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Alternative Approaches to Nerve Sparing: Techniques and Outcomes

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Surgery should be a merciful art; the cleaner and gentler the act of operating, the less the patient suffers.
Berkeley Moynihan

18.1. Introduction

The preservation of sexual potency after prostatectomy has always been the topic of much anxiety and debate. While cancer control and urinary continence are of supreme importance, the preservation of sexual function completes the trifecta that both patient and surgeon strive to achieve. Over the decades open nerve sparing radical prostatectomy has continued to evolve from its early rudimentary beginnings into the more refined techniques that we see today. However, while we have seen considerable advances in recent times the limitations in visualization and dissection of the bundle have continued to provide a challenge even to the most experienced surgeon.

The introduction of robotic assistance into modern day laparoscopic surgery has provided many advantages; the two greatest being improved three dimensional magnified vision and wristed instrumentation. These technical enhancements provide the surgeon with improved surgical tools that have the potential to facilitate a more precise surgical approach. One of the potential advantages during robotic prostatectomy is improving visualization, control and dissection of the neurovascular bundle. In our review, we present the various technical approaches to nerve sparing during robotic radical prostatectomy.

18.2. Nerve-Sparing Techniques and Results

Retrograde neurovascular bundle (NVB) preservation is the most commonly used approach during open nerve sparing radical prostatectomy. This is due to the fact that the procedure is performed in a retrograde manner from apex to base. Laparoscopic prostatectomy has traditionally been performed in an antegrade manner from base to apex due to the improved visualization and appreciation of tissue planes. Therefore, the majority of the laparoscopic approaches to nerve sparing incorporate some form of antegrade dissection. As with any surgical procedure, the technical approach to nerve sparing has been very dynamic and in constant flux. Recently, many centers with expertise in robotic prostatectomy have described their various approaches to nerve sparing.

18.2.1. Categorization of Approaches to Nerve-Sparing Robotic Prostatectomy

The tremendous variability in the approach to preservation of the neurovascular bundle has often led to confusion. This is most commonly due to the fusion of various technical concepts that are used in each individuals approach. While these procedures are often a hybrid of a variety of techniques a few fundamental concepts are apart of everyone’s approach. The approach to nerve sparing robotically can be antegrade, retrograde, or a combination of the two. It can be athermal or with the use of thermal energy (monopolar, bipolar, harmonics). Another variable factor is the approach to the fascial layers surrounding the prostate at the site of the neurovascular bundle. The approach can be extrafascial, interfascial, intrafascial, or high intrafascial. We use this basic terminology to define the various approaches to robotic nerve sparing prostatectomy.

18.2.2. Athermal Approaches to Nerve Sparing

It has become increasingly evident that preservation of the nerves may be achieved; yet trauma to
the nerves can still diminish, delay, or eliminate recovery of erectile function. It is well known that thermal energy can significantly damage neural tissue. In a canine model, Ong and associates compared monopolar, bipolar and harmonic energy sources with conventional (without energy) dissection of the NVB. Intracavernous pressure was measured immediately and 2 weeks after dissection. Dramatic decreases in intracavernous pressures at both early and late evaluations were shown in all energy groups. In fact, the decrease of intracavernous pressure was >95% in all three energy groups at 2 weeks compared to normal pressures in the conventional and control groups. Of note, studies assessing the impact of energy on nerves have usually used a myelinated nerve such as rats sciatic nerve. The cavernosal nerve, on the other hand, is an unmyelinated autonomic nerve which might be even more vulnerable to heat injury than a thicker myelinated nerve. Temperatures as low as 41°C have proven to damage neural tissue.

18.2.3. University of Chicago Clipless Thermal Antegrade Approach

Investigators from the University of Chicago modified the antegrade method originally described by Kursh and Bodner. Upon division through the bladder neck, the plane between both layers of Denonvillier’s fascia is identified and developed, separating the prostate from the rectum. Dissection in this plane is carried out distally towards the apex of the prostate. The thick lateral pedicles of the prostate then become prominent on both sides. Using a combination of mostly blunt and some sharp dissection with cold scissors, the vascular pedicles are teased off the prostatic pedicle. Proceeding in a medial-to-lateral dissection in this posterior plane, the vascular pedicles are released prior to the NVBs. The vascular pedicles are further mobilized in an anterior direction until the most distal ends are identified just before penetrating into the prostatic capsule. These small vessels are cauterized at their most distal ends using only bipolar cautery. The vascular pedicles are then swept off the prostate further mobilizing the NVBs, which are then dissected sharply from the prostatic capsule. The dissection continues with peeling off the peri-prostatic fascia, NVB, and the prostate pedicle en bloc until the urethra is reached. Bulk clipping of the pedicles is eliminated by dividing them as they enter the prostate because the branches are less than 1 mm in diameter at this level. Dissection with a clipless technique with bipolar energy is similar to that described by Guillonneau and Vallancien; however, Chien and colleagues carry out the dissection from medial to lateral, opposite of the other technique. Alternatively, in an effort to avoid any thermal energy use, clipping of the prostatic pedicles is also a viable option. However, there is then concern that bulk clipping may injure some nerve fibers responsible for erection. Chien and colleagues also propose that after having initially mobilized the NVBs, the thermal spread may be theoretically diminished secondary to the increased distance achieved between the NVB and prostatic capsule. Figure 18.1 depicts bilaterally preserved NVBs during a robotic radical prostatectomy. Using a validated sexual function questionnaire, Chien and colleagues found that, at one month, patients returned to 47% of their baseline preoperative sexual function scores. At 3, 6, and 12 months, this rate increased to 54%, 66%, and 69%, respectively. This was a small series and only six patients reached one-year follow-up.