Long-term follow-up of treatment of erectile dysfunction after radical prostatectomy using nerve grafts and end-to-side somatic-autonomic neurorraphy: a new technique

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INTRODUCTION AND OBJECTIVES

To study a novel penile reinnervation technique using four sural nerve grafts and end-to-side neurorraphies connecting bilaterally the femoral nerve and the cavernous corpus and the femoral nerve and the dorsal penile nerves.

METHOD

Ten patients with a mean age of 60.3 ± 4.8 years (54 – 68), who had undergone radical prostatectomy (RP) at least 2 years previously, underwent penile reinnervation in the present study. Four patients had undergone radiotherapy after RP. All patients reported satisfactory sexual activity prior to RP. The surgery involved bridging of the femoral nerve to the dorsal nerve of the penis and the inner part of the corpus cavernosum with sural nerve grafts and end-to-side neurorraphies. Patients were evaluated using the International Index of Erectile Function (IIEF) questionnaire and Pharmaco-Penile Doppler Ultrasonography (PPDU) preoperatively and at 6, 12 and 18 months postoperatively, and using a Clinical Evolution of Erectile Function (CEEF) questionnaire, administered after 36 months.

PPDU - Pharmaco-Penile Doppler Ultrasonography

	Moment				
	Pre op	6 months	12months	18 months	P(*)
Doppler flow					
PSV RCA	31.8 ± 4.5(14.1-50)a	42.0 ± 5.9 (22-82) a	44.3 ± 5.5 (24-83)a	44.4± 5.8 (26-88)a	**0.32**
MDV RCA	5.7 ± 1.6 (-7-11)a	5.2 ± 2.9 (-11-18)a	1.9 ± 2.1 (-7-10)a	5.5 ± 1.6 (-5-11)a	**0.53**
PSV LCA	44.4 ± 8.3 (10-98)a	48.3 ± 5.1 (26-72)a	51.8 ± 6.8 (27-94)a	51.2 ± 6.7 (29-83)a	**0.86**
MDV LCA	5.9 ± 1.7 (-6-12)a	5.8 ± 3.0 (-8-23)a	5.2 ± 3.1 (-7-25)a	6.8 ± 2.6 (-5-20)a	**0.97**
IR RCA	0.7 ± 0.1 (0.5-1.1)a	0.8 ± 0.1 (0.4-1.1)a	0.9 ± 0.1 (0.7-1.1)a	0.8 ± 0.1 (0.6-1.1)a	**0.34**
IR LCA	0.8 ± 0.1 (0.5-1.1)a	0.9 ± 0.1 (0.6-1.1)a	0.9 ± 0.1 (0.6-1.1)a	0.8 ± 0.1 (0.6-1.1)a	**0.6**

Statistics one way Anova with Tukey's for difference between groups.
PSV: peak systolic velocity. MDV: minimum diastolic velocity.
RCA: right cavernous artery. LCA: left cavernous artery.
RI: resistance index.

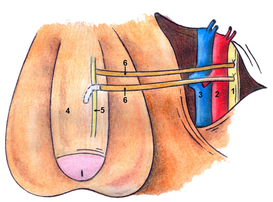
IIEF - International Index of Erectile Function

	Moment				
	Pre op	6 months	12months	18 months	P(*)
Sexual performance					
Erectile dysfunction	3.1 ± (0-6)a	9.7 ± 10.2 (0-27) a	12.6 ± 7.9 (0-24)b	12.7± 8.7 (0-28)b	0.032
Satisfaction with orgasm	4.8 ± 3.7 (0-10)a	7.6 ± 3.6 (0-10)a	8.1 ± 2.6 (2-10)a	7.6 ± 3.0 (2-10)a	0,119
Satisfaction with intercourse	3.7 ± 3.0 (0-9)a	5.7 ± 4.3 (0-12)a	7.6 ± 3.9 (3-14)a	8.6 ± 3.6 (4-14)b	0,032
Sexual desire	6.7 ± 2.9 (0-10)a	8.6 ± 1.5(5-10)a	8.3 ± 1.9 (4-10)a	8.2 ± 2.1 (4-10)a	0,559
General satisfaction	2.3 ± 1.6 (0-5)a	6.0 ± 3.2 (1-10)b	7.4 ± 2.7 (2-10)b	7.0 ± 2.7 (2-10)b	0,000

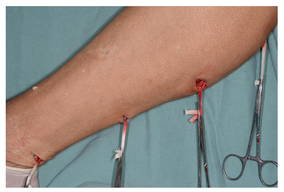
Statistics one way Anova with Tukey's for difference between groups.

CEEF - Clinical Evolution of Erectile Function

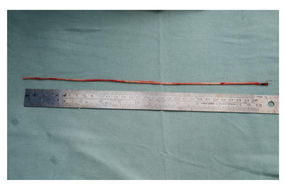
Patient number	Age at reinnervation (years)	Interval between RP and reinnervation (months)	Presence of erection before reinnervation	Radiotherapy	Nocturnal erection or onset of engorgement (months)	Onset of flaccid erection (months)	Onset of semi-rigid erection (months)	Onset of rigid erection (months)	Onset of penetration (months)	Sexual intercourse frequency
1	65	26	no	no	3	6	7	7	7	Twice a month
2	58	37	no	no	1	2	3	3	3	Once daily
3	57	27	no	no	0.5	5	7	7.5	8	5-6 times weekly
4	55	29	no	yes	2	6	14	18	27	Twice a month
5	64	28	no	no	2	6	8	9	13	Once monthly
6	61	138	no	yes	3	6	no	no	no	0
7	68	47	no	no	5	5.5	no	no	no	0
8	57	69	no	yes	5	6	12	19	24	Once weekly
9	54	39	no	yes	2	4	12	no	no	0
10	64	32	no	no	3.5	4	5	6	no	0
Mean	**60.3**	**47.2**			**2.7**	**5.1**	**8.5**	**9.9**	**13.7**	
SD	4.8	34.4			1.5	1.3	3.8	6.1	9.8	
Min	54	26			0.5	2	3	3	3	
Max	68	138			5	6	14	19	27	



Schematic drawing showing the two nerves grafts were sutured on the lateral of the femoral nerve and the end of one of them is suture on the side of the dorsal nerve of the penis. The end of the other graft is introduced into the cavernosus corpus.



Removal of the sural nerve.



Sural nerve.

RESULTS

The IIEF scores showed improvements with regard to erectile dysfunction (ED), satisfaction with intercourse and general satisfaction. Evaluation of PPDU velocities did not reveal any difference between the right and left sides or among the different time points. The introduction of nerve grafts neither caused fibrosis of the corpus cavernosum, nor reduced penile vascular flow. CEEF results showed that sexual intercourse began after a mean of 13.7 months with frequency of sexual intercourse varying from once daily to once monthly. Acute complications were minimal. The study was limited by the small number of cases.

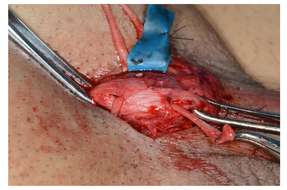
CONCLUSIONS

A total of 60% of patients were able to achieve full penetration, on average, 13 months after reinnervation surgery. Patients previously submitted to radiotherapy had slower return of erectile function. We conclude that penile reinnervation surgery is a viable technique, with effective results, and could offer a new treatment method for ED after RP.

Souza, J.C.T.; Viterbo, F; Petean, A.T.; Fávaro, W.J.; Trindade-Filho, J.C.S. "Long-term follow-up of treatment of erectile dysfunction after radical prostatectomy using nerve grafts and end-to-side somatic-autonomic neurorraphy: a new technique". British Journal of Urology International. 948-54, 2017.

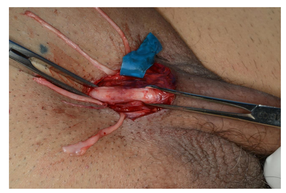
Two incisions in the inguinal areas are used to expose the femoral nerves and one incision in the base o the penis exposes the albuginea.

The sural nerve grafts are sutured on the sides of the femoral nerves and are externalized in the incision of the penis base passing through the subcutaneous tissue.

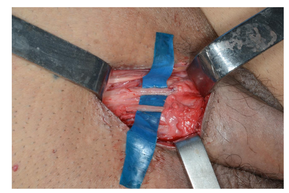


The sural nerve graft extremety is reintroduced to stay inside the corpus cavernosum.

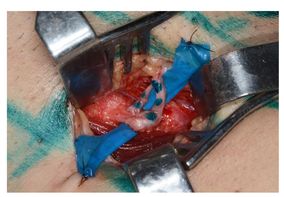
The exposed femoral nerve.



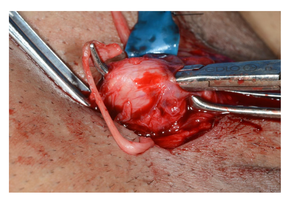
The albuginea is grasped by two alice forceps at the base of the penis.



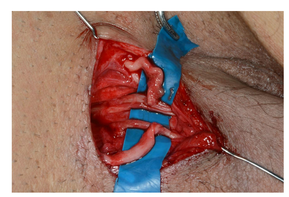
The dorsal nerves of the penis are dissected.



Sural nerve grafts are sutured in the lateral aspect of the femoral nerve after epi-perineurium removal.



After two incisions in the albuginea a mixter forceps is introduced into the distal incision and externalized in the proximal incision. The forceps grasp the end of the sural nerve.



End-to-side neurorraphies of the sural nerve grafts on the dorsal nerve of the penis.