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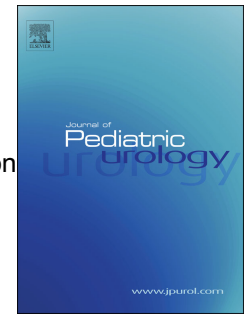


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**Paternity, Erectile Function and Health-Related Quality of Life in Patients Operated on Pediatric Testicular Torsion**

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**Running head**: Long-term effects of pediatric testicular torsion

**Key Words**: fertility, paternity, testicular torsion, quality of life, erectile function

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# Paternity, Erectile Function and Health-Related Quality of Life in Patients Operated on Pediatric Testicular Torsion


## Summary

### Introduction

Torsion of the spermatic cord (SCT) may lead to organ loss and can potentially influence fertility. Long-term effects of SCT are not fully investigated.

### Objective

The purpose was to evaluate paternity rates in adults who have had SCT in childhood and to compare the results to those of a control population. The secondary purposes were to compare paternity rates after testis preserving surgery to orchiectomy, and to evaluate erectile function and health-related quality of life (HRQoL).

### Study Design

Questionnaires concerning paternity, erectile function (IIEF-5 questionnaire) and HRQoL (15D questionnaire) were mailed to 74 men who had been treated for SCT and to 92 controls treated for torsion of testicular appendage (TAT) in 1977–1995 and who were currently older than 30 years.

### Results

Thirty-five of the 74 (47%) SCT patients and 58 of the 92 (63%) controls responded. A same-aged control was selected for each SCT patient. The median age at investigation was 41 (IQR 36 to 46) years in the SCT group and 41 (IQR 38 to 46) years in the controls, (p=0.81). The paternity rate was 23 of 35 (66%) in the SCT group and 26 of 34 (76%) in the

controls (p=0.43). Nine percent of patients **and controls** suffered from infertility. **Of the 30- to 50-year-old SCT patients, 9 out of 16 (56%) had children after orchiectomy and 13 out of 16 (81%) after detorsion (p=0.25).**

Significant or moderate erectile dysfunction (IIEF-5 total score <12) was observed in 3 of 32 (9%) of the patients and in 1 of 35 (3%) of the controls, (p=0.34). **Erectile dysfunction was similarly rare both in orchidopexy and orchiectomy group. Total HRQoL scores were similar in SCT patients and in the control groups (p=0.69) as well as in patients with orchidopexy and orchiectomy (p=0.50).**

**Discussion**

**Paternity, erectile function or HRQoL were not impaired in the general level in the SCT patients in comparison with controls. Neither the mode of treatment: orchiectomy or detorsion, had significant impact on the results. However, the results cannot be generalized to individual level. The limitations were small sample size and inability to investigate maternal factors to the paternity. However, the results are encouraging for the patients and the families.**

**Conclusion**

**Paternity rate and HRQoL were similar in SCT patients and controls. The type of surgery (orchiectomy vs. detorsion) did not affect paternity rates statistically. Moderate or significant erectile dysfunction was rare in both groups.**

## Introduction

Torsion of the spermatic cord (SCT) is a sporadic phenomenon, which may result in organ loss and can potentially influence fertility. Testicular torsion occurs when the spermatic cord becomes twisted and the circulation of blood to the testicle is prevented. SCT can be either extravaginal, typically among neonatal patients, or intravaginal, more commonly found among prepubertal and pubertal boys and young adult men [1]**. The incidence of SCT is 1:4000 in men under 25 years [2]**. Clinical experience has revealed that the duration of the symptoms is a crucial factor when evaluating the vitality of the affected testicle [2,3].

A lot of attention has been given to improved diagnostics of SCT to get the patients sooner to a detorsion operation and to save as many testicles as possible. By contrast, there have been fewer articles focusing on the long-term effects of testicular torsion [4]. Arap et al have reported that SCT may have an effect on sperm quality [5]. Laboratory tests after SCT indicate that germ cell function may be reduced in some patients, especially if the affected testicle had been removed [6]. However, the clinical significance of these findings is unclear and as far as we know, paternity rates or erectile function have not been previously evaluated in adults after SCT in childhood. **Since lack of gonadal tissue may lead to hypogonadism in some cases, we wanted to evaluate if erectile function is affected in SCT patients.**

The primary purpose of this study was to evaluate paternity rates in adults who have had SCT in childhood and to compare the results to those of a control population. The

secondary purposes of the study were to compare paternity rates after testis preserving surgery to those after orchiectomy, and to evaluate erectile function and health-related quality of life (HRQoL) in the patients compared to controls.

**Materials and methods**

The database of the Children's Hospital, University of Helsinki, was retrospectively reviewed for patients treated for SCT between 1977 and 1995. Patients treated for torsion of testicular appendage (TAT) during the same time span formed the control population. Institutional ethical committee approval was obtained before the study began. A total of 166 patients were identified. All 74 patients and 92 controls who were currently older than 30 years were invited to the study. Thirty-five of the 74 (47%) SCT patients and 58 of the 92 (63%) TAT patients responded. For all SCT patients, a matched control of similar age was selected from the control group. The final sample size in both groups was 35 males aged 31 to 54 years.



Questionnaires concerning male fertility, erectile function *(IIEF-5 questionnaire*) and HRQoL *(15D©)* were mailed up to three times. In addition, the patients were asked if they **had fathered or attempted to father** children and if they had chronic illnesses. The patient was considered to have an infertility problem if he had attempted to **father a child** without success for over one year. The paternity rate in the general Finnish population was obtained from Statistics Finland (https://www.stat.fi/) for comparison. In addition, satisfaction concerning the appearance of the testicles or prosthesis was asked:

**Are you satisfied with the prosthesis? Yes/No, and if the answer was no, the men were asked to describe, what kind of problems they had with prosthesis**.

Erectile function was evaluated by using a Finnish translation of the 5-item version of the International Index of Erectile Function (IIEF-5) questionnaire. Less than 22 out of 25 points on that questionnaire indicates mild and less than 12 out of 25 points moderate or significant erectile dysfunction [7]. Health-related quality of life was evaluated with the 15D questionnaire. It measures 15 dimensions of health: mobility, vision, hearing, breathing, sleeping, eating, speech, excretion, usual activities, mental function, discomfort and symptoms, depression, distress, vitality, and sexual activity. Each dimension has five levels (1-5) with 1 indicating perfectly normal function and five very serious problems. A change in the total 15D score of 0.015 or more is considered clinically important in the sense that, on average, a person can feel the difference [8].

IIEF-5 scores are expressed as medians and interquartile ranges (IQR) and 15D scores as means. Paternity rates between patients and controls were compared with Fisher's exact test, IIEF scores between the groups were compared with Mann-Whitney test, and 15D scores with Independent samples T test (SPSS and Statview® 5.0.1, SAS Institute Inc.). A P-value less than 0.05 was considered significant.

**Results**

**The median age at surgery was 13 years (IQR 1-14y) in the SCT patients and 10 years (IQR 6-12y) in the TAT controls (p=0,26).** The median age at investigation was 41 years (IQR 36 to 46) in the SCT group and 41 years (IQR 38 to 46) in the control group, p=0.81. The paternity rate was 23 of 35 (66%) in the SCT group and 26 of 34 (76%) in the controls, (p=0.43). Of the 30- to 50-year-old SCT patients, 9 out of 16 (56%) had children after orchiectomy and 13 out of 16 (81%) after detorsion (p=0.25). Three men with SCT were not included, because of age under 30 years. **The median time for surgery from the beginning of the symptoms for SCT patients was 6 hours (IQR 4-11h) in the orchidopexy group and 27 hours (IQR 17-48h) in the orchiectomy group (p<0,01).**

There were 3 out of 33 (9%) SCT patients and 3 out of 34 (9%) TAT patients who suffered from infertility. Two patients did not answer the question. The paternity rate among our patients and controls was comparable to the population-based paternity rate (65%) of similar-aged men in Finland 2016.

The IIF-5 total score was lower in SCT patients than in the controls; median 24 (IQR 22 to 25) vs. 25 (IQR 24 to 25), (p=0.02). The most significant difference was seen in confidence to get and keep an erection (Q 1), (p=0.005). **There was one man in SCT group and one in TAT group, who has not been sexually active in last six months**. However, significant or moderate erectile dysfunction (score <12) was rare in both groups: in 3 out of 32 (9%) in the patients and in 1 out of 35 (3%) in the controls, (p=0.34). (Table1) **Erectile dysfunction was similarly rare both in orchidopexy and orchiectomy groups.**

HRQoL (15D) total scores were similar in both the patients and the controls. There were also no statistically significant differences between the groups on any of the 15 dimensions of the 15D instrument (Fig. 1) HRQoL was also similar in patients with both testicles left (median age 41 years among responders) and in those who had only one testicle left (median age 37 years among responders; 15 D scores 0.953 vs. 0.936 respectively, p=0.50). However, somewhat lower scores were found in the orchiectomy group in usual activities (p=0.06) and vitality (p=0.05) although the differences did not reach statistical significance.

Patients who had lost a testicle because of torsion in childhood or adolescence were offered an opportunity to have a testicular prosthesis. Sixty-seven percent (14 of 21) had chosen to have a prosthesis and 71% of those with prosthesis were satisfied. **Most complaints concerned about the size of the prosthesis (four patients, 29%) and one of these patients was in addition unsatisfied with the position of the prosthesis.** Patients who had a prosthesis (median age 39 years) reached similar total 15D scores (0.93) compared with patients without prosthesis (median age 34 years among) (0.95), (p=0.43).

**Discussion**

In this study, the paternity rate and HRQoL were similar in SCT patients and the TAT controls. The paternity rate was also comparable to that of same-aged Finnish general population. The type of surgery (orchiectomy vs. detorsion) did not affect paternity rates significantly, either. Moderate and significant erectile dysfunction was rare in both groups.

However, a slight non-significant tendency was found in reduced paternity (56% vs. 81%) and erectile function in patients with SCT, especially after orchiectomy.

In late post-operative series, testicular atrophy has been reported to take place in 60 to 68 % of surgically untwisted testicles [9]. There are also a few studies on testicular hormonal function (LH, FSH, Inhibin-B, Testosterone) after testicular torsion, which show that testicular function is often compromised in patients with SCT[6,10,11]. Arap et al studied the vitality and morphology of the sperm after SCT and found that patients with detorsion and orchidopexy had more sperm abnormalities compared with those with orchiectomy or with controls, respectively [5]. However, sperm concentration was similar in both groups in that study.

In a previous study in Israel, Gielchinsky et al interviewed 63 patients (41 with detorsion and 22 with orchiectomy) who had been treated for SCT, mostly in adulthood, and who had been in a stable relationship for at least one year [12]. In that study, the paternity rates were similar to those in the general population in both the orchidopexy and the orchiectomy group (90.2% vs. 90.9%, respectively). The numbers are in line with the incidence of infertility problems in our study (9% in both groups). Although paternity rates were not compromised in our patient group as a whole, it does not mean that fertility may not be impaired on individual level. **One hypothesis could be, that the slightly lower paternity rate in our orchiectomy group may be related to smaller total testicular volume [6]. Unfortunately, we were not able to perform testicular volume measurements in this study**. In earlier fertility studies, testicular torsion has only accounted for 0.5 % of infertility [13].

The reason to evaluate erectile function in our patients is that in some rare cases, erectile dysfunction may be associated with hypogonadism [14]. **Although the IIF-5 total score was lower in SCT patients than in the controls statistically, it might not be clinically important.** Among our patients, erectile dysfunction was rare and not more common than in controls. Erectile dysfunction and infertility may have a negative influence on the quality of life [15,16]. However, we were not able to evaluate these associations among our patients because of the rarity of erectile dysfunction and fertility problems.

HQRoL (15D) scores were similar in our patients and controls. In a previous study, 33 out of 40 patients were satisfied with testicular prosthesis after radical orchiectomy. The satisfaction rate among our patients with testicular prosthesis was comparable (71%).

Our study has several limitations. First, only about half of the patients and of the controls responded to the study invitation and **there were no physical exam or testicular volume measurements available**. Second, we were not able to focus only on the males who had attempted to have children. Third, we were not able to exclude possible female reasons in the cases reporting infertility problems**. In addition, the number of subjects in each group was rather small and it is not possible to estimate whether the non-significant differences in paternity and erectile dysfunction rates resulted from small sample size and insufficient power of this study. As far as we know the possible effect of torsion of appendix testis on paternity has never been investigated. However, we think that it is suitable that control group has had supposedly non-harmful scrotal operation. In addition, paternity rates were also compared with normal population in registry data, which supported our findings.** Despite of the limitations this is the only study focusing on

the long-term results after pediatric treatment for SCT. In addition, our patient material is rather large, considering the rarity of the condition.

**Conclusions**

In conclusion, paternity, erectile function or health-related quality of life are not usually compromised in the long term in patients treated for testicular torsion in childhood.



**Ethical permissions.** The Board of ethical issues has approved the study, and conforms to the principles of the Declaration of Helsinki.

**Declaration of interest**: None.

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Figure 1. HRQoL (15D) total scores

Table 1. IIEF scores of patients and controls.

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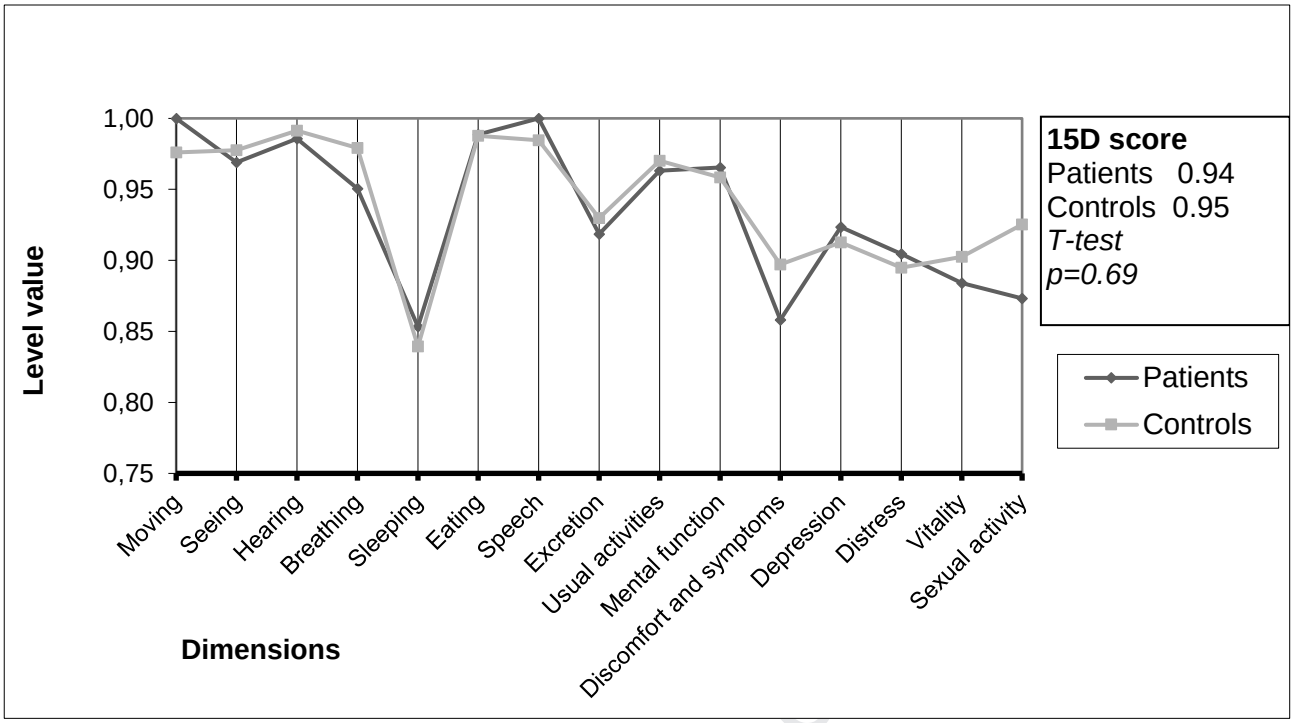
| | **SCT (median, IQR)** | **Controls (median, IQR)** | **p-value** |
|---|---|---|---|
| Age | 41 (36-46) | 41 (38-46) | 0,81 |
| Number of fathers | 23/35 (66%) | 26/34 (76%) | 0,43 |
| IIEF-1 | 4 (4-5) | 5 (5-5) | 0,01 |
| IIEF-2 | 5 (4-5) | 5 (5-5) | 0,05 |
| IIEF-3 | 5 (4,5-5) | 5 (5-5) | 0,26 |
| IIEF-4 | 5 (4-5) | 5 (5-5) | 0,08 |
| IIEF-5 | 5 (4,5-5) | 5 (5-5) | 0,14 |
| IIEF-total | 24(22-25) | 25(24-25) | 0,02 |
| IIEF-total <22 | 7/32 | 3/35 | 0,18 |



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