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THE ROLE OF PRESERVING THE INNER SPHINCTER MECHANISM AND THE BLADDER NECK IN THE EARLY ACHIEVING URINE CONTINENCE WHEN PERFORMING RADICAL RETROPUBIC PROSTATECTOMY

УЛОГАТА НА ЗАЧУВУВАЊЕТО НА ВНАТРЕШНИОТ СФИНКТЕРЕН МЕХАНИЗАМ И ВРАТОТ НА МОЧНИОТ МЕУР ВО РАНОТО ВРАЌАЊЕ НА УРИНАРНАТА КОНТИНЕНТНОСТ ПРИ ИЗВЕДУВАЊЕ НА РАДИКАЛНА РЕТРОПУБИЧНА ПРОСТАТЕКТОМИЈА

Ivchev J.¹, Chipurovski I.¹, Stojanoski I.¹

¹Department of Urology, City General Hospital "8th September" Skopje, R. of Macedonia

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ABSTRACT

Objective: To assess the effect of preserving the internal sphincter on urine continence in patients who have gone through radical prostatectomy due to prostate cancer.

Materials and methods: Open retropubic prostatectomy has been performed on 69 patients in our Urology department, of whom 44 patients were treated with careful preservation of the internal sphincter mechanism on the bladder neck, and a control group of 25 patients who didn't have preserved internal sphincter. Retrospectively, we used the standardized international questionnaires, ICIQ-UI-SF and IIEF-5, which were translated and adapted. All of the patients were operated in the period 2014-2015.

Results: Patients who had preserved inner sphincter mechanism and bladder neck during their radical prostatectomy, achieved continence much sooner, but the rate of continence in both groups after 12 months remained unchanged. The grade of incontinence till the 9-th month postoperatively was evidently lower in the examined group. The rate of anastomotic stricture and erectile dysfunction remained unchanged.

Conclusion: The remains of the internal sphincter makes passive closing mechanism that helps the continence in the patients till the distal sphincter takes over the control which happens much later in the postoperative period.

Key words: Incontinence, radical prostatectomy, inner sphincter.

INTRODUCTION

The prostate cancer is one of the most common cancer in men. As a cause of death prostate cancer is second only to lung cancer. It is estimated that in Western countries lifetime risk of developing microscopic prostate cancer is 3% (1). In biopsy results, the prevalence of microscopically discovered prostate cancer is approximately 80% of men over 80 years. However, although this is a slow-growing cancer, the risk of developing clinically detectable disease is 8% (2).

Nowadays, most commonly applied method for the treatment of prostate cancer is radical prostatectomy (RP). There are various different procedures that are at our disposal: classic retropubic (open) access,

laparoscopic and robotic radical prostatectomy.

Retropubic radical prostatectomy is a method of choice for many decades. It is still considered as a gold standard in the surgical treatment of localized prostate cancer (3). Among the major clinical problems associated with surgical treatment of the prostate carcinoma are the complications that arise immediately after the surgery. Despite improvements in surgical techniques, which allow precise dissection and termino-terminal vesico-urethral anastomosis, urinary incontinence (UI) and erectile dysfunction remains a serious problem for many men and they affect the quality of the lives of more than 50% of the patients (4,5,6). The incidence of post-prostatectomy

urinary incontinence depends a lot on the scaling and grading of the incontinence and length of the post-operative care. Urinary incontinence has a spontaneous recovery in most men, but it can take up to one year after RP. In more than 10% it lasts more than one year after the surgery. The quality of life is quite impaired in these patients, particularly those who had “constantly leakage” and therefore had to use pads or diapers. This is one of the measures for scaling the severity of incontinence. In 6-9% of the patients with incontinence, surgery is necessary to solve this problem (7).

Shortcomings in the radical prostatectomy in terms of urinary incontinence has been subject of intensive research, mainly with urgent task of improving operational technique in order to maintain continence in majority of the patients. A group of technical methods, which can potentially improve continence, are associated with preservation of the neck of the bladder and the nerve pedicle lateral and posterior to the prostate.

Different preoperative risk factors and postoperative factors could affect the restoration of continence after RP. Preoperative evaluation of the individual risk will provide counseling to patients in order to achieve realistic expectations based on the status of the patient. Several predictions are under investigation, such as: age, prostate volume, stage of disease, body weight, comorbidities, history of previous dysfunctions of the lower urinary tract, but in most published studies, conservation of postoperative urinary continence is most credited to the surgical method which was applied. Hence, in this study, we focused on surgical technique as the main cause that can lead to loss or preservation of UI after RP.

In terms of anatomical and physiological division of sphincter mechanism, it is important to distinguish the role of the urethra in the retention of the urine. The urethra has two main roles:

1. To provide adequate continence mechanism (storage phase) and
2. To provide adequate bladder emptying with minimal resistance (voiding phase).

Male urethra has two main sphincter mechanisms:

- a) Proximal sphincter, which is composed of the bladder neck, prostate, prostatic urethra to the verumontanum (this part is removed when a radical prostatectomy is performed),
- b) Distal urethral mechanism, covering the apex of the prostate, distal urethra and the periurethral muscle structures comprised by the cylindrical rhabdosphincter and smooth muscle fibers of the proximal urethra. This

mechanism is very strong and provides continence after radical prostatectomy (8, 9).

According to the EUA Guidelines, Gleason score higher than 7 is not eligible for surgery and if there are distant metastases associated with local invasion, the patient is not suitable for radical prostatectomy and such patients are dismissed from this study (10).

In cases where the patient has undergone a radical prostatectomy (no matter of the surgical technique) the key role in maintaining continence switches from proximal to distal mechanism. The cause of postoperative incontinence is very different. It is even possible occurrence of “de novo” pathological process resulting with dysfunction of the bladder, but the most common reason is the loss of sphincter role of distal and proximal mechanism because of the surgical technique. In an attempt to find the most useful technique studies have showed the role of the passive continence which is especially reinforced with conservation of the neck of the bladder. Therefore numerous newly designed techniques had been used to preserve the proximal sphincter, to provide faster recuperation of the patients’ continence (11, 12, 13, 14).

The aim of this study is to assess the effect of the preservation of the internal sphincter and the bladder neck on the urine continence in patients who had gone through radical prostatectomy due to prostate cancer.

MATERIALS AND METHODS

This is a non-randomized study with retrospectively collected data from 69 patients. All patients underwent open (retropubic) radical prostatectomy because of the presence of histologically confirmed, localized prostate cancer in any of the listed clinical Stage (cT1-cT3N0M0). Determining factor, in which patients we will make preservation of the internal sphincter of the bladder neck and in which not, is the intra-operative finding, i.e. the presence of fibrous tissue periprostatically that changes the quality of the bladder wall. Of a total 69 patients, in 44 we did precise resection of the bladder neck with preservation of the internal sphincter, with the ultimate aim of improving the functional results (urinary continence) after radical prostatectomy. In 25 patients, the resection of the bladder neck was done without extensive conservation of the sphincter; this group of patients is used as a control group. All patients were operated in the period of 2014-2016 in the Department of Urology of the City General Hospital “September 8-th” Skopje by the surgical team with more than 10 years of experience in this field of surgery. Both groups of

patients included in this study are operated in the same time frame, only the control group patients were the prior operations and the examined ones were mostly in the later years of this time period. In all these patients there has been made an attempt to do nerve sparing, i.e. preservation of the is neuro-vascular bundle.

Preoperative staging and evaluation were performed according to the guidelines of the European Association of Urology. All patients included in the study were continent before surgery. Variables that are being examined are urinary continence after removing the catheter and erectile function in patients after the surgery.

The rates of complications after reconstruction of the bladder neck (strictures on the vesico-urethral anastomosis) were also analyzed. Because all the cases, the examined and the control group, have about the same incidence of the stricture and it usually occurs more than 1 year after the operation, we do not expect its impact on the final outcome of this study. There were no cases of acute and chronic urinary retention.

In the postoperative period the patients were examined, every 3 months: the 3th, 6th, 9th and 12th month. For the purposes of this study, patients were asked to answer to questionnaire ICIQ-UI-SF (15), which is standardized and translated in Macedonian language and is a shortened version of the long form for incontinence and disturbance of quality of life. We chose the shortened version because often patients complain and do not want to participate in studies if it requires too much engagement from their side.

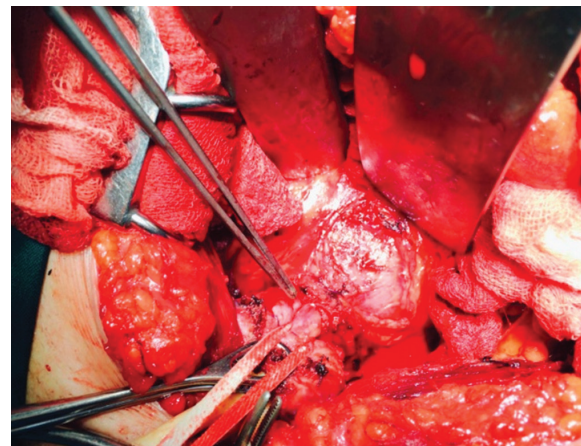
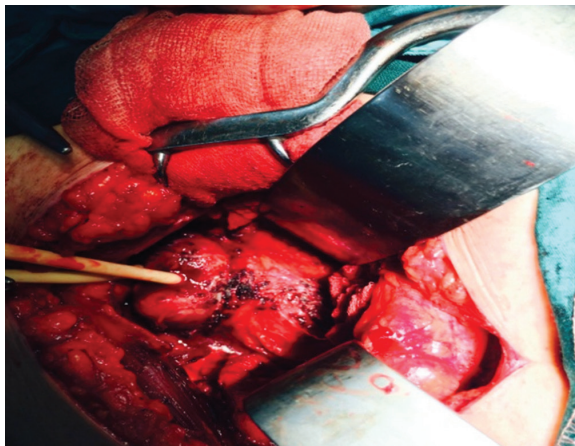
This questionnaire has a scoring system that ranges from 0-21 marks and is quite easy to use in everyday practice at the secondary and tertiary level, because it provides a quick and accurate assessment of how patients experience

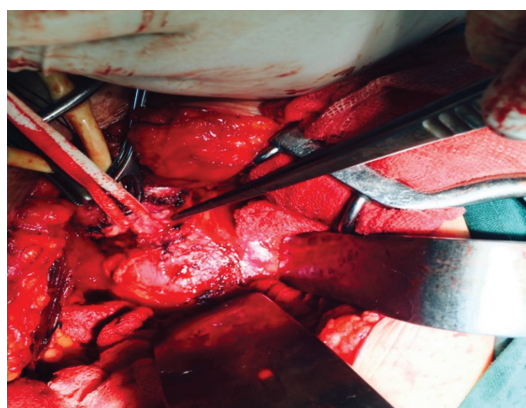
urinary incontinence and to what extent it is happening. Apart the ICIQ-UI questionnaire, patients answer to the IIEF-5 questionnaire for erectile dysfunction as well. Moreover, in each patient the standard postoperative care has been done. In the statistical analysis of these data is used Chi square test and the results showed significant difference (for $p < 0.05$) regarding the continence in the patients. As for the erectile function, the test showed no significance between the examined group and the control group ($p > 0.05$).

Description of the surgical method used in the study:

After liberating the prostate in a retrograde manner (apex release, dissection of the urethra, and retrograde dissection of the vascular loops) we continue to the prostate dissection near the bladder. This is the most important part of the procedure for the postoperative continence. The dissection has to be performed in such manner that the rhabdosphincter will not be detached of the bladder wall. This will allow the muscle fiber to heal in a more natural manner and the electrophysiology of the muscle will not be damaged. After this, eversion of the lining of the bladder is performed. Additional individual sutures, using Vicryl 2/0, can be set if there is need for reinforcement of the serosa of the bladder. This is the procedure which was performed in the experimental group. In the control group, however, because of the local finding, the neck of the bladder was very stratified and had to be reconstructed in a so-called "tennis racket" manner. This is done to ensure the realignment of the muscle fibers and the bladder neck. In all patients dull and sharp dissection was done to the neuro-vascular bundles without using electrocautery devices in order to leave the nerve endings intact. Vesico-urethral anastomosis is created with 6 individual sutures Vicryl 2/0 (picture 1).

Picture 1. Ivchev et al. Dissection of the bladder neck with preservation of the inner sphincter. A) top left- removal of the prostate, B) top right- preserved bladder neck with urethra C) bottom left- resection of the urethra and D) bottom right - preparing for the anastomotic stitches.





RESULTS:

Patients that had preserved inner sphincter mechanism and bladder neck during their radical prostatectomy, achieved continence much sooner, but the rate of continence in the examined and the control group both after 12 months remained unchanged (shown in figure 1 and 2).

Figure 1. The rate of continence in the examined group

Examined patients (total 44)	ICIQ points	Months of incontinence	ED points
1	10	3 - 6	4
2	0	3 - 6	4
3	0	3 - 6	4
4	0	0 - 3	4
5	6	0 - 3	4
6	15	>12	4
7	11	0 - 3	4
8	13	>12	4
9	4	0 - 3	4
10	0	0 - 3	4
11	0	0 - 3	4
12	0	0 - 3	4
13	0	0 - 3	4
14	0	0 - 3	4
15	9	6 - 9	4
16	8	3 - 6	4
17	16	>12	4
18	0	0 - 3	4
19	16	3 - 6	4
20	13	0 - 3	4
21	7	0 - 3	4
22	8	3 - 6	4
23	0	0 - 3	4
24	0	0 - 3	4
25	0	3 - 6	4
26	9	0 - 3	4
27	13	>12	4
28	15	>12	4
29	12	0 - 3	4
30	9	0 - 3	4
31	11	0 - 3	4
32	15	0 - 3	4
33	7	0 - 3	4
34	7	0 - 3	5
35	7	0 - 3	4
36	0	0 - 3	4
37	9	6 - 9	4
38	11	>12	4
39	9	0 - 3	8
40	4	0 - 3	10
41	6	6 - 9	4
42	0	6 - 9	4
43	8	0 - 3	12
44	4	0 - 3	10

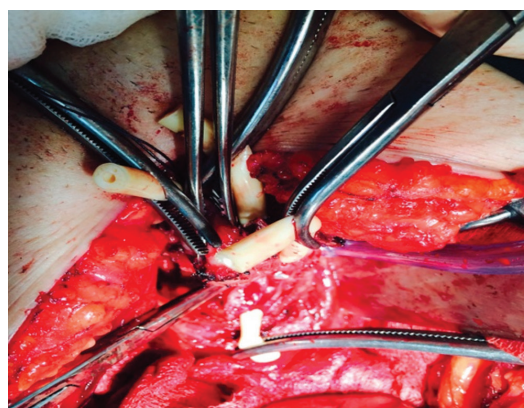
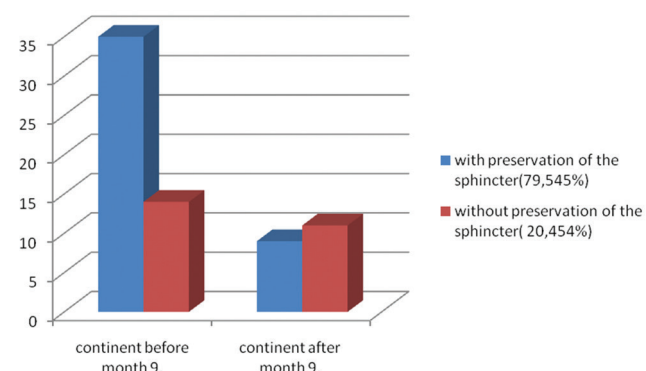


Figure 2. The rate of continence in the control group

Control group (total 25)	ICIQ points	Months of incontinence	ED points
1	0	0 - 3	4
2	10	>12	4
3	15	>12	4
4	14	>12	4
5	6	3 - 6	4
6	13	>12	4
7	0	0 - 3	4
8	0	6 - 9	9
9	0	>12	4
10	0	0 - 3	6
11	5	>12	4
12	6	0 - 3	4
13	14	>12	4
14	9	>12	4
15	0	0 - 3	4
16	7	>12	4
17	10	>12	4
18	5	0 - 3	11
19	5	6 - 9	4
20	0	0 - 3	4
21	5	6 - 9	4
22	14	>12	4
23	10	>12	4
24	6	0 - 3	6
25	9	6 - 9	4

The grade of incontinence till the 9-th month postoperatively was evidently lower in the examined group. Precisely 79.5% of the patients with preserved inner sphincter were continent before month 9, and only 20.4% of those without preservation of the bladder neck (shown in figure 3).

Figure 3. Contingency before and after 9 months. Results, Ivchev et al.



The rate of anastomotic stricture and erectile dysfunction remained unchanged. The careful preserving of internal sphincter and bladder neck shows that the remains of the internal sphincter makes passive closing mechanism that helps the continence in the patients till the distal sphincter takes over the control. This happens much later in the postoperative time due to the complexity of the distal sphincter.

DISCUSSION

Investigated in our study was the technique of preservation of the bladder neck during a prostatectomy. Many other techniques for the bladder neck exist, like tunelisation of the bladder neck using a circular stitching, intussusception of the bladder neck and plication of the bladder neck. The effectiveness of these techniques has not been confirmed in large prospective studies, although their use is rational from an anatomical point of view. Published long-term results are limited. Several studies mention the increased risk of complications associated with more aggressive techniques of reconstruction of the bladder neck. Possible explanation for the rapid restoration of continence is the presence of so-called proximal passive mechanism for closing the opening in the neck of the bladder.

In these limited follow-up period in some patients occurred strictures on the vesico-urethral anastomosis, but the rate is low. In addition, it can be said that the greatest risk of anastomotic stricture is present in the first postoperative year. In the opinion of some urologists, the area of the bladder neck after prostatectomy did not play a significant role in urinary continence. Proponents of this theory suggest that achieving continence is only a matter of time necessary for the distal sphincters that are quite complex to take the leading role. We believe that early after the surgery (up to 6 months) the mechanism of the passive proximal closure may be beneficial to the urinary control and can compensate at least partly from changes in abdominal pressure. Later, structural and functional correction of the distal sphincter is important in all patients because it can cause a significant difference in the rate of continence among the subjects examined after the 12th month of operation. The obvious limitation of our study may come only by the fact that although we are trying to do preservation of the neuro-vascular pedicle, objective way to prove how much of it is damaged or not, does not exist. Since we know that nerves play a big role in the quick

functional reconstruction of the sphincter mechanism, the preservation of the nerv bundle can be a reason for bias in the study.

CONCLUSION

Continence recuperates much faster in patients with preserved inner sphincter mechanism and bladder neck after radical prostatectomy. There is also evident reduction in the grade of remaining incontinence. The effect is insignificant after the 12-th postoperative month.

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УЛОГАТА НА ЗАЧУВУВАЊЕТО НА ВНАТРЕШНИОТ СФИНКТЕРЕН МЕХАНИЗАМ И ВРАТОТ НА МОЧНИОТ МЕУР ВО РАНОТО ВРАЌАЊЕ НА УРИНАРНАТА КОНТИНЕНТНОСТ ПРИ ИЗВЕДУВАЊЕ НА РАДИКАЛНА РЕТРОПУБИЧНА ПРОСТАТЕКТОМИЈА

Ивчев Ј., Чипуровски И., Стојаноски И.

Градска општа болница “8^{ми} Септември” Скопје, уролошко одделение

АБСТРАКТ

Цел: Да се процени улогата на зачувувањето на внатрешниот сфинктер на уринарната континентност кај пациенти кај кои е направена радикална простатектомија поради карцином на простатичната жлезда.

Материјал и методи: Отворена ретропубична простатектомија направена е кај 69 пациенти на уролошкото одделение, од кои кај 44 пациенти направено е внимателно зачувување на внатрешниот сфинктерен механизам на вратот на мочниот меур, а кај контролната група од 25 пациенти направена е операција без зачувување на внатрешниот сфинктер. Ретроспективно, го употребивме стандардниот меѓународен прашалник ICIQ-UI-SF и ПЕФ-5, кои беа преведени и адаптирани на наши услови. Сите пациенти беа оперирани во периодот од 2014 до 2015 година.

Резултати: Пациентите кои имаа зачуван внатрешен сфинктерен механизам и врат на мочниот меур за време на нивната радикална простатектомија, добија континентност многу порано, но стапката на континентност кај двете групи после 12 месеци остана непроменета. Степенот на инконтиненција се до 9-тиот месец постоперативно, беше евидентно понизок кај испитуваната група. Стапката на стриктури на местото на анастомозата и на еректилната дисфункција останаа непроменети.

Заклучок: Зачуваниот внатрешен сфинктер овозможува пасивен механизам на затворање кој ја помага континентноста кај пациентите се додека дисталниот сфинктер ја превземе контролата, што се случува многу покасно во постоперативниот период.

Клучни зборови: Инконтинентност, радикална простатектомија, внатрешен сфинктер.