NERVE GRAFT TO RESTORE ERECTILE FUNCTION DURING RADICAL PROSTATECTOMY

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COVERAGE RATIONALE

Sural or other nerve grafts to restore erectile function during radical prostatectomy are unproven.

No comparative studies between nerve grafts and standard medical therapy (e.g., intracorporeal injection, or vacuum erection devices have been completed. The evidence for nerve grafts for restoration of erectile function is derived mainly from non-randomized studies limited by small sample sizes. A randomized controlled trial was discontinued when it was determined that unilateral nerve-sparing radical prostatectomy was not effective.

BACKGROUND

Erectile dysfunction is a common problem after radical prostatectomy. In particular, spontaneous erections are absent in patients who have bilateral resection of the neurovascular bundles as part

Nerve Graft to Restore Erectile Function During Radical Prostatectomy: Medical Policy (Effective 12/01/2013)

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of the radical prostatectomy procedure for treatment of localized prostate cancer. A technique
called nerve-sparing surgery has been developed to prevent damage to these nerves; however,
this technique is not possible in some patients.

Nerve grafting to replace resected cavernous nerves during radical retropubic prostatectomy has
been proposed as a technique to increase the likelihood of restoring spontaneous erectile
function. During the procedure, a donor nerve (e.g., sural nerve, genitofemoral nerve) is
harvested from the patient and joined to the distal and proximal ends of the resected cavernous
nerve. Grafting may be performed on one or both resected cavernous nerves. The sural nerve (a
nerve traveling along the short saphenous vein in the lower leg) is the most common donor nerve
used in the nerve grafting procedure during radical prostatectomy. The nerve is considered
expendable and has been used commonly in other nerve grafting procedures for repairing injured
peripheral nerves. During the sural nerve grafting procedure, a portion of the nerve is harvested
from one leg of the patient and grafted to the resected cavernous nerve.

Advocates of nerve grafting believe that nerves should be preserved whenever compatible with
complete resection of cancer, but that when the cavernous nerve must be resected or is
damaged severely, graft replacement should be a consideration (Kim, 2001a; Scardino, 2001).
While the decision to spare or resect the neurovascular bundles is based on the surgeon's
preference, it is influenced by clinical stage, prostate-specific antigen level, and transrectal
ultrasound/biopsy results (Kim, 2001a).

**CLINICAL EVIDENCE**

No studies that provide substantial new evidence regarding nerve grafts to restore erectile
function during radical prostatectomy were identified in an October 2013 literature search.

In a randomized trial, Davis et al. (2009) compared nerve-sparing retropubic radical
prostatectomy with unilateral sural nerve grafting versus the same procedure without unilateral
sural nerve grafting for clinically localized prostate cancer. The study planned to enroll 200
patients, but an interim analysis at 107 patients met criteria for futility and the trial was closed. For
patients completing the protocol to 2 years, potency was recovered in 32 of 45 (71%) of the sural
nerve graft recipients and 14 of 21 (67%) of the controls, which was not a statistically significant
difference. By intent-to-treat analysis, potency was recovered in 32 of 66 (48.5%) of the sural
nerve graft recipients and 14 of 41 (34%) of controls. No differences were seen in time to potency
or quality-of-life scores for erectile dysfunction and urinary function. The investigators concluded
that the addition of sural nerve graft to a unilateral nerve-sparing radical prostatectomy did not
improve potency at 2 years following surgery. This study was not powered to rule-out a smaller
effect (20% or less) attributable to sural nerve grafting.

Sugimoto et al. (2009) evaluated 24 patients who underwent unilateral nerve-sparing with
contralateral cavernous nerve-grafting or bilateral nerve-grafting and 64 patients who underwent
prostatectomy without nerve-sparing procedure. Patients in nerve-grafting group who recovered
potency demonstrated higher sexual function scores compared with those without nerve-sparing
procedure. However, the majority of these patients were not satisfied with their sexual function.

Kuwata et al. (2007) prospectively investigated health-related quality of life (HR-QOL), including
sexual function in patients who underwent nerve grafting during a radical prostatectomy in
comparison with those who underwent a non-nerve-sparing radical prostatectomy in 66 patients
(22: nerve-grafting patients, 44: non-nerve-sparing and non-nerve-grafting patients). The
observation periods ranged from 12-46 months (median: 29 months). The sexual function score
was significantly better in the nerve-grafting (bilateral nerve graft or unilateral nerve graft with
contra-lateral nerve-sparing) patients than in the non-nerve-sparing/non-nerve-grafting patients.
The sexual bother score, however, was more serious for the patients who underwent nerve-
grafting surgery than for the non-nerve-sparing/non-nerve-grafting patients.

Porpiglia et al. (2005) evaluated 29 men who underwent laparoscopic radical prostatectomy with
deliberate wide unilateral neurovascular bundle resection and preservation of the contralateral

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bundle. Fifteen men (group A) had an interposition sural nerve graft on the sectioned bundle, and 14 (group B) had laparoscopic radical prostatectomy with preservation of the unilateral bundle only. Erectile function was evaluated after surgery, and at 3, 8, 12 and 18 months, using the five-item version of the International Index of Erectile Function (IIEF-5) questionnaire. The follow-up was complete for 12 men in group A and 10 in group B. Group A had significantly higher erectile function scores on the IIEF-5 at 12 and 18 months than immediately after surgery, whereas in group B the improvement was not statistically significant. According to the investigators, the study results suggest that laparoscopic sural nerve grafting during radical prostatectomy is feasible and safe; nevertheless it cannot be concluded that sural nerve grafting is more effective than preserving the neurovascular bundle alone in retaining sexual potency.

Saito et al. (2007) evaluated 64 patients who underwent a radical prostatectomy and intraoperative electrophysiological confirmation of cavernous nerve preservation. Twelve patients underwent a unilateral interposition sural nerve graft (UNG) for the resected neurovascular bundle. Twenty-one and 31 patients underwent bilateral nerve-sparing (BNS) and unilateral nerve-sparing (UNS) surgery without a nerve graft, respectively. As the age of patients was significantly younger in the UNG group than in the other groups, age-matched analysis also was conducted. In the age-matched analysis, the postoperative sexual function (SXF) score of the UNG group showed an intermediate level of recovery between those of the BNS and UNS groups at 12 months and reached the same level as the score at 12 months of the BNS group at 18 months postoperatively. The difference in the SXF score between the UNG and UNS groups began to appear after 6 months postoperatively and increased steadily with time. However, the background factors, such as the baseline SXF score, the usage rate of phosphodiesterase 5 inhibitors, and the rate of comorbidities were different between the UNG and UNS groups.

A prospective study by Namiki et al. (2007) evaluated 113 patients undergoing radical retropubic prostatectomy for the rate of recovery of urinary continence and sexual potency. Patients were classified into 3 groups according to the degree of nerve sparing; unilateral nerve preservation with contralateral sural nerve graft interposition, bilateral nerve sparing, and unilateral nerve sparing. The bilateral nerve sparing group showed the fastest recovery, although by 24 months there were no significant differences observed between the bilateral nerve sparing group and the unilateral nerve sparing group with sural nerve grafting. The bilateral nerve sparing group reported a better sexual function score than the unilateral nerve sparing group throughout the postoperative period. During the first year postoperatively, the bilateral nerve sparing group and the unilateral nerve sparing group with sural nerve grafting had better urinary function results than the unilateral nerve sparing group. The authors concluded that the nerve graft procedure may contribute to the recovery of urinary function as well as sexual function after radical retropubic prostatectomy; however these findings need to be validated in a randomized trial.

The remaining studies on nerve grafting during radical prostatectomy are case series or retrospective trials (Kim et al., 2001b; Zorn et al., 2008; Rabbani et al., 2010; Satkunasivam et al., 2009). While these studies suggest some benefit regarding nerve grafts, the study conclusions are unreliable due non-randomization of treatment and lack of appropriate comparison groups.

According to the National Comprehensive Care Network (NCCN) prostate cancer guideline, replacement of resected nerves with nerve grafts has not been shown to be beneficial for recovery of erectile function after radical prostatectomy (NCCN 2012).

Preliminary evidence from some studies suggests that nerve grafting with unilateral nerve sparing radical prostatectomy may improve rates of return of sexual and urinary function. However, the evidence is insufficient to conclude that this surgical technique is equivalent to bilateral nerve sparing prostatectomy or that long-term outcomes are improved by nerve grafting.

**U.S. FOOD AND DRUG ADMINISTRATION (FDA)**

Sural nerve transplant is a procedure, and as such, is not regulated by the FDA.
Medicare does not have a National Coverage Determination (NCD) for sural or other nerve grafts to restore erectile function after a radical prostatectomy. Local Coverage Determinations (LCDs) do not exist at this time. (Accessed October 16, 2013)

APPLICABLE CODES

The codes listed in this policy are for reference purposes only. Listing of a service or device code in this policy does not imply that the service described by this code is a covered or non-covered health service. Coverage is determined by the benefit document. This list of codes may not be all inclusive.

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<tr>
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REFERENCES


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**POLICY HISTORY/REVISION INFORMATION**

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| 12/01/2013 | • Routine review; no change to coverage rationale or list of applicable codes  
• Archived previous policy version 2013T0372J |