Endoscopic radical perineal prostatectomy: Preliminary results

Vasileios A. Pangalos, Antonios Katsimantas, Konstantinos Sfetsas, Konstantinos Ioannidis, Athanasios Archontakis

Department of Urology, 401 GMHA

Abstract

Radical Perineal Prostatectomy (RPP) is the oldest surgical technique for prostate cancer. Prostate’s anatomy allows for RPP to be considered as a minimally invasive technique. However, only a few surgeons perform it, probably due to technical difficulties arising from the constricted surgical field, as well as surgeons’ insufficient training. We introduce Endoscopic Radical Perineal Prostatectomy as an evolution of RPP and present our results in a series of patients. ERPP combines the advantages of both RPP and laparoscopic techniques in terms of surgical results while, at the same time, offers surgeons an invaluable training tool.

Introduction

Radical perineal prostatectomy (RPP) is the oldest surgical approach developed for the treatment of prostate cancer and was first described by Young in 1905. Until 1970, it was the main surgical technique used by most urologists. In 1947, Millin was the first to describe retropubic radical prostatectomy (RRP). This approach gained particularity popularity in the early 1980s, thanks to Walsh et al., who developed and improved it. In 1982, in fact, Walsh and Donker indicated a method for preserving the cavernous nerves, and therefore of sexual function, in retropubic radical prostatectomy. In 1988, Weldon and Tavel adapted these anatomical and functional improvements to radical perineal prostatectomy. In Greece, the first radical perineal prostatectomy with preservation of the neurovascular bundles took place in our clinic in 1993. In recent decades, although effective, radical perineal prostatectomy has gradually become less popular and is now performed by very few surgeons worldwide. The reason for this can be attributed both to the particularities of the surgical field and to the difficulty of training young surgeons in this. Retropubic radical prostatectomy is now used widely and is the preferred method of most urologists, as they are trained exclusively on this, although its superiority compared to the perineal access has not been proven.

“Minimally invasive” techniques, such as laparoscopic radical prostatectomy (LRP) and robotic-assisted laparoscopic radical prostatectomy (RALP) have also gained ground in recent years. In fact, RALP has developed rapidly over the current decade and today is

Corresponding author:
Athanasios I. Archontakis, General Chief Medical Officer, Director, Urology Clinic, 401 GMHA 138 Mesogion Ave., 115 25, Athens, Tel.: 210 7494184, E-mail: athanasios.archontakis@gmail.com
the most frequently performed surgery for prostate cancer in the United States. These techniques were developed with the dual purpose of causing minimal trauma to the entrance route and the surgical field and secondly of improving the surgical outcome. However, these techniques are variants of open retropubic prostatectomy and, betraying their original definition as minimally invasive techniques, cause a greater trauma internally, especially when the intraventricular space is used to approach the prostate.

At the clinic of the 401 GMHA, we decided to combine the anatomically appropriate - due to its foetal origin - and therefore minimally invasive nature of radical perineal prostatectomy with the improved imaging and more effective execution offered by laparoscopic technology. Therefore, for the first time in the history of prostate cancer surgery, we performed endoscopic radical perineal prostatectomy (ERPP).

**Material - Method**

From October 2014 to today, we have performed endoscopic radical perineal prostatectomy (ERPP) in 15 patients with clinically localised prostate cancer. The mean age of the patients was 67 years. The mean pros-
tate size was 46cc. The mean PSA value was 7.2. None of the above patients presented severe comorbidities and none required pelvic lymphadenectomy, according to their classification into risk groups.

In the operating room, the patients were placed on the operating table in a lithotomy position. A special tractor fitted into a No. 20 Foley catheter was inserted in the bladder. The operation began with an approximately 4 - 5cm long convex perineal incision. The perineal tendon was cut after opening the subcutaneous tissue. This was followed by the opening of the urethreorectal muscle. The next step was the separation of the two lamellae of the levator ani and the gradual revealing of the posterior surface of the prostate.

### TABLE 1

**Comparison of RRP, RPP and RALP in restoring continence postoperatively**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Type of operation</th>
<th>Number of Patients</th>
<th>Criteria</th>
<th>Urinary continence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 months</td>
</tr>
<tr>
<td>Eastham et al. (1996)</td>
<td>RRP</td>
<td>581</td>
<td>No pad</td>
<td>65</td>
</tr>
<tr>
<td>Harris and Iselin (2003)</td>
<td>RPP</td>
<td>508</td>
<td>No pad</td>
<td>62</td>
</tr>
<tr>
<td>Roumeguere et al. (2003)</td>
<td>RRP</td>
<td>51</td>
<td>No pad</td>
<td>62.5</td>
</tr>
<tr>
<td>Lepor et al. (2004)</td>
<td>RRP</td>
<td>621</td>
<td>No pad</td>
<td>74.4</td>
</tr>
<tr>
<td>Matsubara et al. (2005)</td>
<td>RPP</td>
<td>41</td>
<td>No pad</td>
<td>65</td>
</tr>
<tr>
<td>Menon et al. (2007)</td>
<td>RALP</td>
<td>1142</td>
<td>No pad</td>
<td>NA</td>
</tr>
<tr>
<td>Zorn et al. (2007)</td>
<td>RALP</td>
<td>161</td>
<td>No pad</td>
<td>47</td>
</tr>
<tr>
<td>Krambeck et al. (2009)</td>
<td>RRP</td>
<td>564</td>
<td>No pad</td>
<td>NA</td>
</tr>
</tbody>
</table>

RRP: Radical retropubic prostatectomy; RPP: Radical perineal prostatectomy; RALP: Robotic assisted laparoscopic prostatectomy; NA: Not applicable

### TABLE 2

**Comparison of RRP, RPP and RALP as to postoperative erectile function**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Type of operation</th>
<th>Number of Patients</th>
<th>Criteria</th>
<th>Urinary continence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 months</td>
</tr>
<tr>
<td>Weldon et al. (1997)</td>
<td>RPP</td>
<td>220</td>
<td>Intercourse</td>
<td>NA</td>
</tr>
<tr>
<td>Roumeguere et al. (2003)</td>
<td>RRP</td>
<td>51</td>
<td>Intercourse</td>
<td>33.3</td>
</tr>
<tr>
<td>Graefen et al. (2006)</td>
<td>RRP</td>
<td>1755</td>
<td>Intercourse</td>
<td>NA</td>
</tr>
<tr>
<td>Martis et al. (2004)</td>
<td>RRP</td>
<td>100</td>
<td>Intercourse</td>
<td>NA</td>
</tr>
<tr>
<td>Zorn et al. (2007)</td>
<td>RALP</td>
<td>161</td>
<td>Intercourse</td>
<td>53</td>
</tr>
</tbody>
</table>

RRP: Radical retropubic prostatectomy; RPP: Radical perineal prostatectomy; RALP: Robotic assisted laparoscopic prostatectomy; NA: Not applicable
At this stage, we placed the Alexis device through the trauma, and applied the Gelpoint mini device thereon (single port laparoscopic trocar device), by Applied Medical and filled with CO$_2$ at a pressure of 8atm (Figures 1, 2, 3). A laparoscopic camera and two trocars (for the scissors and tweezers) were introduced through the port.

The posterior section of Denonvilliers’ fascia was then opened and prepared, obliquely, from the posterior and lateral surface of the prostate, to ensure that the neurovascular bundles remain intact, using scissors, a dissecteur (laparoscopic tissue separation forceps) and a grasper (laparoscopic grasping forceps). We prepared, ligated and sectioned the pedicles of the prostate. Subsequently, we prepared the apex of the prostate, we sectioned the urethra and placed a new Foley catheter in the bladder, through the apex of the prostate (Figure 4). This catheter was used as a lever for mobilising the prostate and easing surgical handling.

The next step was the preparation of the lateral and anterior surface of the prostate, by detaching the puboprostatic ligaments, followed by the preparation and ligation of the vas deferens and seminal vesicles. Finally, the prostate was separated from the bladder neck and removed.

This was followed by thorough haemostasis and subsequent performance of anastomosis of the urethra with the bladder neck, making 3 - 4 knots using a laparoscopic needle holder and a laparoscopic knot promoter, while a No. 18 triple lumen urinary catheter was placed in the bladder. This was followed by checking the tightness of the anastomosis, by injecting 200ml of normal saline solution into the bladder and its subsequent aspiration. None of the patients presented any leakage. The Alexis and Gelpoint mini devices were then removed. Then, a Penrose-type drain was placed in the wound, the two lamellae of the levator ani were brought together and the urethrorectal muscle and central tendon of the perineum were sutured. Finally, the subcutaneous tissue and skin were closed with clips.

Results
Laparoscopic radical perineal prostatectomy was completed successfully in all 10 patients. The mean duration of surgery was two hours. Mean blood loss was assessed at approximately 200ml. The Penrose drain was removed on the first postoperative day in all patients. The mean time the patients spent in the hospital postoperatively was 1.5 days. None of the patients presented severe postoperative complications. The results of the histological examinations showed that all patients had clinically localised disease with negative surgical margins. The first postoperative PSA value was zero in all patients. The first 5 patients who arrived at the three-month follow-up were all continent and had satisfactory erections.

Discussion
This paper represents the first description of Endoscopic (Laparoscopic) Radical Perineal Prostatectomy (ERPP). A few months after we started our first ERPP operations, in December 2014, Laydner et al. reported the possibility of using robotic-assisted radical perineal prostatectomy in 3 male corpses. The study by Laydner et al. concerned a technique for the approach of robotic-assisted radical perineal prostatectomy, which showed that it was possible to remove the prostate while successfully preserving the neurovascular bundles.

In practice, radical perineal prostatectomy has been abandoned since 1980, with the advent and establishment of the retropubic access, which is used widely worldwide. There are very few centres worldwide, one of which is our clinic, which have relevant expertise and perform RPP. However, there are no prospective randomised studies showing that retropubic prostatectomy is superior to the perineal approach, as regards its oncological, and functional, results (continence, erectile function). In fact, rather the opposite is true.

RPP has proven advantages over RRP, i.e. shorter operative times, absence of postoperative inguinal hernias and abdominal hernias, lower frequency of anastomotic stricture in the urethra, immediate patient mobilisation, minimum postoperative pain, shorter hospitalisation times, minimal blood loss (in the perineal access, the surgeon does not cut Santorini’s venous plexus) and infrequent blood transfusions. As regards the latter in particular, it should be noted that, by opening and repelling Denonvilliers’ fascia, the perineal access provides a surgical field under Santorini’s venous plexus, which is thus preserved,
resulting in limited blood loss. Based on bibliographic data, average blood loss does not exceed 300ml. A very important advantage of the perineal access is the easy and immediate access it provides to the apex of the prostate and the membranous urethra. This is the most dangerous area in radical retropubic prostatectomy, with respect to positive margins, postoperative morbidity, incontinence and urethral strictures. In contrast, direct transperineal access to the apex and posterior surface of the prostate facilitates precise excisions and significantly reduces the risk of positive margins in those areas, as compared to the retropubic approach.

Another particularly important strong point of the perineal access concerns the very low rates of external sphincter injury and, therefore, the minimum incidence of urinary incontinence. The striated circular muscle fibres constituting the urethral striated sphincter and surrounding the membranous urethra and part of the apex of the prostate are connected, in the perineal area, in a fibrous band, the mid-dorsal raphe. The fibrous band provides security in the event of sphincter injury during the preparation of the apex of the prostate, as the injury concerns the fibrous band and not the muscle fibres.

For patients who do not need pelvic lymph node ablation, the cost of the perineal approach is significantly lower than that of RRP. At this time, when financial issues are a dominant parameter even in medicine, the application of a low-cost surgical method with optimal oncological and functional results, such as RPP, is an excellent choice.

According to bibliographic data, the main disadvantage of RPP is its higher rectal injury rates. For this reason, surgeons or their assistants should perform a digital rectal examination, to avoid such injuries and losing the correct surgical plan. However, no such complications were observed in the patient series of our clinic and we believe that, when this happens, it is due to inadequate training in this procedure.

In previous years, criticism of RPP focused on the surgeon’s inability to perform pelvic lymphadenectomy by perineal access. If a patient required pelvic lymphadenectomy, they had to undergo this operation using a different access method, usually laparoscopically, which, in our view, is not a poor practice. Today, however, such issues no longer arise, as bilateral pelvic lymphadenectomy, through the same perineal incision, which is performed for radical perineal prostatectomy, has been described and established.

Saito and Murakami performed this operation in 20 patients who underwent RPP and removed an average of 8 lymph nodes per patient. Keller et al. performed bilateral pelvic lymphadenectomy through the same perineal incision in 90 patients who underwent RPP. Lymphadenectomy was performed after removal of the prostate by means of a self-locking hook that pushes the bladder centrally and allows access to the iliac vessels and lymph nodes, under direct visual contact. The average operative time was 149 minutes and the average number of lymph nodes resected was 19. The main complication of this operation was lymphocele, which appeared in 7.8% of patients, while four of them (3.3%) required some form of treatment.

In the last decade, the widespread use and the growing experience with RALP tend to establish it as the new “gold standard” in the surgical treatment of prostate cancer. When performed at experienced centres, this operation offers significant advantages compared to retropubic radical prostatectomy. However, RPP ensures better results at a much lower cost.

From an anatomical viewpoint, ERPP offers more direct access to the prostate compared to RALP, in which the prostate is approached through the anterior abdominal wall and the abdomen. Surgical times in RALP include entering the peritoneal cavity, the mobilization of the bladder, the opening of the endopelvic fascia and the ligation of Santorini’s venous plexus. These times, which do not exist in ERPP, mean that it is faster and entails less bleeding, thus constituting its main advantage.

Furthermore, the perineal access has the advantage of avoiding adhesions in patients who have undergone abdominal operations in the past and in patients who have had surgery for abdominal or inguinal hernias, for which a mesh has been used. Further, ERPP can be smoothly performed in obese patients, as it does not require the creation of a pneumoperitoneum, which is associated with increased pressure in the airways. In addition, ERPP does not entail a risk of uroperitoneum or injury to the bowel or large vessels, which, although small, is existent in RALP.

Additionally, as ERPP does not involve entry into the
peritoneal cavity, the bowel is mobilised more quickly postoperatively and patients can be directly fed normally. However, ERPP’s main advantage is that it is performed directly on the target organ, avoiding other visceral and anatomical structures and their possible consequent injuries.

The hitherto published studies comparing radical retropubic prostatectomy, radical perineal prostatectomy and RALP provide similar oncological results for all three techniques. Furthermore, their comparison as regards postoperative continence and postoperative erectile function shows that all of these three approaches are equally effective, and that the much vaunted robotic-assisted prostatectomy is certainly not superior. In contrast, in all cases, RPP is always, albeit slightly, in the lead compared to the other two approaches (Tables 1,2).

Our experience with ERPP has shown that the use of laparoscopic instruments, via perineal access, provided better imaging and allowed more precise handling in a deep and narrow surgical field. The preparation of the various prostate surfaces and especially the anastomosis of the bladder to the urethra were conducted with greater ease and accuracy, endoscopically. Simultaneously, endoscopic radical perineal prostatectomy provides a more valuable training tool, as it allows trainee surgeons to watch the entire operation on the monitor.

Since RALP was introduced, there has been talk about the minimally invasive nature of the method. Of course, there is an issue regarding the excessively high costs involved both for the acquisition of the robotic system and for its maintenance and the acquisition of laparoscopic tools. On the other hand, we also have radical perineal prostatectomy, which, as discussed above, is the epitome of minimally invasive methods, as it could be the dictionary definition of the term. However, it also offers a clear and indisputable advantage: it approaches the prostate through an anatomically much more rational access point, through the perineal route, using a very small perineal incision that does not cause injury to the surrounding tissues and leads to the prostate without affecting the neurovascular bundles and Santorini’s venous plexus and, of course, stays away from the peritoneal cavity and the bowel. The perineal incision pays homage to the etymological definition of the organ (prostate: that preceding the urinary bladder), and to its embryological origin. It is therefore clear that when we talk about a minimally invasive procedure, radical perineal prostatectomy clearly surpasses RALP and should rightly be described as the most minimally invasive approach to the prostate.

We believe that RPP returns to the fore, particularly after the introduction of ERPP, and assumes its rightful place, initially at least, in the minds of those urologists who were until now unaware of its important advantages in all abovementioned parameters. The application of endoscopy in performing perineal prostatectomy is a step in the refinement of the operation, while increasing its value as a training tool.

**Conclusion**

ERPP is a feasible and safe operation, which combines the advantages of radical perineal prostatectomy and laparoscopy. In conclusion, this allows for an easier and more accurate operation and has fewer complications, while its oncological and functional results are excellent. Moreover, the fact that ERPP is performed and displayed on a monitor increases its value as a training tool and it therefore becomes more accessible and understandable by urologists.
Περίληψη

Η ριζική περινεϊκή προστατεκτομή είναι η παλαιότερη χειρουργική θεραπεία για τον καρκίνο του προστάτη. Παρόλο που, λόγω ανατομίας του προστάτη, η ριζική περινεϊκή προστατεκτομή αποτελεί ελάχιστα επεμβατική τεχνική, εκτελείται σήμερα από ένα μικρό αριθμό χειρουργών. Αυτό μπορεί να οφείλεται, αφενός, στο ιδιαίτερο χειρουργικό πεδίο και, αφετέρου, στη δυσκολία που παρουσιάζει η εκπαίδευση των νέων χειρουργών σ’ αυτήν. Με την παρούσα εργασία εισάγουμε την ενδοσκοπική ριζική περινεϊκή προστατεκτομή και παρουσιάζουμε τα αποτελέσματά της σε μία σειρά ασθενών. Η τεχνική αυτή συνδυάζει τα πλεονεκτήματα ριζικής περινεϊκής προστατεκτομής και της λαπαροσκοπίας, αποτελεί ένα βήμα προς την τελειοποίηση της επέμβασης, ενώ συγχρόνως την καθιστά εκπαιδευτικότερη.

Λέξεις ευρετηριασμού

προστατικός καρκίνος, χειρουργική θεραπεία, ενδοσκοπική ριζική περινεϊκή προστατεκτομή

References


