Erectile function restoration post-radical prostatectomy: Utilisation of a new novel nerve grafting procedure

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Introduction
- Long term survival for men after prostate cancer treatment has seen increased focus on the importance of patient survivalship and quality of life (QoL).
- Approximately 70% of men suffer permanent erectile dysfunction (ED) following radical prostatectomy (RP).
- ED can significantly impact on general QoL and health-related quality of life (HRQoL).
- Treatment modalities for ED unresponsive to PDE5is are limited:
  - In March 2017, Souza Trindade et al. reported a minimally invasive penile reinnervation surgical technique using somatic to autonomic nerve bridges from the femoral nerve for restoration of erectile function after novel nerve graft surgery.
  - We report the outcomes of our completely novel penile reinnervation surgical technique using somatic to autonomic nerve bridges from the femoral nerve to restore erectile function and improve HRQoL, in men with permanent ED after nerve- and non-nerve sparing radical prostatectomy.

Study: Melbourne retrospective cohort review
- Novel somatic nerve graft surgery was performed in 22 men with permanent ED following RP:
  - >6 months after non-nerve sparing (NNS) RP.
  - >2 years after nerve sparing (NS) RP.
- 7 patients (Bilateral NS)
- 3 patients (Uniateral NS)
- Patient-reported outcomes were assessed by retrospective cohort review of patient clinical data.
- Changes in erectile function and Sexual Quality of Life (QoL) were evaluated pre-nerve graft surgery, 3.5 month interval post-nerve graft surgery.

Primary Outcome: Erectile Function was assessed using the 5-item version of the International Index of Erectile Function (IIEF-5).

Secondary Outcome: Sexual Quality of Life (QoL) was assessed using the sexual domain of the Expanded Prostate Cancer Index Composite (EPIC) - summary, function, and bother.

Patient reported outcomes were collected and evaluated independently of treating surgeons.

Results
- 22 men with permanent ED following RP underwent novel somatic nerve reinnervation surgery.
- Mean age was 62.5 ± 5.0 years (range 49.8 to 69.9 years) at the time of nerve graft surgery.
- 8 patients were excluded:
  - Non-compliance to protocol (n = 4).
  - Patients who have undergone uni-lateral nerve sparing radical prostatectomy (n = 1).
  - Measures of erectile function were not collected 6 months post-nerve graft surgery (n = 3).
- Of the 15 remaining patients in study, 2 patients are at 6 months post-nerve grafting so these outcomes are not reported.

Novel surgical technique
- The novel somatic to autonomic nerve bridge surgical technique involves minimally invasive harvesting of both sural nerves.
- Sural nerves are used as and to side nerve grafts from both femoral nerves to bilaterally reinnervate the corpora cavernosa of the penis.
- Nerve bridges are sutured to the femoral nerve utilizing appropriate microsurgical techniques.
- Surgery is performed in ≥ 2.5 hours.
- Patients are discharged after an overnight stay in hospital.

Patient inclusion criteria:
1. Be aged younger than 75 years.
2. Have had satisfactory erectile function (IIEF > 17) prior to radical prostatectomy.
3. Have PSA levels <10ug/ml in their most recent test following radical prostatectomy.
4. Have suffered from erectile dysfunction (IIEF < 11) prior to novel nerve graft surgery with or without oral and/or injectable therapies.
5. Have had their radical prostatectomy prior to 5 years.
6. Have no hormonal related conditions or diabetes.
7. Have not had radiotherapy to treat prostate cancer (external beam and/or brachytherapy).
8. Have never taken androgen deprivation therapy.

Successful restoration of erectile function criteria in study defined as:
1. Restoration of spontaneous erectile function.
2. Restoration of erectile function with the use of PDE5is post-nerve graft surgery where these were ineffective pre-nerve graft surgery.

Patients included in study outcome analysis: 17 patients
- 31 of 17 patients with permanent ED have restored erectile function sufficient to achieve & maintain full sexual penetration (IIEF-5 > 17) following novel nerve graft surgery.

3 of the 17 patients with restored erectile function do not require any penile rehabilitation/PEGS therapy to achieve an erection.
- 6 out of 8 patients (75%) who underwent surgical nerve bridge reinnervation surgery have restored erectile function after non-nerve graft surgery.

Improvements in sexual QoL outcomes (improved function and less bother in sexual domains of EPIC) were observed after novel nerve graft surgery.

- Greater improvements in sexual QoL, was observed in men with restored-erectile function restoration (as assessed by IIEF-5).

Conclusions
- Innovative somatic to autonomic end-to-side sural nerve graft surgery successfully restored erectile function (IIEF-5 > 17) sufficient for sexual intercourse in 11/17 (64.7%) men with permanent erectile dysfunction following radical prostatectomy.
- Erectile function was restored in:
  - 69 (69%) men who had undergone non-nerve sparing RP.
  - 36 (30%) men who had undergone bilateral nerve sparing RP.
  - 23 (23%) men who had undergone unilateral nerve sparing RP.

- 5/11 (45.5%) of patients have spontaneous erectile function restoration, without the need for PDE5is following novel nerve graft surgery.
- Novel nerve graft surgery improves the sexual Quality of Life (QoL) of men.

- A larger study is currently underway to assess the impact of this novel nerve graft procedure in further Quality of Life domains (CES-D, SEAR).
- Alternate treatment modalities (eg. penile prostheses) remain an option for patients where erectile function was not restored following novel nerve graft surgery.

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