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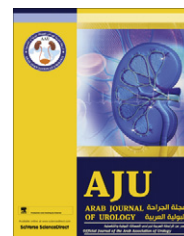


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**ANDROLOGY/SEXUAL MEDICINE**

**ORIGINAL ARTICLE**

**Does pentoxifylline enhance the recovery of erectile function after a T-shunt procedure for prolonged ischaemic priapism? A prospective randomised controlled trial**

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**KEYWORDS**

Ischaemic priapism;  
Erectile function;  
T-shunt

**ABBREVIATIONS**

EF, erectile function;  
ED, erectile dysfunction;  
IP, ischaemic priapism;  
PDU, power Doppler ultrasonography;  
SHIM, Sexual Health Inventory for Men

**Abstract Objective:** To evaluate the role of oral pentoxifylline for enhancing the recovery of erectile function (EF) in patients who had a T-shunt, a technically simple procedure for treating prolonged ischaemic priapism, as the recovery of EF has been reported in many patients treated by this procedure.

**Patients and methods:** This prospective randomised study was conducted on 40 patients with prolonged ischaemic priapism treated with a T-shunt. Patients were randomly divided into two groups; group A received oral pentoxifylline from the second day after surgery for 3 months, and group B received placebo. Patients were followed for 18 months.

**Results:** The pain resolved in all patients, and EF recovered in 15 patients in group A and 10 in group B within 3 months. All patients but three had recovery of EF within the 18-month follow-up. Six patients had recovery of EF by using on-demand 50 mg sildenafil. The three patients who did not recover EF had a penile prosthesis implanted after the end of the study.

**Conclusion:** Pentoxifylline had no significant effect on the recovery of EF after a T-shunt procedure, but a larger study (double-blinded) is required for a more accurate assessment of any beneficial effect of pentoxifylline after a T-shunt procedure.

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## Introduction

The treatment of ischaemic priapism (IP) is considered a urological emergency [1], because of the associated pain and the structural changes in the penis that can cause penile fibrosis and erectile dysfunction (ED) [2]. Many shunt procedures have been described for managing IP after a failed initial conservative treatment. ED is the most important complication of IP, and the preservation of pre-morbid erectile function (EF) has been reported after shunt procedures, with variable success rates. Brant et al. [3] reported good recovery of EF using the T-shunt procedure.

The aim of the present study was to evaluate the role of oral pentoxifylline for enhancing the recovery of EF in patients who had a T-shunt procedure for IP.

## Patients and methods

This prospective randomised study was conducted on 40 patients presenting with prolonged IP. Local ethics committee approval was obtained before conducting the study. All patients signed an informed consent before surgery, explaining the possible outcome of the procedure and approving the use of postoperative oral medication. All 40 patients presented after >24 h of persistent priapism with failed corporeal aspiration and administration of sympathomimetics. None of the patients had any temporary relief of priapism of >10 min with conservative management.

### Procedures

Penile cavernous blood-gas analysis and penile Doppler ultrasonography (PDU) were used to confirm the diagnosis of IP. The T-shunt procedure was performed under local anaesthesia (penile block) in all cases. A number 10 blade was used and the technique was performed on one side of the glans, as described by Garcia et al. [4]. If a rigid erection recurred within 20 min from skin closure the procedure was repeated on the other side of the glans. A non-compressive dressing was applied. Patients were instructed to squeeze the penis with their hands regularly during the first 24 h after the shunt. PDU was used in all patients on the first day after surgery. Patients were randomly divided into two groups; group A (20 patients) received oral pentoxifylline 400 mg three times daily with meals for 3 months, starting from the second day after surgery. Group B received a placebo of the same shape, colour and size as the pentoxifylline tablets (sugar-containing tablets) supplied from the Pharmaceutical department of the University.

### Follow-up

Patients were followed for 18 months, and assessed using the Sexual Health Inventory for Men (SHIM)

score, a questionnaire comprising five questions each having five possible responses scored from 1 to 5. The sum of the answers is calculated to evaluate the EF state; a score of 22–25 denotes no ED. The results were analysed statistically using Student's *t*-test, the chi-square test and Fisher's exact test.

## Results

The mean (SD, range) age of the patients was 36.8 (7.3, 24–50) years. The cause of priapism was idiopathic in 18 patients, inappropriate use of intracorporeal vasoactive medication in eight and drug abuse in 14. The duration of priapism was 1–4 days. None of the patients had undergone any previous shunt procedures and the T-shunt was performed as the first option after failed conservative treatment. A bilateral T-shunt was used in 25 patients, 13 in group A and 12 in group B. Intracorporeal tunnelling was performed using a 7-mm diameter straight sound, because of the difficulty of expressing occult blood in five patients (three in group A and two in group B). The pain was resolved in all patients. After 3 months 15 patients in group A had recovery of EF, compared to only 10 in group B, but the difference was not statistically significant (Table 1).

All patients but three had recovery of EF after 18 months of follow-up. Nine patients had pre-existing ED; of these, six had recovery of EF by using on-demand 50 mg sildenafil. Three of these nine did not recover EF throughout the follow-up, even with the use of on-demand 100 mg sildenafil. All three patients had a penile prosthesis implanted after the end of the study.

## Discussion

To our knowledge this is the first trial to evaluate the effect of pentoxifylline amongst patients treated after prolonged IP, and the aim was to evaluate its well-known anti-fibrotic effect amongst patients with prolonged IP.

The main principle of shunt surgery used for treating IP is the re-establishment of corporeal blood flow, by creating a fistula between the corpus cavernosum and the glans, corpus spongiosum and dorsal or saphenous veins [5–9]. The T-shunt procedure has the advantage of being easy to perform, and with excellent results for treating priapism and a reported good recovery of EF [3].

ED is considered the most important complication of priapism [10]. The outcome of priapism was analysed in 124 cases of previously potent patients by Kulmala et al. [10]. They noted that 39% of their patients became impotent. They also reported a correlation between the duration of symptoms and the risk of priapism [10], where 92% of patients with priapism for <1 day remained potent, whilst potency was preserved in 22% of patients with priapism for >7 days [10]. Nixon et al. [11] reported 90% of patients had ED in their

**Table 1** Comparison of the two groups (20 patients each).

Variable	Group A	Group B	P
Mean (SD)			
Age (years)	37.9 (7.8)	35.7 (6.9)	0.351
Duration of priapism (h)	36 (19.2)	31.2 (14.4)	0.379
SHIM score	21.2 (1.5)	18.4 (5.6)	> 0.05
Patients with pre-existing ED (n)	5	4	0.999
Mean (SD) period for recovery of EF (months)	3.7 (3.0)	4.9 (4.1)	0.298
Patients with recovery of EF after 3 months (n)	15	10	0.191
Patients who did not recover EF (n)	1	2	0.999

follow-up of men who had shunt procedures for low-flow priapism.

Histopathological and molecular studies showed that a long period of anoxia in cases of IP leads to an impairment of smooth muscle contractility and causes smooth muscle cell death and fibrosis of the corpora cavernosa [12]. In addition, hypoxia leads to up-regulation of hypoxia-induced growth factors such as TGF- $\beta$ , which if present in excess amounts can lead to tissue damage and scarring. Thus it is thought to be an important factor in corporeal tissue fibrosis after prolonged IP [13–15].

Pentoxifylline is a haemorrhological agent (i.e. an agent that affects blood viscosity) with many clinical applications and a high safety profile [16]. Pentoxifylline is now being used by many physicians as a conservative treatment for Peyronie's disease [16], as it was reported to inhibit fibrosis and TGF- $\beta$ -mediated collagen deposition in the tunica albuginea [16–18].

Ozidal et al. [19] evaluated the efficacy of using a combined therapy of sildenafil and pentoxifylline to treat vasculogenic ED, and their results suggested that this therapy might be of benefit in treating this condition [19].

Recently, pentoxifylline was used by Albersen et al. [20] to promote the recovery of EF in a rat model with ED after prostatectomy. These authors reported a significant improvement in EF in the group of rats treated with pentoxifylline compared to the control group [20]. They also reported that a histopathological examination of the corpus cavernosum of rats showed that pentoxifylline treatment resulted in a partial restoration of smooth muscle architecture and less collagen deposition than in the control group [20].

The results of the present study showed that patients treated with pentoxifylline had a faster recovery of EF than the control group, although the difference was not statistically significant, probably because there were few patients in the study, as it was conducted at one institute. The mechanism by which pentoxifylline enhances recovery of EF also needs further assessment, but it might be related to the inhibition of fibrosis and TGF- $\beta$ -mediated collagen deposition in the tunica.

The advantage of the present study is that it tested a novel idea, i.e. using non invasive measures to promote the recovery of EF after prolonged IP. Despite the well-known beneficial effects of pentoxifylline, i.e. its anti-fi-

brotic effect [21], the results from the present study would have been more acceptable if it had been double-blinded to avoid any degree of bias. Thus we suggest that a larger multicentre study should be conducted to assess the effect of pentoxifylline after shunt procedures for prolonged IP.

In conclusion, pentoxifylline had no significant effect on the recovery of EF because there were too few patients and the nature of the disease (ischaemic injury rather than fibrosis only), but a larger study (double blinded) is required for a more accurate assessment of any beneficial effect of pentoxifylline after T-shunt procedures.

#### Conflict of interest

No conflict of interest to declare.

#### Source of funding

None.

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