

Manual detorsion allows time for orchidopexy in testicular torsion

 Serpil Sancar,  Meryem Anayurt,  İsmet Kırmacı,  Sabriye Dayı

Department of Pediatric Surgery, Bursa City Hospital, Bursa, Türkiye

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Corresponding Author: Serpil Sancar, serpil.sancar@sbu.edu.tr

ABSTRACT

Aims: To investigate the efficacy of color Doppler ultrasound (CDUS)-guided manual detorsion (MD) as an immediate intervention in pediatric testicular torsion (TT) and its impact on testicular preservation, surgical timing, and postoperative outcomes.

Methods: A retrospective analysis was conducted on 43 pediatric patients who underwent surgery for TT between July 2019 and January 2025. Patients were divided into two groups based on whether MD was attempted prior to surgery (MD group, n=15) or not (non-MD group, n=28). MD success was defined by symptom resolution and confirmed reperfusion on CDUS. Data on symptom duration, time to surgery, intraoperative findings, orchiectomy rates, contralateral testicular fixation (CTF) feasibility, and postoperative complications were compared between groups.

Results: MD was successful in 14 of 15 cases (93.3%), significantly prolonging the median time to surgery (11±5.9 hours) compared to the non-MD group (2.0±1.28 hours; $p<0.001$), allowing for improved surgical conditions. Orchiectomy was avoided in all successful MD cases but required in four patients in the non-MD or failed MD group. Testicular atrophy occurred only in the non-MD group. CTF was more frequently performed in the MD group due to reduced scrotal edema. No recurrences or major complications were observed in the MD group during follow-up.

Conclusion: CDUS-guided MD is a safe and effective temporizing maneuver that facilitates testicular salvage and surgical planning in TT. However, timely orchidopexy following successful MD remains essential to prevent residual torsion or recurrence and to ensure optimal outcomes.

Keywords: Testicular torsion, manual detorsion, orchidopexy, reperfusion

INTRODUCTION

Testicular torsion (TT) is a clinical emergency in which the testicular cord and vessels twist around themselves, disrupting the blood supply to the testicle and, if left untreated, resulting in testicular loss. The time to salvage the testis after TT is very short. Research shows that ischemic changes can start within 4 to 6 hours, making prompt intervention crucial. If detorsion does not happen within 24 hours, about 80% of patients may face orchiectomy due to necrosis.^{1,2} Urgent scrotal exploration and detorsion are recommended as the standard surgical method for testicular salvage.

In TT, where hours or even minutes are crucial for saving the testicle, the time to surgery may be prolonged due to preoperative preparation and hospital resources.³ Manual detorsion (MD) is the correction of torsion by an external maneuver in the opposite direction of torsion. Nash first

described TT in 1891 as a case report in which surgery was performed, followed by the same author in 1893, who described a complete regression of complaints and findings with external MDs without surgery.⁴ The testicles are usually torsioned from lateral to medial. In detorsion, a maneuver like opening a book from medial to lateral is recommended.² However, if this maneuver is unsuccessful, it has been reported to be successful with the maneuver performed in the opposite direction.⁵ After detorsion, the pain is relieved, and the testicle descends into the scrotum.^{6,7} MD can be performed during physical examination or immediately with a Color Doppler Ultrasound (CDUS) guide. Success is proven when blood flow is seen again on CDUS at this time.⁸

It is essential to perform the procedure with CDUS to diagnose torsion and control blood flow after MD. In the diagnosis of TT, CDUS is the gold standard diagnosis with

100% sensitivity, 97.9% specificity, and 98.1% diagnostic accuracy.⁹ CDUS can detect even the direction and number of cord twists,⁸ which is essential information when performing MD under CDUS guidance. After MD, a normal CDUS should document a complete detorsion of the spermatic cord and testicular blood flow in the affected testicle.^{8,10}

In our study, we aimed to present the results of our patients to whom we applied MD before surgery for TT.

METHODS

The study was conducted with the permission of the Scientific Researches Ethics Committee of Bursa City Hospital (Date: 16.04.2025, Decision No: 2025-8/2). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

The records of patients who underwent surgery with the diagnosis of TT between July 2019 and January 2025 were retrospectively reviewed. Perinatal torsion cases were excluded from the study. The patients' age, symptom duration, MD intervention, surgical waiting time, surgical findings, surgical method applied, and early and late postoperative complications were analyzed. MD success was confirmed by the sudden decrease in symptoms and reperfusion monitoring on CDUS. Patients who did not undergo MD (non-MD group) and those who underwent MD (MD group) were compared in terms of duration of symptoms, time to surgery, orchiectomy, and atrophy.

MD method: The examining physician is on the patient's right side, holding the testicular elements proximal to the inguinal canal with one hand in a slightly palpable position along the canal. In contrast, the other hand rotates the affected testicle from medial to lateral as if opening a book. The number of rotations continues until the testicle descends into the scrotum, and the pain suddenly subsides. The procedure is performed with CDUS, and the return of blood flow confirms the success of the procedure.

Statistical Analysis

All data analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA). The distribution of continuous variables was assessed using the Kolmogorov-Smirnov test. Not normally distributed data were presented as median (minimum-maximum). Categorical variables were expressed as numbers and percentages (%). Comparisons between two independent groups were made using the Mann-Whitney U test for continuous variables and the Chi-square test or Fisher's exact test for categorical variables. $p < 0.05$ was considered statistically significant.

RESULTS

During the study period, 43 patients with a mean age of 13.39 ± 2.68 (5-17) were treated with the diagnosis of TT. Twenty-five (58%) patients had the left testicle affected, and 18 (42%) had the right testicle affected.

Fifteen (35%) patients with confirmed TT diagnosis in the MD group, and 28 (65%) patients in the non-MD group. The demographic and timing comparison of the groups is presented in **Table 1**. The median symptom duration of patients presenting to the emergency department due to TT was 7.00 (range: 1-84) hours, and there was a significant difference between the two groups ($p < 0.001$). In the MD group, except for one patient, symptom duration was shorter than 24 hours in 14 patients. MD was attempted in 15 patients and was successful in 14 (93.3%) patients. The patient with an unsuccessful MD had a symptom duration of 48 hours. The median time between presentation to the emergency room and surgery was significant difference between the two groups ($p < .001$). The median degree of torsion in the non-MD group was 720 (360-1080) degrees. There was no torsion in 13 of 14 patients who underwent successful MD, and one patient had testicular circulation but 180 degrees of residual torsion. There was a minimal color change in the detorsion testicles that underwent successful MD. In one patient who underwent an unsuccessful MD, it was observed that there were 1080 degrees of torsion, and the testicle was necrotic.

During surgery, contralateral testis fixation (CTF) was performed in all patients in the group with successful MDs. CTF was not performed in 5 patients (4 patients in the non-MD group and one patient with unsuccessful MD) due to severe scrotal edema. One (20%) of the five patients presented with contralateral TT 3 weeks later and had orchidopexy following successful MD. Elective orchidopexy was performed on one patient one month later. The follow-up of the remaining three patients continues without CTF at the family's request.

MD and non-MD group results are presented in **Table 2**. A total of 4 patients underwent orchidectomy. No orchidectomy

Table 2. Clinical outcomes in MD and non-MD groups

Outcome	MD group (n=15)	Non-MD group (n=28)
Successful MD	14 (93.3%)	–
Orchiectomy	0	4
Atrophy during follow-up	0	5
Postoperative complications	0	4 (3 wound leakage, 1 dehiscence)
CTF performed	14	23

MD: Manual detorsion, CTF: Contralateral testicular fixation

Table 1. Demographic and clinical characteristics of patients with testicular torsion

Characteristics	Total (n=43)	MD group (n=15)	Non-MD group (n=28)	p-value
Age, years, mean (min–max)	13.39 (5–17)	12.66 (5–17)	13.78 (5–17)	0.21
Pain duration, hours, median (min–max)	7.00 (1–84)	2.00 (1–48)	24.00 (2–84)	<0.001
Time from diagnosis to surgery, hours, median (min–max)	4.00 (0.5–20)	11.00 (1.00–20)	2.00 (0.5–5)	<0.001

Data are presented as mean (min–max) or median (min–max). p: p-value. * $p < 0.05$ indicates statistical significance. MD: Manual detorsion, Min: Minimum, Max: Maximum



was performed in patients with successful MDs. In the early postoperative period, three patients in the non-MD group experienced incision leakage, and one patient had an incision opening. There were no early postoperative complications in the MD group.

The average follow-up period of our patients is 67 (4-64) months. During the follow-up period, atrophy developed in 5 patients who were in the non-MD group. No atrophy was observed in patients who were successful in the MD group. Since the group that underwent MD and was successful included patients who came within the first 24 hours, no atrophy was observed in the group that did not undergo MD under the same conditions when patients with a symptom duration of less than 24 hours were evaluated.

DISCUSSION

TT is an emergency surgical condition that develops when the testis, vascular and cord structures twist around themselves and rapidly progress to ischemic necrosis. Time is critical in saving the testicle.^{11,12} Therefore, the duration of diagnosis and intervention from the onset of symptoms is decisive for testicular survival.

The degree of torsion and the length of ischemic time are the main determinants of testicular damage.^{10,13} In our study, the median value of the symptom duration at the time of presentation to the emergency department was 7 (range: 1–84) hours. The decision to perform MD was made according to the severity of scrotal edema and hyperemia, the duration of symptoms, and the preference of the surgeon performing the intervention. A total of 15 patients underwent MD, 14 of which were successful. The symptom duration in the only unsuccessful case was over 24 hours. Dias Filho et al.¹⁴ applied MD only to patients with symptoms for less than 24 hours. Vasconcelos-Castro et al.¹⁰ argued that MD can be applied to all patients regardless of the duration of symptoms and that there should be no contraindication to trying MD. In our study, MD was not applied to patients who had pain complaints for more than 24 hours due to the edematous appearance of the scrotum, and it was not successful in one patient. Our clinical opinion on this issue is that MD should not be applied if clinical findings such as scrotal edema and redness are severe, as well as the duration of pain. In our patients who applied in less than 24 hours and did not receive an MD, the preference of the surgeon who applied the first treatment differed. As a result of all these, the patients in the MD group had shorter symptom duration than the group in the non-MD.

Since Nash defined MD in 1893, articles have been published on the benefits of MD.^{3,6,10,14} CDUS is essential both in the diagnosis of TT and in proving the effectiveness of MD.^{9,10} Today, even the direction of torsion and the number of torsions can be seen with CDUS.⁸ This increases the safety of CDUS-guided MD applications.¹⁵ In all of our patients, TT was diagnosed with CDUS by emergency medicine specialists or radiologists, and simultaneous control CDUS was performed on patients who underwent MD. MD was applied to 15 patients, and in 14 (93.3%), a sudden improvement in

pain and blood flow was restored in the testicle. One patient had no improvement in clinical and CDUS findings and was taken to emergency exploration. Patients who underwent successful MDs were not discharged immediately; they were hospitalized and taken to surgery in more stable conditions.

Patients in the non-MD group are taken to surgery as soon as possible after diagnosis. The median time from presentation to surgery in the MD group was 11 ± 5.91 (1.00-20) hours, and the median time from surgery in the non-MD group was 2.00 ± 1.28 (0.5-5) hours. The two groups had a significant difference ($p < .001$). The application of MD allowed for a more comfortable surgery by making the patient's preoperative preparation easier and reducing edema and symptoms. We generally do not recommend discharge to our patients. A normal CDUS after MD cannot be used as the sole factor to evaluate MD as successful because standard CDUS cases have been reported in TT.¹⁶ In one of our patients, 180-degree torsion was observed during surgery despite some improvement in testicular blood flow. Vasconcelos-Castro¹⁰ argued that this residual TT would be diagnosed more clearly with RDUS and complete resolution of pain and that proof of MD success with RDUS alone would not be sufficient. Sessions et al.² reported that 18 patients (32%) had an average of 360 degrees of residual torsion at surgery, and despite symptomatic improvement, some patients still had significant spermatic cord rotation at surgery. Other studies have also published these findings.^{14,17} In patients whom we consider to have successful MD, orchidopexy should be planned as soon as possible due to the possibility of residual torsion. We recommend semi-urgent orchidopexy before discharge in all patients.

It has been reported that 80% of patients with ischemic scrotum require orchiectomy after 24 hours due to necrosis.^{1,2,12} The degree of torsion and the length of ischemic time are the main determinants of testicular damage.^{10,13} In our study, the median degree of torsion in the non-MD group was 720 (360-1080) degrees. There was no torsion in 13 of 14 patients who had successful MD, and one patient had 180 degrees of residual torsion, although there was testicular circulation. Orchidopexy was performed in all patients who had successful MDs. Orchiectomy was performed in 4 patients, 3 of whom were non-MD and one of whom was unsuccessful MD due to testicular necrosis. All patients who underwent orchiectomy had symptoms longer than 24 hours and torsion degrees of 720 and 1080 degrees. Orchiectomy was not performed in any patient with a successful MD. Although MD is considered advantageous in terms of orchiectomy, we cannot make a standard comparison regarding orchiectomy because patients with symptom duration longer than 24 hours and severe clinical findings were not in the successful MD group. In addition, our study demonstrated a high success rate of MD (93.3%). This may reflect the relatively short symptom duration and selected cases in our cohort. However, Sessions et al.² reported residual torsion at surgery in a notable proportion of cases despite clinical improvement, highlighting that symptomatic relief and Doppler reperfusion may not guarantee complete detorsion. Similarly, Vasconcelos-Castro et al.¹⁰ reported variable outcomes of MD, with lower success rates and emphasized that a normal



CDUS alone may not reliably exclude incomplete detorsion; therefore, orchidopexy should not be delayed even when apparent improvement is observed.

It is known that complete recovery in clinical and radiological findings with MD is insufficient for treatment. Information on recurrence should be provided in patients who do not undergo orchidopexy. We received information that one of our patients who applied to us with TT and to whom we applied MD successfully had applied for MD at another center with a diagnosis of TT 15 days before his application. We hospitalized the patient after a successful MD and performed testicular fixation under semi-emergency conditions. Successful MD saves us significant time from diagnosis to surgery. This situation becomes even more critical, especially during referrals from a center where there is no surgical facility at the center where the patient was first diagnosed. Discharge to home and elective surgery recommendations may also be appropriate after a successful MD. However, due to the uncertainty of residual TT and recurrence, referral to a center that will perform surgery as soon as possible would be appropriate.

CTF is generally recommended in TT, except in neonatal torsions. Bell clapper anomaly is associated with an increased risk of intravaginal TT. Contralateral bell clapper anomaly is common in older boys with acute TT, supporting its standard application in this clinical setting.¹⁸⁻²¹ CTF is performed because of the risk of contralateral TT.²² However, some authors argue that the risk of contralateral TT is low and that CTF should not be performed to avoid surgical trauma to the testis during fixation. Some experimental data indicate the potential adverse fertility effects of transparenchymal fixation sutures, depending on how CTF is performed.²³ Our clinical approach is to add CTF at the same session in TT, except in neonatal TT, which is generally accepted.

CTF was applied to all patients in the MD successful group, while it was not applied to 5 patients in the non-MD group because the scrotum was very edematous. CTF was easily applied in our patients since we operated on the group in which MD was applied in semi-emergency conditions with the regression of findings such as edema and redness. However, in the non-MD group, CTF was not applied during this period when inflammation was intense in cases where the scrotum was very edematous and hyperemic. MD facilitated the decision and application of CTF. MD provided the opportunity for the safe application of CTF. Contralateral TT occurred in one of the five patients (20%) who did not receive CTF after 3 weeks, and the family applied one hour after the pain because they were conscious. MD was applied to the patient successfully, and emergency testicular fixation was applied. Although it is not significant for a small number of patients, the rate of contralateral TT in our series is high. Therefore, applying CTF in the same session may be important. Elective CTF was applied to one patient one month later in a different session. The families of the remaining three patients to whom CTF was not applied were informed about contralateral TT. They were taken under clinical follow-up with the family decision, recommending an urgent application in case of a complaint related to the

testicle. It is essential to provide this information to the patient's families and obtain their consent to be informed about this.

Possible complications after orchidopexy include recurrent ipsilateral or contralateral torsion, testicular ischemia and atrophy, and adverse effects on fertilization.^{24,25} In our study, ipsilateral TT did not occur in either group. Contralateral torsion occurred in one patient. We discussed this issue in the CTF paragraph. Atrophy was not seen in any patient in the MD group but in 5 patients in the non-MD group. Atrophy was seen in patients who presented more than 24 hours later in the non-MD group. However, no significant difference was seen between the two groups regarding atrophy in patients with symptom duration less than 24 hours. The mean follow-up period of our patients was 67 (4-64) months.

Limitations

This study has several limitations. First, it is retrospective in nature and conducted at a single center, which may limit the generalizability of the findings. Second, the sample size is relatively small, and the number of events such as orchiectomy and contralateral torsion is limited. Third, the follow-up period was relatively short and variable across patients, which restricts the ability to evaluate long-term outcomes such as fertility and recurrent torsion. These factors should be considered when interpreting our results.

CONCLUSION

As a result, performing an MD before surgery in TT is vital for testicular reperfusion, for which hours are essential. MD does not eliminate the need for surgery but can provide more controlled surgical planning. It saves time for patient referrals from centers that do not have surgical treatment options. Considering the risk of residual torsion and recurrence after MD, patients should undergo orchidopexy as soon as possible after a successful MD.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was conducted with the permission of the Scientific Researches Ethics Committee of Bursa City Hospital (Date: 16.04.2025, Decision No: 2025-8/2).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

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Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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