

# Prevention of erection after penile surgery

## A double-blind trial of intracavernous noradrenaline versus placebo

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**Summary.** To prevent nocturnal erections after penile surgery a randomized, double blind trial of nocturnal intracavernous infusion of noradrenaline (10 micrograms per hour) versus placebo in 20 patients was carried out. During infusion the corpus cavernosum pressure was continuously registered. The patients made a record of nocturnal erections and associated pain. The pressure registration confirmed total absence of erections in the noradrenaline group. In the placebo group half of the patients were devoid of nocturnal erections. No signs of ischaemia was seen, but in four patients receiving noradrenaline infusion was stopped due to pain. This treatment seems effective in preventing nocturnal erections after penile surgery.

**Key words:** Penile surgery – Penile erection – Noradrenaline – Postoperative complications

### Introduction

Prepubertal boys and adult men have 3 to 8 nocturnal erections related to REM-sleep periods [4]. Following penile surgery erections are painful and may prejudice the result, as the sutures may not withstand a rigid erection.

An effective and reversible method to avoid nocturnal erections has not been described. Estrogens may hinder erections, but are unacceptable due to possible thrombo-embolic complications and after one case of non-fatal lung embolism in a young man, we stopped this preventive measure. Orally administered chlorpromazine has been used without convincing effect.

In 1982 pharmacologically induced erection was introduced as a treatment of erectile dysfunction [10],

and later reports have proven that intracavernous injection of papaverine, phentolamine, phenoxybenzamine and other drugs can create erections [2, 9, 11, 12]. Intracorporeal injection of these drugs may lead to priapism, which however can be managed by intracavernous injection of adrenaline, noradrenaline or metaraminol [1, 6–8].

The aim of the present study was to test if noradrenaline (NA), administered as a continuous nocturnal intracavernous infusion, could prevent erections in the period after surgical correction of penile deviation. The investigation was carried out as a randomised, double-blind, placebo-controlled study.

### Material and methods

#### *Pilot series*

In order to establish the optimal dose level, with a reliable infusion procedure and to rule out the theoretical possibility of ischaemia, a pilot series of six patients were treated with increasing doses of NA. Different types of infusion needles were tried.

Initially a Rigiscan apparatus (continuous registration of penile circumference and rigidity by 2 wire loops) was used [3], but due to the preceding surgery a state of severe oedema developed, and instead intracavernous pressure-registration was used.

#### *Randomized series*

Twenty consecutive patients, scheduled to go through operative correction of congenital penile angulation, were included. They were all operated under local anesthesia by the same surgeon by plicature of the tunica albuginea on the convex side of penis. Median age was twenty-two years (range 18–27 years).

In the first three postoperative nights the patients received active treatment (10 microgram NA per hour), or placebo (normal saline) from 9 pm to 8 am. A solution of saline containing NA 1 microgram/ml was prepared. Infusion of 10 ml/h was controlled by a micro-infusionpump (IVAC Neo-mate 565). Randomization and blinding was done by a pharmacist. Infusion was given through an angulated

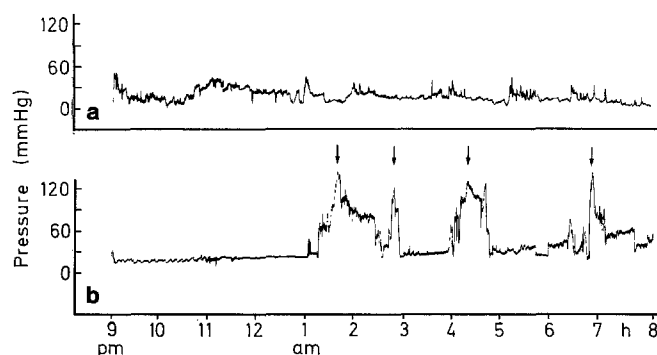


Fig. 1a and b. Intracavernous pressure registration. The upper registration (a) is from a patient who received NA and had no erections. The lower one (b) is from a patient who had placebo, and four erections were recorded during this night. Arrows indicate erections

Table 1. Mean total pain score

	At hospital	At home
Noradrenaline	18.0 (N=10)	14.4 (N=10)
Placebo	8.8 (N=10)	22.2 (N=10)

“green fly” (Terumo Surflo winged infusion set, 21 G×3/4”), which was introduced at the end of surgery with the outlet in one corpus cavernosum, and the “wings” fixed to the penile surface. The intracavernous pressure was recorded (amplifier and recorder: Simonsen & Weel; System 8000) with a transducer (Gould Statham P50) connected to the infusion system. An erection was defined as an increase in intracavernous pressure to more than 75 mmHg.

The patients made a record every morning with the number of erections experienced during the night and the related pain. Pain was indicated on a four-grade scale. The recordings were performed during the three nights of admission and the following three nights at home. From the records a total score was calculated (number of erections multiplied by the pain score, summed over the three nights).

The stability of the NA preparations was tested, and more than 92 per cent of the biologically active substance was found after 9 days cool storage followed by slow passage through of the infusion system at room temperature.

The trial was carried out according to the provisions of the Helsinki Declaration II and was ratified by the local ethics committee and by the National Health authorities. All patients gave informed consent.

Statistical analysis: Fisher's exact test and Mann-Whitney test.

## Results

Intracavernous pressure recordings are shown in Fig. 1. Of the 60 nights analysed 11 were excluded because of inadequate tracings or because the patients refused further infusion. Analyses of the rest identified 15 patients without erections, and 5 patients with one or

more nocturnal erection within the first 3 postoperative nights.

Breakage of the randomization code disclosed that 10 patients received NA, and that all of these were among the 15 patients where no nocturnal erections were recorded. The remaining 5 patients with erections had received placebo ( $P=0.03$ , Fisher's exact test).

Two patients had minor post-operative hematomas which resolved spontaneously. No signs of ischaemia or systemic side effects were observed.

The total pain scores reported by patients in the NA and the placebo group during the period at hospital – and at home (Table 1) was not significantly different ( $0.10 > P > 0.05$  and  $0.70 > P > 0.60$  for the two periods respectively, Mann-Whitney test). In four patients belonging to the group receiving NA the infusion was stopped due to pain during the second (1 patient) or third night (3 patients). In two of these leakage of the infusate was observed.

## Discussion

Intracavernous infusion of NA was found effective in preventing nocturnal erection after penile surgery. In the placebo group five patients were devoid of postoperative nocturnal erections. This however might be due to lack of normal sleep (non-familiar environments, postoperative pain, inserted needle, etc.).

Continuous intracavernous infusion of vasoconstrictive substances for this purpose has not previously been reported. However treatment of priapism has been performed by use of irrigation of the corporal bodies with adrenaline in normal saline (1 mg/1,000 ml) and phenylephrine 10 mg/500 ml saline [9]. Also injections with metaraminol (1 mg) and adrenaline (0.5 mg) have been reported [2, 5]. The dosage in our trial was 10 microgram NA per hour amounting to 110 microgram of NA per night which is a small dose compared to the doses used in the treatment of priapism. However the dosage seemed to be sufficient as the difference between the groups was significant. However the study included a relatively small number of patients and the risk of a statistical error of type I should not be neglected.

We did not find that there was a risk of ischemic tissue damage, perhaps because only the tissue supplied by cavernous arteries was affected, while the dermis and subcutaneous tissue are maintained by the dorsal penile arteries. On the other hand one cannot ignore, that four of the patients who had the  $\alpha$ -receptor-stimulating agent wanted to discontinue the scheduled intracavernous infusion due to pain.

Artifacts in the pressure registration due to displacement or blockage of the needle were seen frequently,

but such artifacts could be identified and distinguished from erectile activity.

In conclusion continuous intracavernous infusion of NA seemed to be an effective tool in preventing nocturnal erections after penile surgery.

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