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Preoperative manual detorsion of the spermatic cord with Doppler ultrasound monitoring in patients with intravaginal acute testicular torsion

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Abstract *Objective*. To assess the effectiveness of preoperative manual detorsion in acute testicular torsion.
Materials and methods. Between June 1998 and March 1999, seven patients presenting with testicular torsion underwent manual manipulation under US monitoring in order to restore the flow to the testis prior to surgery (orchidopexy). All detorsions were lateral in direction. The success of the manoeuvre was assessed both clinically and sonographically and confirmed at surgery.
Results. Six manoeuvres were successful in restoring flow to the testis. The failed attempt in the seventh patient was due to failure to manipulate beyond an initial 1 1/2 rotations (540°).
Conclusions. Preoperative detorsion is the fastest way to relieve testicular ischaemia. However, manual detorsion of the spermatic cord is not a substitute for surgical exploration and bilateral orchidopexy is still necessary.

Introduction

Intravaginal testicular torsion is the most dramatic cause of acute scrotum in adolescents and young adults. The viability of the torsed testis depends on the duration of the torsion. The aim of emergency surgical exploration with intraoperative detorsion is to alleviate testicular ischaemia and prevent subsequent atrophy. Because access to the operating room can be delayed for 1 h or more, we wish to emphasize in this report the usefulness of preoperative manual detorsion of the spermatic cord as a method for immediate restoration of blood flow.

Materials and methods

Between July 1998 and March 1999, eight intravaginal testicular torsions were seen in Hôpital Sainte-Justine, Montreal, Canada. Cases of extravaginal torsion occurring in newborns and infants were excluded from the study. Ages ranged from 14 to 151/2 years.

The diagnosis of testicular torsion was made clinically and sonographically. In all cases, complete absence of testicular arterial flow was documented by colour Doppler ultrasound (CDU). In one patient (case 8), the testis was already necrotic at presentation due to a 72-h torsion. In the other seven patients, manual detorsion was attempted. Detorsion was performed in the ultrasound suite immediately after the diagnosis had been confirmed by the lack of testicular perfusion at CDU.

Sedation was not used. Various operators performed the detorsion manoeuvre: a surgical resident (cases 1 and 2), three surgical fellows (cases 3, 4 and 6), a staff radiologist (case 5) and a staff surgeon (case 7). All detorsions were lateral in direction, toward the respective outer thigh, in increments of 360°–540° (1–1 1/2 rotations) and monitored by CDU. The complete lack of resistance during detorsion is important as a valuable indicator of the proper direction of the manoeuvre.

Successful detorsion was recognized by the immediate relief of pain, elongation of the cord (testicular mobility) and the restoration of perfusion at CDU. All cases underwent subsequent surgery and bilateral orchidopexy.

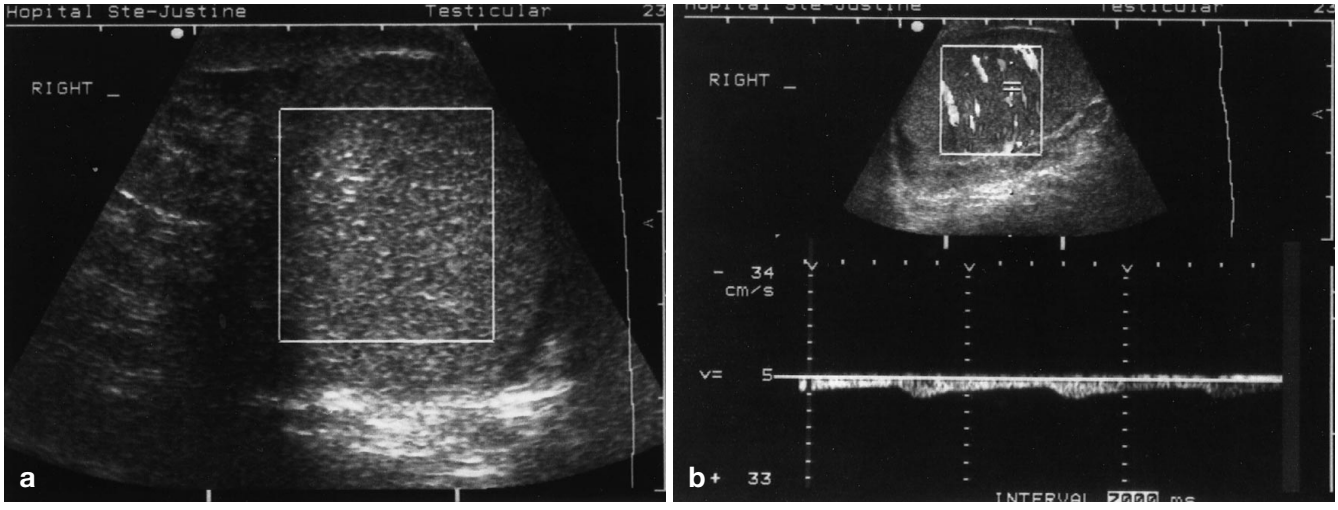


Fig. 1 a, b Case 1, torsion of the right testicle. **a** Initial US, 1 h post-torsion, reveals absence of flow within a homogeneous testis. **b** Following detorsion, restoration of blood flow is immediate

Results

These are summarized in Table 1. Six of seven manoeuvres were successful in restoring flow to the testis. The failure (case 7) was managed by a member of the surgical staff who did not follow the detorsion protocol and did not pursue the attempt beyond the initial 540°. Detorsion was completed operatively with an additional 540°.

Cases 1 and 5 are illustrated in Figs. 1 and 2. Surgery confirmed detorsion in cases 1–6. According to the surgical findings, it is likely that the testis would not have been salvaged in case 5 without the immediate benefit of detorsion.

Discussion

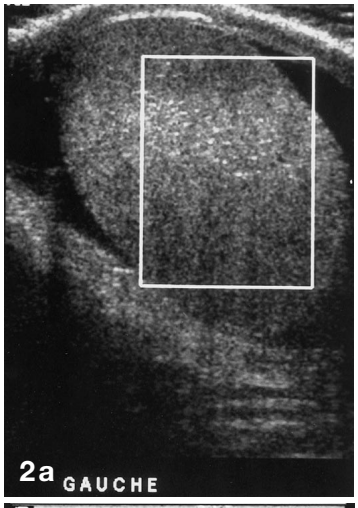
Manual detorsion is an old [1], well-documented [2–16], effective (Table 2) and safe technique that is, surprisingly, not performed routinely in children's hospitals. It is alluded to in some textbooks [17–19] and already addressed specifically in a paediatric series [9]. Our results confirm the efficiency and usefulness of pre-operative manipulation of the torsed spermatic cord.

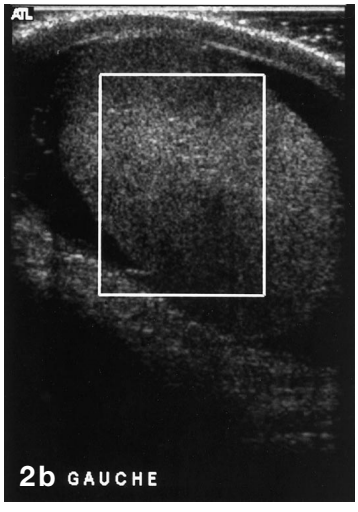
Experimentally, complete occlusion of arterial inflow occurred in a canine model at 450°–540° of torsion [20]. The viability of the torsed testis is then in direct relation to the duration of torsion; restoration of flow within 6 h post-torsion is associated with an extremely high chance of maintaining testicular viability (97–100%). The likelihood of viability decreases rapidly as time goes by – approximately 57% between 7 and 12 h, 35% between 13 and 24 h, and close to 0 after 24 h [16, 21, 22].

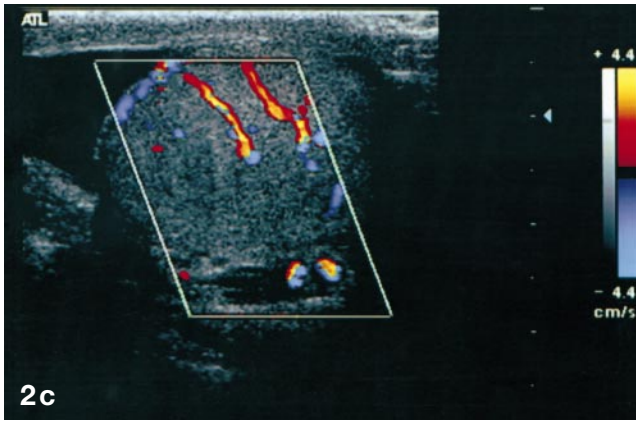
Sonographically, hypoechoic or inhomogeneous testes have been shown to be nonviable at surgery [16]. Case 5 (Fig. 2) was very close to confirming the latter correlation. An anatomical predisposition, the 'bell-

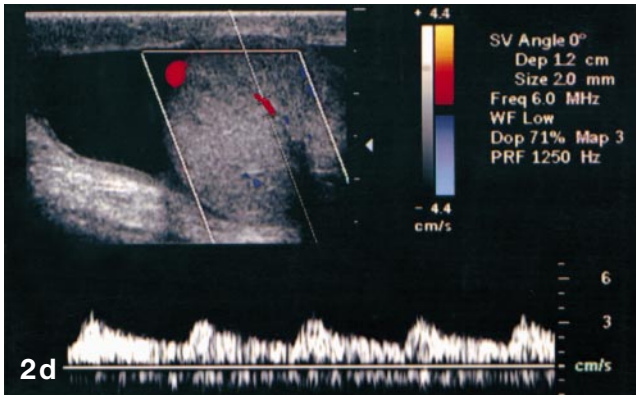
Table 1 Intravaginal testicular torsion and manual detorsion

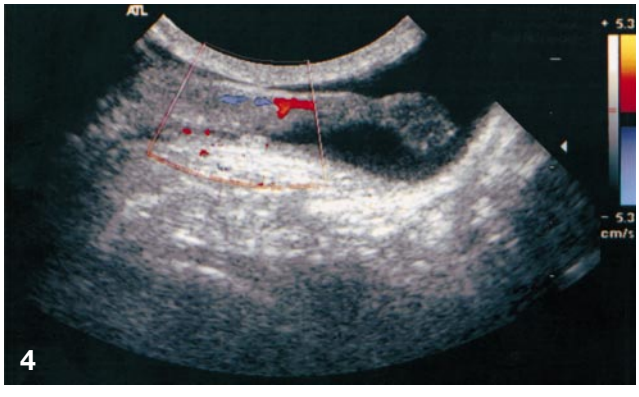
Case	Age (years)	Side	Timing US (hours)	Manual detorsion	Restoration of flow
1	15	R	1	Lateral, 2 rotations	+++ Immediate
2	15	R	2	Lateral, 2 rotations	+++ Progressive
3	$14^1/_2$	L	$4^1/_2$	Lateral, $1^1/_2$ rotation	+++ Progressive
4	14	L	$2^3/_4$	Lateral, 2 rotations	+++ Immediate
5	15	L	$5^3/_4$	Lateral, 2 rotations	+++ Immediate
6	14	L	2	Lateral, $1^1/_2$ rotations	+++ Immediate
7	14	L	2	Lateral, $1^1/_2$ rotations	No – no further preoperative detorsion; $1^1/_2$ additional rotation needed in O.R.
8	$15^1/_2$	L	72	Non-viable testis	











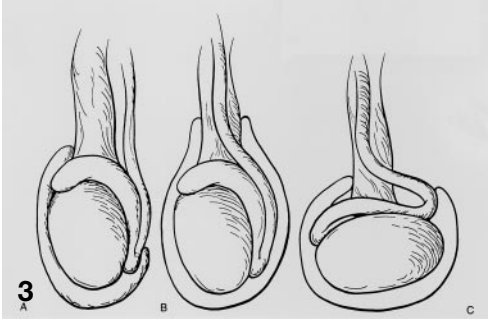


Fig. 2 a–d Case 5, torsion of the left testicle. **a** Initial US 53/4 h post-torsion shows absence of flow within an enlarged already inhomogeneous testis (**b**). A moderate amount of fluid surrounds the testis. **c** Following detorsion, central perfusion occurred immediately. A peripheral rim of vessels illustrates the severity of ischaemia. **d** Spectral analysis of a central artery post-detorsion

Fig. 3 a–c Testis position within the tunica vaginalis (permission granted from Lippincott-Raven Publishers). **a** Normal anatomy. **b** 'Bell-clapper' deformity. **c** 'Bell-clapper' deformity with horizontal testis

Fig. 4 'Bell-clapper' deformity in a 14-year-old who had several spontaneously resolving bouts of acute scrotal pain. The patient was asymptomatic at the time of examination. An abnormally long cord is well demonstrated within a small amount of hydrocele. Surgery a week later confirmed the Bell-clapper deformity; bilateral orchidopexy was performed

clapper' deformity, is encountered in most cases of intravaginal testicular torsion. Normally, the tunica vaginalis does not completely envelop the epididymis. A small area of the epididymis and the entire spermatic cord are outside the tunica vaginalis. In the 'bell-clapper' deformity, the tunica vaginalis extends high on the spermatic cord, enveloping the epididymis and allowing the testis to twist within (intravaginal torsion) (Fig. 3). The high insertion of the tunica vaginalis on the cord structures allows for a horizontal testis position and mobility similar to a bell-clapper within a bell. Most of these patients have experienced previous attacks of incomplete and/or spontaneously resolving torsion. Careful US examination can then display evidence of an abnormally long testicular cord that is part of the 'bell-clapper' deformity (Fig. 4) and should lead to preventive surgery (orchidopexy).

Table 2 Manual detorsion

Author	Year	Cases	Success
Nash [1]	1893	1	+
Perry [2]	1898	3	+
Attlee [3]	1911	1	+
Finny [4]	1914	1	+
Smith [5]	1934	2	+
Burkitt [6]	1956	1	+
Sparks [7]	1972	8	+
Frazier and Bucy [8]	1975	4	+
Betts et al. [9]	1983	8	+
Kiesling et al. [10]	1984	19	+ (18 cases)
Vordermark [11]	1984	8	+ (5 cases)
Cattolica [12]	1985	35	+
Diaz-Ball et al. [13]	1990	4	+
Cannon et al. [14]	1995	1	+
Mrhac et al. [15]	1997	1	+
Middleton et al. [16]	1997	1	+
		98	94

Testes usually twist in an inward (medial) direction with anteromedial rotation of the spermatic cord. Manual detorsion should proceed with lateral (outward) rotations. Some authors [10] have emphasized the need for rotating the torsed testicle through two planes: caudal to cranial, to release the locking mechanism, and medial to lateral. In our series, simple outward detorsion was effective and successful. Again, the lack of resistance reliably indicated the proper direction of manipulation. In rare instances in which the testis twists outwards, detorsion must be performed medially, as indicated by the lack of resistance to the manipulation. The only pitfall to manual detorsion is partial reduction of twists which are 720° or greater [23], hence the importance of monitoring the restoration of flow by CDU.

Conclusion

Pre-operative manipulation is the fastest way to relieve testicular ischaemia. This easy, effective and rewarding technique must be recommended and should be implemented routinely in patients presenting early. Manual detorsion must be assessed both clinically (immediate relief of pain, testicular mobility) and sonographically (testicular perfusion). Manual detorsion of the spermatic cord is not a substitute for surgical exploration and bilateral orchidopexy remains mandatory to prevent recurrence.

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Note added in proof

Since the submission of this paper, three additional cases were successfully managed by manual manipulation, including our first case of medial detorsion in an 11 year old patient.