Penile Length after Radical Prostatectomy

Subjects: Urology & Nephrology

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One of the standard treatments for localized prostate cancer is radical prostatectomy (RP), which is widely performed worldwide. Changes in pelvic anatomy after radical prostatectomy are inevitable and, therefore, postoperative complications cannot be completely eliminated; however, preserving as much of the tissue and structure around the prostate as possible, to the extent that prostate cancer control is not compromised, may help reduce the prevalence of postoperative complications.

Radical Prostatectomy Penile Length Prostate cancer

1. Introduction

One of the standard treatments for localized prostate cancer is radical prostatectomy (RP), which is widely performed worldwide. In RP, the prostate is removed along with the seminal vesicles, and the urinary tract is reconstructed by dropping the bladder into the pelvic floor and suturing the bladder and urethra together. This process causes damage to the pelvic floor and postoperative complications due to the anatomical changes in the pelvic floor caused by the vesicourethral anastomosis. Urinary incontinence and erectile dysfunction (ED) are major complications that impair quality of life (QOL) after radical prostatectomy. In addition, shortening of penile length and increased frequency of inguinal hernia (IH) occurrence have been reported. Although RP was initially performed with transperineal approaches, after the reports of anatomical RP and nerve-sparing (NS) techniques by Walsh et al., RP with retropubic approaches through a median incision in the lower abdomen became popular worldwide [1][2]. Since then, laparoscopic techniques have spread following their development and improvement [3], and robotic-assisted surgery is now widely performed [4]. In addition to the anterior approach, in which the anterior bladder is expanded and the operative field is secured [1], a Retzius-sparing posterior approach, in which the Retzius space is not opened and all operations are performed from the Douglas fossa, is now used for prostatectomy [5].

2. Penile Length after Radical Prostatectomy

2.1. Penile Length Measurement

The penis is an elastic organ, and its length varies depending on the conditions under which it is measured. Although it is highly desirable to measure the penis in an erect state, it is not easy to measure the penis in an erect state in a general outpatient clinic. Therefore, since the stretched penile length (SPL), which is measured with the penis fully extended, approximates the penile length at erection [6], many reports measure the SPL, which is

relatively easy to measure [7][8][9][10][11][12][13]. To ensure uniform measurements, the temperature and body position at the time of measurement should be constant, and care should be taken to ensure that there are no changes in the thickness of the abdominal wall above the pubic bone when measurements are taken chronologically [13][14].

2.2. Chronological Changes of Penile Length after Radical Prostatectomy

The results of penile length shortening after RP are similar in all studies, although one report found that shortening continued up to 1 year postoperatively [9], whereas other reports claim that after shortening, penile length is regained over time [10][11][13]. Some of these studies report improvements to preoperative levels in approximately 6 to 12 months [11][13], whereas another study reported improvement in 3 to 5 years [10].

2.3. Penile Length Changes and Sexual Function

Factors affecting penile length changes after RP have been reported. It has been reported that changes in penile length correlated with sexual function as assessed by the five-item version of the International Index of Erectile Function (IIEF-5) [11]. There are also some reports that phosphodiesterase 5 inhibitors (PDE5i) administration could prevent shortening of penile length [12][15][16][17]. nerve-sparing (NS) techniques reportedly had no effect on penile shortening [8][13][17]. The RP and control groups were asked about their awareness of penile shortening, QOL, and self-esteem. The results reported that awareness of penile shortening was higher in the RP group (55% vs. 26%), and that age, degree of ED, lower QOL, and lower self-esteem were related to the awareness of penile shortening [18]. Rather than penile shortening directly affecting sexual function, psychological influences, including self-esteem may be involved.

2.4. Mechanism of Penile Length Change after Radical Prostatectomy

The following mechanisms have been proposed to explain the changes in penile length after RP, based on magnetic resonance imaging (MRI) findings before and after surgery and at 1 year [13]. Anatomically, the Corpus spongiosum surrounding the urethra is an integral structure with the peripheral side continuous to the glans and the central side continuous to the bulb of penis. At the time of vesicourethral anastomosis after prostatectomy, the bladder is dropped into the pelvic floor. Because the bladder is loosely pulled cephalad by the surrounding vascular pedicle and connective tissue, the anastomosis is pulled cephalad immediately after the vesicourethral anastomosis. As a result, the cavernous tissue, which is integrated with the urethra, is pulled in a pelvic direction, causing shortening of the penis. Over time, the vascular pedicle and connective tissue that had been pulling on the bladder are gradually stretched, and after a period of approximately 1 year, penile length is expected to return to its original value, as the membranous urethra, which was being pulled cephalad, returns to its original position. In animal experiments with rats, structural changes in the penis and sympathetic hypertonia, which may be caused by hypoxia resulting from damage to the penile cavernous nerve, have been observed and may be the cause of penile shortening [19]. Changes in penile length due to androgen have also been reported; there have been reports of shortening of the penis due to androgen deprivation therapy (ADT) [20][21], and improvement in penile length after the discontinuation of ADT, and a relationship between androgens and penile length have also been considered [22]. In the long term, it is possible that tissue changes within the penis under the influence of blood flow and

hormones may affect penile length. It was also reported that an early postoperative intervention using a vacuum erection device reduced the shortening of penile length [23]. In the long term, there are many factors that affect penile length after RP, which may be one of the reasons for the variability in measurements between reports.

3. Conclusions

After RP, pelvic anatomy differs from the preoperative one, resulting in a variety of complications. There are complications and mechanisms of pelvic anatomical changes associated with RP, as well as countermeasures. ED and urinary incontinence are the main complications that impair QOL after RP. It is clear that NS is useful for preserving the erectile function, and NS, urethral length preservation, and Retzius sparing are useful for urinary continence. Preservation of as much periprostatic tissue and periprostatic structures as possible may lead to favorable postoperative outcomes and reduce postoperative complications, as long as the cancer condition permits. In addition to an accurate preoperative staging, detailed surgical planning and surgical techniques will be important.

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