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European Association of Urology

Surgery in Motion

Technical Refinement and Learning Curve for Attenuating Neurapraxia During Robotic-Assisted Radical Prostatectomy to Improve Sexual Function

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Article info

Article history:
Accepted February 29, 2012
Published online ahead of print on March 8, 2012

Keywords:
Learning curve
Sexual function
Robotic
Radical prostatectomy
Nerve-sparing
Neurapraxia

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Abstract

Background: While radical prostatectomy surgeon learning curves have characterized less blood loss, shorter operative times, and fewer positive margins, there is a dearth of studies characterizing learning curves for improving sexual function. Additionally, while learning curve studies often define volume thresholds for improvement, few of these studies demonstrate specific technical modifications that allow reproducibility of improved outcomes.
Objective: Demonstrate and quantify the learning curve for improving sexual function outcomes based on technical refinements that reduce neurovascular bundle displacement during nerve-sparing robot-assisted radical prostatectomy (RARP).
Design, setting, and participants: We performed a retrospective study of 400 consecutive RARPs, categorized into groups of 50, performed after elimination of continuous surgeon/assistant neurovascular bundle countertraction.
Surgical procedure: Our approach to RARP has been described previously. A single-console robotic system was used for all cases.
Outcome measurements and statistical analysis: Expanded Prostate Cancer Index Composite sexual function was measured within 1 yr of RARP. Linear regression was performed to determine factors influencing the recovery of sexual function.
Results and limitations: Greater surgeon experience was associated with better 5-mo sexual function ($p = 0.007$) and a trend for better 12-mo sexual function ($p = 0.061$), with improvement plateauing after 250–300 cases. Additionally, younger patient age (both $p < 0.02$) and better preoperative sexual function (<0.001) were associated with better 5- and 12-mo sexual function. Moreover, trainee robotic console time during nerve sparing was associated with worse 12-mo sexual function ($p = 0.021$), while unilateral nerve sparing/non–nerve sparing was associated with worse 5-mo sexual function ($p = 0.009$). Limitations include the retrospective single-surgeon design.
Conclusions: With greater surgeon experience, attenuating lateral displacement of the neurovascular bundle and resultant neurapraxia improve postoperative sexual function. However, to maximize outcomes, appropriate patient selection must be exercised when allowing trainee nerve-sparing involvement.

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1. Introduction

Opponents of prostate-specific antigen screening and aggressive treatment of low-risk prostate cancer contend that treatment-related sequelae and the costly treatment of the side-effects may be worse than a potentially indolent disease process [1,2]. For instance, the likelihood of postprostatectomy erectile dysfunction ranges from 7% to 80% [3,4], contributing to treatment regret [5,6]. This marked variation in postprostatectomy sexual function may be attributable to differences in patient selection, varying definitions of *potency*, biases stemming from varying methods of data collection (physician- vs patient-reported outcomes with or without validated quality-of-life instruments), and, most important, heterogeneous surgical techniques [3,7,8].

Surgical techniques to preserve erectile function have continued to evolve since Walsh's initial description of nerve-sparing prostatectomy approximately 30 yr ago [9]. With improved knowledge of pelvic anatomy and the advent of greater magnification during open radical prostatectomy or robot-assisted radical prostatectomy (RARP), there has been greater emphasis on full nerve sparing compared with partial nerve sparing, or on achieving the intrafascial dissection plane compared with the interfascial dissection plane during nerve sparing [10–12]. This emphasis is epitomized by histologic studies correlating recovery of sexual function with the amount of residual neurovascular bundle tissue resected with the prostate [13,14]; however, there is less emphasis on minimizing stretch neuropathy and neurapraxia that adversely affects recovery of sexual function. We recently described earlier recovery of sexual function through the elimination of active assistant and/or surgeon neurovascular bundle countertraction during RARP [15]. However, additional subtle technical refinements improve sexual function, and this paper describes and demonstrates maneuvers to further attenuate neurapraxia during nerve-sparing RARP and improve sexual function outcomes.

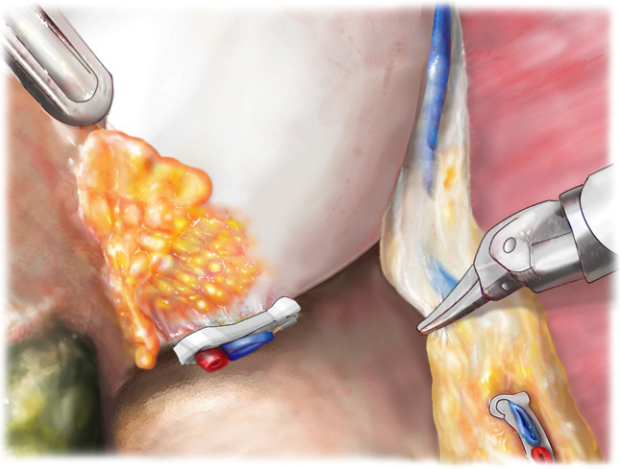

Fig. 1 – Prior technique of intermittent blunt dissection associated with transient cross-tension and lateral displacement of the neurovascular bundle as it is peeled away from the prostate during right nerve-sparing dissection.

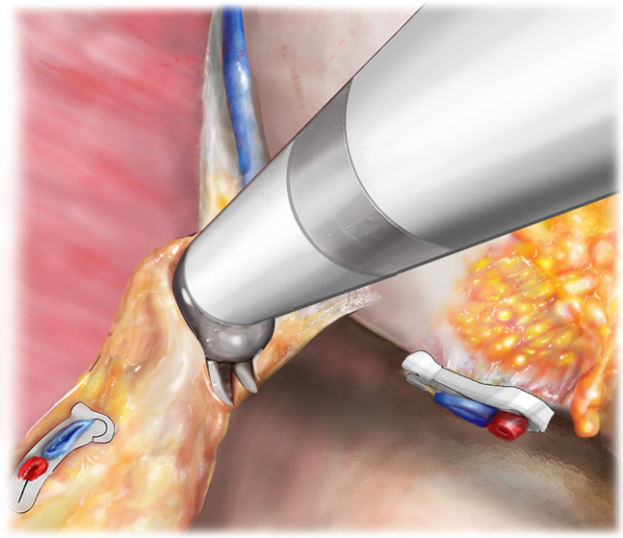

Fig. 2 – Prior technique of peeling with intermittent blunt dissection associated with transient stretch of the left neurovascular bundle.

2. Methods

2.1. Technical modification

Our approach to RARP has been described previously. A single-console robotic system was used for all cases. After eliminating continuous lateral displacement of the neurovascular bundles by the assistant and robotic surgeon to facilitate nerve-sparing dissection with countertraction [15], we focused on reducing the lateral neurovascular bundle displacement that occurs with intermittent blunt dissection resulting from a peeling motion (Figs. 1 and 2). This reduction was accomplished bilaterally with greater reliance on spreading the robotic scissors longitudinally medial to the neurovascular bundle, followed by sharp dissection (Fig. 3). In addition, during left apical nerve-sparing dissection, the robotic Maryland dissector is spread open just enough to allow sharp dissection of the medial border of the neurovascular bundle away from the left apex (Fig. 4).

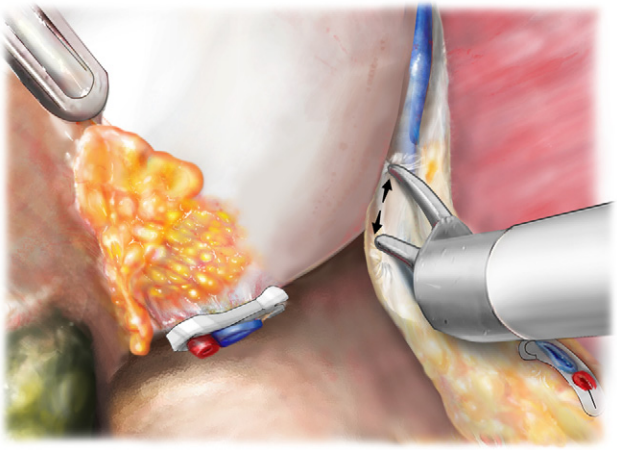

Fig. 3 – Modified right nerve-sparing dissection with spreading of scissors longitudinally along the medial edge of the neurovascular bundle to set up sharp dissection.