ARTICLE

Plication surgery does not produce additional loss of length in Peyronie's disease patients

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Nesbit's procedure remains a cornerstone in surgical management of Peyronie's disease, despite the subjective loss of penile length. This retrospective study demonstrates that the perceived length loss has already occurred prior to surgery and that the Nesbit's procedure does not produce additional loss of length. Ninety-one patients who had undergone Nesbit's procedure between 2017 and 2022 at the Department of Urology of the University of Trieste were enrolled in the study. Preoperative stretched penile length and postoperative stretched penile length were measured. The curvature was uniplanar in 78 patients and biplanar in the remainder. Mean degree of the main curvature was 52.58° ± 14.13° and mean number of plications was 2.42 ± 1.07. Analysis revealed that the median of the differences between preoperative stretched penile length and postoperative stretched penile length was not significant ($p = 0.466$). According to our results, no significant penile shortening occurs as immediate consequence of Nesbit's procedure, as length is defined by the shorter side of the shaft affected by Peyronie's disease. Hence the length loss should have to be attributed to Peyronie's disease itself and could have been accurately predicted preoperatively allowing for a more accurate counseling of patients. Further studies are pending to assess potential postoperative loss of length due to scarring contracture.

IJIR: Your Sexual Medicine Journal; https://doi.org/10.1038/s41443-024-00852-3

INTRODUCTION

Peyronie's Disease (PD) is a connective tissue disorder characterized by the development of fibrous scar tissue, or plaques, within the corpora cavernosa of the penis. As these plaques do not stretch as the surrounding tunica albuginea, in erection they can cause penile curvature, narrowing and a degree of shortening [1]. Due to pain, worsening of the quality of erection, penile deformity and loss of size, PD can have a severe impact on patient self-esteem, psycho-physical wellbeing and overall quality of life and put a serious strain in the relationship with the partner [2]. Prevalence rates of this condition range from approximately between 0.7 and 11% [3].

Surgical correction using tunical plication techniques (PT), which shorten the longer, healthy side of the shaft, still represent a cornerstone in the management of PD patients with an adequate penile length, adequate rigidity with or without the use of phosphodiesterase type 5 inhibitors (PDE5i) and relatively non-complex curvatures, generally below 60° [4]. The aim of these procedures is to render the penis functionally straight in order to allow the patient to resume penetrative sexual intercourse with confidence [4].

The Nesbit's procedure (NP) and PTs in general are widely used to address penile curvatures secondary to PD. All these techniques aim at correcting the curvature by shortening the longer, convex aspect of the shaft, in order to make it as long as the concave side, which has been contracted by PD plaque [5].

Traditionally, the main drawback of plication procedures is the subjective loss of penile length, which might represent a significant bother for some PD patients [6]. Traditionally, patients have been counseled to expect up to 1 cm of penile length loss for every 30 degrees of curvature correction and this is why guidelines suggest not to offer NP or PT in patients with a curvature of more than 60 degrees [7, 8]. The aim of this study is to demonstrate how the loss of length in reality is caused by the disease itself and that, if performed correctly, NP and PT do not produce any further loss of penile size. This concept might allow clinicians to provide the patient preoperatively with an accurate estimate of expected postoperative length.

MATERIALS AND METHODS

The present study was carried out according to the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study was conducted in accordance with the principles outlined in the Declaration of Helsinki and approved by the institutional ethical review board (ID 132/2023). Written informed consent was obtained for all the patients enrolled. The present study has an observational and retrospective design, no experimental interventions were performed. Data containing sensitive information were de-identified in order to ensure analysis of anonymous data only.

The notes of 91 patients who had undergone NP between July 2017 and April 2022 by a single surgeon were reviewed retrospectively. Perioperative data of the patients as well as the characteristics, direction and degree of

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Received: 1 December 2023 Revised: 5 February 2024 Accepted: 14 February 2024
Published online: 22 February 2024

their penile curvature were gathered. Preoperatively, each patient underwent an artificial erection test with the administration of a variable dose between 5 and 20 mcg of intracavernosal prostaglandin E1 (PGE1, Caverject ®, Pfizer, United States) in order to assess the direction and degree of penile curvature. Once an adequate rigidity has been achieved, the penis has been forcibly straightened and preoperative straighten erect length (PrSEL) was recorded at this stage. Pre (PrSPL) and postoperative stretched penile length (PoSPL) were measured from pubic adiposity to glans' tip at the time of surgery, once general anesthesia had been induced. Complete penile stretch was achieved pulling a 3–0 Vicryl ® suture (Ethicon, Johnson-Johnson Surgical Technologies, United States) which is routinely inserted in the glans penis to secure the butterfly needle used to induce the artificial erection test. All measurements were performed on the dorsal aspect of the shaft without applying any pressure on the prepubic adiposity. Follow up data was available for all patients. Descriptive analysis included medians and standard deviation (SD) for continuous coded variables. The paired samples *T*-test was performed to evaluate any statistically significant variation between pre and post-operative measurements.

RESULTS

Overall 91 patients were included in the present study. Table 1 shows perioperative data of the study population. All patients underwent a NP/PT. In two cases some additional procedures were performed, namely a circumcision in one and a dorsal vein ligation in the other. At the time of the study two patients had already had a previous straightening procedure and received a redo Nesbit due to the failure of their first surgery. No patients had received intralesional or topical treatments before NP.

At artificial erection the mean degree of curvature was 52.58° ± 14.13° while its direction was dorsal in 76 patients (83.5%), lateral in 9 (9.9%) and ventral in 6 (6.6%). 13 of the 91 patients showed also a secondary curvature which resulted to be dorsal in 1 (1.1%) and lateral in the remaining 12 (13.2%). The erection hardness visual score [9] at PGE1 test was 3 in 4 patients (4.4%), 3–4 in 77 (84.6%) and 4 in 10 (11%) respectively.

Mean PrSPL was 159.01 ± 17.79 mm and mean PoSPL was 159.13 ± 17.73 mm. Mean number of plications required to correct the curvature was 2.42 ± 1.07.

No major surgical complications (Clavien Dindo ≥ 3) were recorded.

As shown in Table 2, the analysis of the related samples, PrSPL and PoSPL, revealed that the median of the differences between them was not significant ($p = 0.466$), confirming the null hypothesis hence showing no statistically relevant length differences before and after surgery.

Table 1. Descriptive baseline and surgical characteristics of the cohort of 91 patients with PD treated with NP.

Variable	Overall
Patients, *n*. (%)	91 (100)
Procedure, *n*. (%)	
• Nesbit	87 (95.6)
• Nesbit + circumcision	1 (1.1)
• Nesbit and dorsal vein ligation	1 (1.1)
• Redo Nesbit	2 (2.2)
Grade of curvature at artificial erection test, mean ° ± SD	52.58 ± 14.13
Direction of main curvature, *n*. (%):	
• dorsal	76 (83.5)
• lateral	9 (9.9)
• ventral	6 (6.6)
Direction of secondary curvature, *n*. (%):	
• dorsal	1 (1.1)
• lateral	12 (13.2)
PrSPL, mean mm ± SD	159.01 ± 17.79
PoSPL, mean mm ± SD	159.13 ± 17.73
Grade of erection, *n*. (%):	
• 3	4 (4.4)
• 3–4	77 (84.6)
• 4	10 (11)
Number of plications, mean ± SD	2.42 ± 1.07

PD Peyronie's disease, *NP* Nesbit's Procedure, *SD* standard deviation, *PrSPL* pre-operatory stretched penile length, *PoSPL* post-operatory stretched penile length.

DISCUSSION

It has been common practice to counsel patients undergoing NP/PT to expect to lose up to 1 cm in length for each 30 degrees of curvature correction and previous literature reported a penile shortening in 17.4 to 100% of cases [10–16].

Because of this "stigma" many patients have been skeptical to undergo NP/PT despite these procedures have proved to be simple and reproducible and are associated with the greatest amount of patients' satisfaction about erectile function in the short and long term [7].

The current series shows how the NP/PT per se does not produce any additional loss of length as it shortens the longer, healthy side of the penis to render it as long as the shorter side, which has been previously affected by PD. Since the limiting factor while measuring SPL is the shorter side of the penis, which is not targeted by NP/PT, no statistically significant difference has been found between PrSPL and PoSPL. Likewise, while forcibly straightening the erect penis, the longer, unaffected side buckles to become as long as the shorter side previously affected by PD contracture. This is the reason why the current series has not identified a statistically significant difference between PrSEL, PrSPL and PoSPL and therefore both PrSEL and PrSPL could be used preoperatively to give the patient an accurate estimate of what penile length to expect at the end of the procedure [12, 17].

To our knowledge this is the first series presenting such an innovative insight on NP which has been traditionally associated with a various degree of penile shortening [18, 19].

In our opinion such a notion, if confirmed by larger, prospective and randomized studies, might be helpful in preoperative counseling and planning.

Such a notion may indeed be useful preoperatively in addressing patients' concerns regarding their postoperative penile appearance [20], in particular by reassuring them in regards to a further penile shortening after surgery. On the other hand, it could influence preoperative planning by allowing an extension of NP indications also to patients with a dorsal penile length below the previously established 13 cm minimum cut-off [21–23], thus widening the surgical options for PD patients indifferently their penile length. As stated above further studies are needed to produce definitive and solid conclusions in this regard.

It is not unreasonable to suspect that the patient reported loss of length may derive from the patient recollection of the length of the penis before the development of PD and of the associated loss of length.

Although according to the results of this series no significant penile shortening occurs at the time of surgery as a consequence of NP/PT for PD, this does not take into account the potential postoperative loss of length due to scarring contracture, which is not uncommon in case of penile surgery, especially when erectile function is poor and not sufficient to guarantee adequate post-operative stretching of the penis. In case of suboptimal erections, in order to avoid/minimize postoperative loss of length due to scarring contracture, it is therefore paramount to start an intense

Table 2. Paired *T* test comparing PrSPL and PoSPL.

	Paired differences					*t*	df	*p*
	Mean	SD	Mean standard error	95% CI				
				Lower	Upper			
PrSPL PoSPL	0.12088	1.57646	0.16526	0.44919	0.20743	0.731	90	0.466

PrSPL pre-operatory stretched penile length, *PoSPL* post-operatory stretched penile length, *SD* standard deviation, *CI* confidence interval, *df* degrees of freedom.

postoperative rehabilitation. Adequate stretch can be achieved either mechanically, with the regular use of a stretching device or of the vacuum constriction device, or by naturally enhancing the nocturnal erections with the administration of PDE5i [24, 25].

Our study is not devoid of some limitations, with its retrospective design to be pointed out as the first one. Furthermore, the small sample size may also represent a drawback, as this precluded from the use of a multivariable analysis. Moreover we must acknowledge that some demographic and anamnestic data of the patients were unavailable, however our study focused only on penile length immediately after surgery, which is not affected by age, comorbidities and quality of erections that might play a more significant role in a subsequent later shortening or recurrence.

CONCLUSION

According to our findings no significant penile shortening occurs as immediate consequence of NP/PT for PD, as the length is defined by the shorter side of the shaft (which is affected by the disease). Hence the length loss might have to be attributed to PD as such rather than to NP. This notion might be helpful in patients' counseling and preoperative planning. Further studies are pending to draw definitive conclusions.

DATA AVAILABILITY

Data are anonymized and stored at the Department of the University of Trieste.

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AUTHOR CONTRIBUTIONS

Conceptualization: GG; Data curation: GG, FT and LO; Methodology: GG, FT and LO; Software: FT, GR, AB and FZ; Investigation: GG, FT, LO; Formal analysis: FT and LO; Writing – Original Draft: GG, LO and FT; Writing—Review & Editing: FC, NP, AP, MR, CT and GL; Supervision: CT and GL.

FUNDING

This research received no external funding.

COMPETING INTERESTS

The authors declare no competing interests.

ETHICS APPROVAL

This is a prospective non-interventional study conducted on patients treated by the law and the national and European ethical guidelines. All Authors ensured that their institutions and their clinical behavior are complying with the specific requirements of the Country.

INFORMED CONSENT STATEMENT

Informed consent was obtained from all subjects involved in the study. The informed consent as well as the consent for the use of personal data were regularly collected

from all the subjects involved in the study. Signed informed consent forms are stored in an appropriate repository.

ADDITIONAL INFORMATION

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