# Low success rate of salvage surgery for testicular torsion in newborns

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**INTRODUCTION:** Testicular torsion within the first 30 days of life is rare. The treatment is controversial, and the prognosis for testis viability varies from 0-40% in the literature. The aim of this study was to review our institutional results for surgery for testicular torsion in the neonatal period with a special focus on salvage surgery.

**METHODS:** Patient records were reviewed for all children in the age up to 30 days who were operated for testicular torsion at our hospital during the past 20 years.

**RESULTS:** A total of 13 patients were included, two with bilateral affection. Emergency surgery was performed in eight cases and delayed surgery in five cases. Out of our 15 affected testes, 12 (85%) were non-viable at the time of surgery and were removed, one was fibrotic and left in place and two were salvageable.

**CONCLUSION:** The overall frequency of salvageable testis was low, and testis was only salvaged in cases with urgent surgery at symptom recognition. Cases that presented within the first day of life resulted in a non-salvageable testis despite emergency surgery. The reason may be prenatal torsion. Doctor's delay was common for this rare disease. **FUNDING:** not relevant.

TRIAL REGISTRATION: not relevant.

Testicular torsion in newborns is a rare condition which often results in a non-functioning testis on the affected side despite early surgical intervention. Bilateral torsion occurs in 5-10% of the cases [1-6] and may cause a need for lifetime hormonal replacement.

The treatment of neonatal testicular torsion is controversial, and the prognosis for preservation of testis viability differs in the literature. Urgent surgical exploration has been recommended [7], but a more conservative approach has been advocated because very few testes saved and because of the potential risk of anaesthesia in neonates [1, 8, 9]. Experimental studies in animals have shown that spermatogenesis is damaged after 4-6 hours and hormonal function after 10-12 hours of ischaemia. On this basis, it is often concluded that pre-natal torsion of the testis is a non-salvageable event [1, 2, 9]. Clinical reports on the salvage rate of post-natal torsion ranges from 0 % to 40%. When the testis is considered non-viable, orchidectomy is often recommended because of an up to 10% risk of later malignancy in persisting germ cells [10-12].

The objective of this study was to retrospectively review our institutional results for surgery for testicular torsion in the neonatal period with a special focus on salvage surgery in relation to clinical presentation and age.

### METHODS

Patient records for all children aged up to 30 days operated for testicular torsion at our hospital during the past 20 years were reviewed retrospectively. The following information was obtained: symptoms, objective findings, ultrasonography findings, age at which testicular pathology was first suspected, age at time of operation, doctor or parent delay, operative strategy and pathology reports.

Trial registration: not relevant.

#### RESULTS

Thirteen patients (15 affected testis) were identified and included in the study. Emergency surgery (within six hours after symptom presentation) was performed in eight cases (61.5%), and delayed surgery (> 24 hours) in five cases (38.5%). Delayed surgery was most often due to doctor's delay. No parent delay was described, but there was no information on the cause of delay in two cases. Patient characteristics appear from Table 1. Two cases of bilateral affection were seen. Salvation of the affected testis was successful in two of the 15 affected testes, 12 non-viable testis or remnants were removed, and one fibrotic testis was left in situ. Contralateral orchidopexy was performed in three of the 11 cases with unilateral affection. Pathology reports were available in ten of the 12 orchidectomy cases (case 1-10), and they all showed testicular infarction with calcifications, fibrosis and no viable testicular tissue. Two cases with fibrosis only were considered vanished testis (case 1 and 7).

Preoperative ultrasonography was performed in five of the 13 patients, and in only one case it was conclusive showing testicular torsion with no Doppler-signal (case 10); otherwise, the ultrasonography was inconclusive.

## DISCUSSION

The results from the present study confirm the low rate of salvage of the affected testis found in previous studies [1, 2, 4-6, 13].

# ORIGINAL ARTICLE

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#### TABLE 1

#### Time of surgery according to presentation, objective findings and results of surgery.

Patient no.	Urgent exploration (delay, days)	Age at first suspicion, days <sup>a</sup>	Pain⁵	Dis coloration	Affected side	Orchidectomy	Orchidopexy of contralateral testis	Salvage of affected testis
1	No (18 <sup>c</sup> )	12	No	Yes	Bilateral	Yes/no	-	No/no
2	No (16 <sup>c</sup> )	3	No	No	Left	Yes	No	No
3	No (26 <sup>d</sup> )	0	No	Yes	Left	Yes	No	No
4	Yes	3	Yes	Yes	Left	Yes	No	No
5	Yes	0	No	No	Right	Yes	No	No
6	No (1 <sup>c</sup> )	0	No	Yes	Right	Yes	No	No
7	Yes	0	Yes	No	Right	Yes	No	No
8	Yes	0	No	Yes	Right	Yes	Yes	No
9	Yes	0	No	Yes	Right	Yes	Yes	No
10	No (1 <sup>d</sup> )	0	N/A	N/A	Right	Yes	N/A	No
11	Yes	2	No	Yes	Left	No	No	Yes
12	Yes	2	N/A	No	Bilateral	Yes/yes	-	No/no
13	Yes	19	Yes	Yes	Right	No	Yes	Yes

N/A = not applicable.

a) Age at suspicion refers to the age at which any scrotal pathology was first detected.

b) Pain refers to whether the child had shown any sign of pain prior to surgery.

c) Doctor's delay.

d) Unknown.

Neonatal testicular torsion can be divided into two sub-groups: pre-natal torsion recognised as a fibrous scrotal swelling at delivery and post-natal torsion occurring within the first 30 days of life. The post-natal torsion is clinically similar to that seen later in life with inguinoscrotal swelling and skin discoloration, whereas scrotal tenderness or pain often is difficult to assess [2, 3].

Based on operative findings and pathology reports, we considered that prenatal torsion occurred in at least eight of our cases, which presented with clinical findings within the first day of life. Testis was saved on no cases in this group. Salvation of the testis was possible in only two cases, which presented at two and 19 days of age.

# FIGURE 1

Peroperative findings in 18-day-old child with bilateral torsio testis. **A.** A necrotic testis. **B.** A fibrotic testis, also known as a vanished testis. None of these were salvageable.



Although symptoms like pain are difficult to assess in newborns, it has been claimed that that lack of pain indicates unsalvageable testis [1, 8]. However, in one of our patients with a salvageable testis, no signs of pain or distress were reported in the record.

Urgent surgery was performed in eight cases in our study, and delayed surgery in the remaining cases. A survey among paediatric urologists in the US revealed that only 31% of the respondents would operate immediately in case of pre-natal torsion, and no surgery was recommended by 12% of the surgeons [14]. Almost all surgeons (96%) would operate immediately in cases presenting in the post-natal period. Similar results were obtained from a survey among UK paediatric surgeons and urologists, but only 10% of the surgeons had ever found a viable testis [15]. The policy of "wait and see" has been challenged by others because surgery is the only possible way to save viable testicular testes even in cases with severe ischaemia [16].

Use of ultrasonography with colour Doppler to diagnose testicular torsion is controversial [2, 4, 6, 8, 17]. Even in the hands of a skilled investigator, the specificity and sensitivity is poor and should not delay surgical exploration. In our series, only one out of five cases with preoperative ultrasonography conclusively showed testicular torsion.

Histologically, pre-natal testicular torsion can present either as a fibrotic and non-functioning testicular remnant or as a fibrotic lump without visible testicular tissue, the so-called vanished testis. The vanished testis is hardly the result of underlying endocrine pathology as most of the boys have a normal male karyotype and a normal number of Leydig and germ cells in the contralateral testis [18, 19]. The theory that vanished testis is caused by torsion is further supported by the fact that haemosiderin-laden macrophages are present in most removed specimens, which is consistent with haemorrhagic infarction [5, 10, 11, 18]. It is generally accepted that a necrotic or fibrous testicular remnant (**Figure 1**) should be removed to prevent infection, avoid risk of later malignancy and minimise the risk of antibodies against testicular tissue.

Contralateral orchidopexy is another important and controversial subject. It has been shown that up to 85% of boys born with monochordism, most likely as a result of vanish testis, have contralateral gubernaculum deformities, possibly increasing the risk of later torsion [20]. Thus, most authors recommend contralateral testicular fixation. Others have been chary of contralateral orchidopexy due to the risk of complication which is seen in up to 18% of the cases [1]. Intrauterine torsion is extravaginal, whereas torsion later in life most often is intravaginal [5]. Therefore, the general recommendation of contralateral fixation is probably not applicable to neonates. Torsion during the observation period (1-19 years) occurred in none of our seven patients with no contralateral testis fixation, To our knowledge, the true risk of testicular torsion later in life is unknown.

The limitations of the present study are the retrospective design and the limited study size, even if this is one of the largest series published. Testicular torsion in the first month of life is a rare condition, and randomised prospective studies are not likely to be conducted ever. Although no firm conclusions can be drawn from this or other published studies, the present results confirm that there seems to be no advantage from early intervention in the new-born male presenting with a firm testicular mass, scrotal swelling or discoloration within the first day of life.

Urgent surgery is recommended in cases that present with symptoms after birth, but the chance of saving the testis remains poor. Contra-lateral testicular fixation is controversial and carries a significant risk of complications.

#### CONCLUSION

Testicular torsion is seldom within the first 30 days of life and it is associated with a poor testicular outcome, especially among those presenting within the first day of life. It is not possible to conclude which surgical strategy is the best, but the risk of contralateral testicular fixation should be considered as there is no knowledge on the risk of developing torsion later in life. The parents should be counselled on the merits of the various strategies including the outcome expectations. CORRESPONDENCE: *Rie Jensen*, Kirurgisk Afdeling, Odense Universitetshospital, Sdr. Boulevard 29, 5000 Odense C, Denmark. E-mail: rijen08@gmail.com

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#### LITERATURE

- Djahangirian O, Ouimet A, Saint-Vil D. Timing and surgical management of neonatal testicular torsions. J Pediatr Surg 2010;45:1012-5.
- Driver CP, Losty PD. Neonatal testicular torsion. Br J Urol 1998;82:855-8.
  Hitch DC. Shandling B. Lilly JR. Recognition of bilateral neonatal testicular
- torsion. Arch Dis Child 1980;55:153-4. 4. Roth CC. Mingin GC. Ortenberg J. Salvage of bilateral asynchronous
- perinatal testicular torsion. J Urol 2011;185:2464-8.
- Al-Salem AH. Intrauterine testicular torsion: a surgical emergency. J Pediatr Surg 2007;42:1887-91.
- Yerkes EB, Robertson FM, Gitlin J et al. Management of perinatal torsion: today, tomorrow or never? J Urol 2005;174:1579-82.
- 7. McFarland JB. Testicular strangulation in children. Br J Surg 1966;53:110-4.
- van der Sluijs JW, den Hollander JC, Lequin MH et al. Prenatal testicular torsion: diagnosis and natural course. An ultrasonographic study. Eur Radiol 2004;14:250-5.
- Snyder HM, Diamond DA. In utero/neonatal torsion: observation versus prompt exploration. J Urol 2010;183:1675-7.
- Grady RW, Mitchell ME, Carr MC. Laparoscopic and histologic evaluation of the inguinal vanishing testis. Urology 1998;52:866-9.
- Hegarty PK, Mushtaq I, Sebire NJ. Natural history of testicular regression syndrome and consequences for clinical management. J Pediatr Urol 2007;3:206-8.
- Cendron M, Schned AR, Ellsworth PI. Histological evaluation of the testicular nubbin in the vanishing testis syndrome. J Urol 1998;160: 1161-2.
- Sorensen MD, Galansky SH, Striegl AM et al. Perinatal extravaginal torsion of the testis in the first month of life is a salvageable event. Urology 2003;62:132-4.
- Broderick KM, Martin BG, Herdon CD et al. The current state of surgical practice for neonatal torsion: a survey of pediatric urologists. J Pediatr Urol 2013;9:542-5.
- Rhodes HL, Corbett HJ, Horwood JF et al. Neonatal testicular torsion: a survey of current practice amongst paediatric surgeons and urologists in the United Kingdom and Ireland. J Paediatric Surg 2011;46:2157-60.
- Callewaert PR, Van Kerrebroeck P. New insights into perinatal testicular torsion. Eur J Pediatr 2010;169:705-12.
- 17. Cartwright PC, Snow BW, Reid BS et al. Color Doppler ultrasound in newborn testis torsion. Urology 1995;45:667-70.
- Pigon O, Dundar BN. Vanishing testes: a literature review. J Clin Res Pediatr Endocrinol 2012;4:116-20.
- Huff DS, Wu HY, Snyder HM et al. Evidence in favor of the mechanical (intrauterine torsion) theory over the endocrinopathy (cryptorchidism) theory in the pathogenesis of testicular agenesis. J Urol 1991;146:630-1.
- 20. Harris BH, Webb HW, Wilkinson AH et al. Protection of the solitary testis. J Pediatr Surg 1982;17:950-2.