collagen fleece; Tachosil®; Case report

Core Tip: Testicular torsion is an emergent disease in urology that should be treated as quickly as possible. Its treatment is detorsion and orchiopexy. But fasciotomy has been suggested because this treatment is effective for testicular decompression, and it could prevent testicular compartment syndrome. Fasciotomy with tunica vaginalis flap coverage has been reported. Now, we suggest a new method with collagen fleece.

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INTRODUCTION

Testicular torsion is a common emergent disease in urology. It should be treated as quickly as possible. It is a common cause of acute scrotum, which refers to the constellation of new onset of pain, swelling, and/or tenderness of intrascrotal contents[1]. Torsion of the appendix testis is the most common diagnosis (40% to 60%) in acute scrotum, followed by spermatic cord torsion (20% to 30% excluding neonates), epididymitis (5% to 15%), and others or no pathology (10%)[1].

Testicular torsion occurs when a testis rotates, twisting the spermatic cord that brings blood to the scrotum. This can lead to testicular ischemia or infarction if there is a delay in presentation for medical attention. Testis torsion is time sensitive to ischemia. The rate of orchiectomy can reach 80% to 90% when ischemia time exceeds 24 h[2]. Thus, it is essential to perform urgent surgical exploration in all cases of testicular torsion within 24 h of symptom onset[3].

Traditionally, orchiopexy has been established as the standard treatment for testis torsion when the testis color returns to its normal color after detorsion. Orchiectomy could be considered if testis does not return to normal after detorsion and the affected testicle appears grossly necrotic or nonviable[4]. And It has been suggested that testicular torsion may include an element of compartment syndrome[5]. Decompression of compartment syndrome is known to salvage tissues in numerous organ systems[6].

Especially, tunica albuginea incision with tunica vaginalis flap (TVF) coverage has been suggested as a promising option for managing clinically marginal torsed testes and enhancing salvageability after prolonged ischemia before performing orchiectomy in selected cases of testicular torsion[5]. Testicular fasciotomy combined with TVF has been reported as a method to relieve testicular compartment syndrome (TCS)[6]. However, it is time-consuming. It is also associated with bleeding, especially if scrotal edema and inflammatory reaction are present. Therefore, other methods such as orchiopexy as alternative techniques have been reported[2].

To improve salvage rates, we used collagen fleece called Tachosil® instead of using TVF. Tachosil® is a medicated sponge coated with human fibrinogen and human thrombin. It can improve hemostasis, promote tissue sealing, and support sutures when standard surgical techniques are insufficient[7].

Although there have been case reports of fasciotomy using tunica vaginalis in the case of testis torsion, there has been no case report of surgery using Tachosil®. Here we report the first case of using Tachosil® for treating testis torsion.

CASE PRESENTATION

Chief complaints

A 5-year-old boy who presented with pain migration from abdomen to scrotum visited our urology department.

History of present illness

He had already visited our emergency room with a symptom of intermittent abdominal pain two days before he visited our urology department. He only had abdominal pain at that time without showing specific symptoms like nausea, vomiting, fever, or others. Pediatric doctors suspected acute gastroenteritis and intussusception. To rule out intussusception, he underwent a bowel ultrasound. However, there was no specific finding. After he went home, he still complained of abdominal pain. The pain of scrotum then started.

History of past illness

He had no specific disease history, and no medication history except pediatric asthma.

Personal and family history

He had no family history, and no personal history.

Physical examination

On physical examination, there was no Prehn's sign or cremasteric reflex.

Laboratory examinations

Lab results showed no specific findings.

Imaging examinations

With a suspicion of testicular torsion and epididymitis, we performed a scrotal ultrasound for the diagnosis of testicular torsion.

FINAL DIAGNOSIS

Scrotal doppler ultrasound demonstrated a heterogenous hypoechogenicity with decreased vascularity in the left testis indicating "left testicular torsion" (Figure 1).

TREATMENT

Even though 24 h had passed from symptom onset and poor prognosis was expected, there was no other treatment except surgery. Thus, we decided to perform "immediate surgical exploration" as a treatment for testicular torsion.

The patient was placed in a supine position under general anesthesia. He was dressed using bethadine and draped before the surgery. The scrotum was explored *via* midline incision and the soft tissue was dissected. We opened the tunica vaginalis and delivered the testis. The left testis had counter clockwise torsion, and we performed detorsion. The dark color of the testis remained. It might indicate an ischemic state. Fasciotomy was performed to make decompression. For coverage of tunical albuginea (Figure 1), we used 7.5 cm² (3 cm × 2.5 cm × 0.5 cm) Tachosil® which consist of fibrinogen and thrombin. It was made by Takeda Pharmaceutical Company for covering the testis. The operation took 1 h.

OUTCOME AND FOLLOW-UP

Patient felt no more pain after surgery. Scrotal ultrasonography was performed at 2 d and 16 d after surgery. Blood flow in the left testis was confirmed (Figure 2). After 3 mo, the patient and their parents came hospital for follow up, and although scrotal ultrasonography were not performed, there were no abnormal findings in the physical examination, and the patient had no symptom during 3 mo.

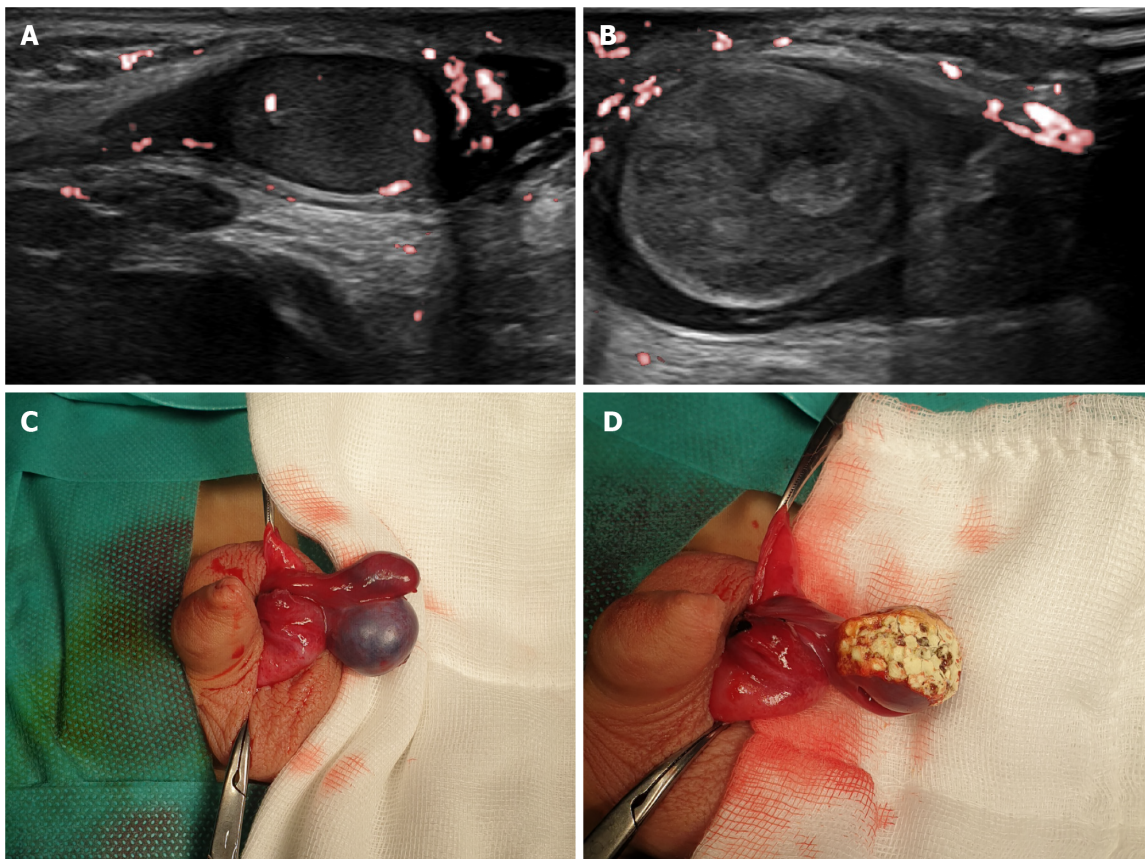
DISCUSSION

In the case of testicular torsion, restoration of blood flow to the ischemic testis should be performed promptly[4]. Two methods are generally used: Manual detorsion and surgical exploration.

Manual detorsion should be attempted before surgical exploration or preparation of surgery. It could relieve symptoms and allow for delayed orchidopexy[1]. However, it should not supersede or delay the surgical exploration[4]. Orchiopexy should be performed if the affected testis seems viable[4]. Orchiectomy could be performed if the affected testicle appears grossly necrotic or nonviable[4]. The contralateral testis should be fixed with a nonabsorbable suture to reduce the risk of metachronous torsion[8].

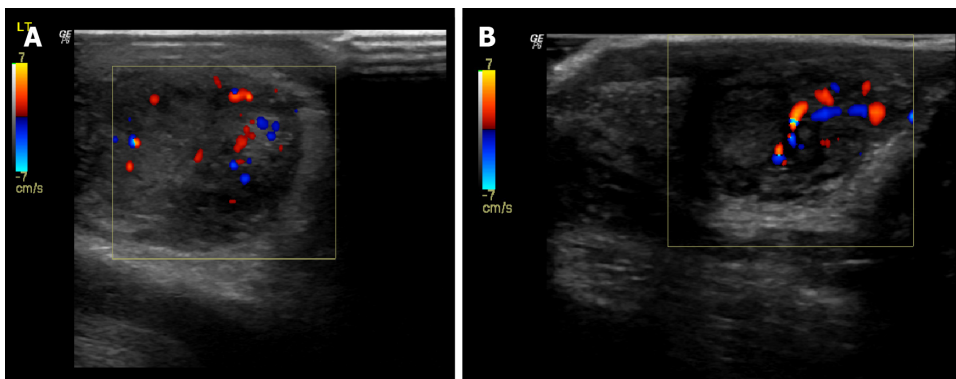
After detorsion, irreversible cellular damage may occur due to edema and increased intratesticular pressure caused by reperfusion damage[9]. Because the testis is surrounded by its relatively inelastic tunica albuginea, edema in this confined space could increase 'testicular compartment' pressure with decreased perfusion to the testis and further ischemic injury even after the spermatic cord is untwisted [10]. This concept called "TCS" was proposed by a Philadelphia group in 2008[10].

To manage TCS, testicular fasciotomy and incising of the tunica albuginea with a tunica vaginalis graft have been suggested. They can prevent high intratesticular compartment pressure and maintain



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Figure 1 Scrotum ultrasonography before surgery. A: Normal blood flow in right testis; B: Heterogenous hypoechogenicity without vascularity in left testis indicating left testicular torsion; C: Dark colored testis with counter-clockwise torsion; D: Tachosil® is adopted to cover the defect of tunica albuginea after fasciotomy to prevent compartment syndrome.



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Figure 2 Post-operative scrotum ultrasonography. A: Post-operative ultrasonography (USG) on the 2nd post-operative day showing intact blood flow; B: Post-operative USG on the 16th post-operative day showing normal blood flow.

low compartment pressure inside the testis. We can see studies about TCS (Table 1). However, harvesting the flap is meticulous, tedious, and time consuming. Thus, other methods such as orchio-septopexy have been suggested as alternatives[2].

We used Tachosil® instead of covering with TVF because of its utility. It consists of two layers, namely one collagenous layer and a layer containing fibrinogen and human thrombin[11]. One well-designed study showed that Tachosil® was significantly superior compared with standard suturing in obtaining intraoperative control of hemorrhaging[12].

Tachosil® is indicated not only for hemostasis, but also for tissue sealing. It can support sutures, prevent adhesions and arrosions, and so on[11]. Surgeries using Tachosil® and its efficacies for other diseases of urology have already been reported. For example, many advantages have been reported in surgery of Peyronie's disease like self-adhesive properties, decreased operative time, minimal risk of

Table 1 Previous studies about tunica albuginea incision with flap coverage

Ref.	Type of surgery	n	Age (yr)	Ischemic time (hr)	Duration of pain		Follow-up period (mo)	Salvage or viability rate (%)
					Duration (hr)	n		
Figueroa <i>et al</i> [5]	Detorsion + orchiopexy	31	11.8 ± 4.08 (mean)	13.4 (mean)	-	-	6.3 (mean)	62.5
	TAI + TVFC	11	10.1 ± 4.83	31.2	-	-	7.9	54.6
	Detorsion + orchiectomy	17	10.1 ± 5.16	67.5	-	-	8.4	-
Nagasawa <i>et al</i> [15]	Orchiopexy	7	14 (median)	5	-	-	3	100
	TVF	5	13	8	-	-	-	60
	Orchiectomy	3	18	24	-	-	-	-
Chu <i>et al</i> [16]	Septopexy alone	97	15 (13-16) (median)	7 (5-11) (median)	-	-	2.2 (1.4-3.8) (median)	95
	TAI + TVFC	36	14 (13-15)	11 (6-26)	-	-	4.5 (2.1-12.5)	86
	Orchiectomy	49	14 (13-14)	51 (29-72)	-	-	2.6 (1.2-5.2)	-
Elifranji <i>et al</i> [2]	Orchiopexy	5	3 to 17	-	< 6	4	-	100
				-	7-12	1	-	
				-	> 12	0	-	
	Orchio-septopexy	11		-	< 6	0	9.5 (mean)	54.5
				-	7-12	6		
				-	> 12	5		
	Orchiectomy	5		-	< 6	0	-	-
				-	7-12	0	-	-
				-	> 12	5	-	-

TAI: Tunica albuginea incision; TVFC: Tunica vaginalis flap coverage; TVF: Tunica vaginalis flap.

contraction compared to other grafting materials, hemostatic effect, hemostatic effect and cost effect[13].

An important point of our case was that surgery was performed after 24 h of symptom onset. Thus, if time has exceeded 24 h from symptom onset, we can still save the testis if we proceed with an operation promptly. Tachosil® could be the best choice in an urgent moment because it could decrease the time of surgery.

However, this case report has some limitations. The main limitation is the short follow-up. Despite prompt diagnosis and surgery, infertility remains a major issue after treatment of testicular torsion[14]. Randomized, comparative trials and long-term studies that evaluate the use of similar graft are necessary in the future.

CONCLUSION

Collagen fleece could be an appropriate choice in testis torsion surgery because it could decrease surgery time. More studies are needed to provide a high level of evidence about its efficacy and safety.

FOOTNOTES

Author contributions: Kim KM contributed to manuscript writing and data collection; Kim JH contributed to editing, conceptualization and supervision; All authors have read and approved the final manuscript.

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REFERENCES

- 1 **Partin AW**, Dmochowski RR, Kavoussi LR, Peters CA, Wein A. Campbell Walsh Wein Urology. 12th Ed. Elsevier Health Sciences, 2020
- 2 **Elifranji M**, Abbas T, Leslie B, Vallasciani S, El Kadhi A, Pippi-Salle JL. Orchio-Septopexy: A new technique to cover and fix detorsed testis undergoing fasciotomy of tunica albuginea. *Int Braz J Urol* 2022; **48**: 706-711 [PMID: 35373956 DOI: 10.1590/S1677-5538.IBJU.2022.0128]
- 3 **Visser AJ**, Heyns CF. Testicular function after torsion of the spermatic cord. *BJU Int* 2003; **92**: 200-203 [PMID: 12887467 DOI: 10.1046/j.1464-410x.2003.04307.x]
- 4 **Sharp VJ**, Kieran K, Arlen AM. Testicular torsion: diagnosis, evaluation, and management. *Am Fam Physician* 2013; **88**: 835-840 [PMID: 24364548]
- 5 **Figueroa V**, Pippi Salle JL, Braga LH, Romao R, Koyle MA, Bägli DJ, Lorenzo AJ. Comparative analysis of detorsion alone versus detorsion and tunica albuginea decompression (fasciotomy) with tunica vaginalis flap coverage in the surgical management of prolonged testicular ischemia. *J Urol* 2012; **188**: 1417-1422 [PMID: 22906680 DOI: 10.1016/j.juro.2012.02.017]
- 6 **Kutikov A**, Casale P, White MA, Meyer WA, Chang A, Gosalbez R, Canning DA. Testicular compartment syndrome: a new approach to conceptualizing and managing testicular torsion. *Urology* 2008; **72**: 786-789 [PMID: 18561988 DOI: 10.1016/j.urol.2008.03.031]
- 7 **Colombo GL**, Bettoni D, Di Matteo S, Grumi C, Molon C, Spinelli D, Mauro G, Tarozzo A, Bruno GM. Economic and outcomes consequences of TachoSil®: a systematic review. *Vasc Health Risk Manag* 2014; **10**: 569-575 [PMID: 25246797 DOI: 10.2147/VHRM.S63199]
- 8 **Hyun GS**. Testicular Torsion. *Rev Urol* 2018; **20**: 104-106 [PMID: 30288149 DOI: 10.3909/riu0800]
- 9 **Şahin AH**, Cevizci MN, Turan G, Şahin H. Effect of tunica albuginea incision on testicular tissue in testicular torsion. *Ulus Travma Acil Cerrahi Derg* 2022; **28**: 1367-1372 [PMID: 36169476 DOI: 10.14744/tjtes.2022.58228]
- 10 **DaJusta DG**, Granberg CF, Villanueva C, Baker LA. Contemporary review of testicular torsion: new concepts, emerging technologies and potential therapeutics. *J Pediatr Urol* 2013; **9**: 723-730 [PMID: 23044376 DOI: 10.1016/j.jpuro.2012.08.012]
- 11 **Rickenbacher A**, Breitenstein S, Lesurtel M, Frilling A. Efficacy of TachoSil a fibrin-based haemostat in different fields of surgery--a systematic review. *Expert Opin Biol Ther* 2009; **9**: 897-907 [PMID: 19527109 DOI: 10.1517/14712590903029172]
- 12 **Siemer S**, Lahme S, Alziebler S, Machtens S, Strohmaier W, Wechsel HW, Goebell P, Schmeller N, Oberneder R, Stolzenburg JU, Becker H, Lüftenegger W, Tetens V, Van Poppel H. Efficacy and safety of TachoSil as haemostatic treatment versus standard suturing in kidney tumour resection: a randomised prospective study. *Eur Urol* 2007; **52**: 1156-1163 [PMID: 17467884 DOI: 10.1016/j.eururo.2007.04.027]
- 13 **Sokolakis I**, Pyrgidis N, Hatzichristodoulou G. The use of collagen fleece (TachoSil) as grafting material in the surgical treatment of Peyronie's disease. A comprehensive narrative review. *Int J Impot Res* 2022; **34**: 260-268 [PMID: 33452519 DOI: 10.1038/s41443-020-00401-8]
- 14 **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; **12**: 237-246 [PMID: 33116959 DOI: 10.2147/OAEM.S236767]
- 15 **Nagasawa S**, Kanematsu A, Shinkai Y, Shimatani K, Hashimoto T, Togo Y, Suzuki T, Go S, Nojima M, Yamamoto S. [Clinical Study of Testicular Fasciotomy for Testicular Torsion]. *Hinyokika Kyo* 2017; **63**: 455-459 [PMID: 29232795 DOI: 10.14989/ActaUrolJap_63_11_455]
- 16 **Chu DI**, Gupta K, Kawal T, Van Batavia JP, Bowen DK, Zaontz MR, Kolon TF, Weiss DA, Zderic SA, Canning DA.

Tunica vaginalis flap for salvaging testicular torsion: A matched cohort analysis. *J Pediatr Urol* 2018; **14**: 329.e1-329.e7
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