CLINICAL SCIENCE

Influence of perineal prostatectomy on anal continence

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OBJECTIVE: Perineal prostatectomy has been proposed as a less invasive and safe procedure, but the risk of anal incontinence has been studied. This study aimed to evaluate the effects of perineal access on anal continence mechanisms after perineal prostatectomy.

METHODS: From August 2008 to May 2009, twenty three patients underwent perineal prostatectomy. These patients were evaluated before surgery and eight months postoperatively using the Cleveland Clinic Anal Incontinence Score, the Fecal Incontinence Quality of Life Score, and anorectal manometry.

RESULTS: The mean age of the subjects was 65 (range, 54-72) years, and the mean prostate weight was 34.5 (range, 24-54) grams. Gleason scores ranged from 6-7, and the mean Cleveland Clinic Anal Incontinence Score (mean $\pm$ standard deviation) values were 0.9 ± 1.9 and 0.7 ± 1.2 ($p > 0.05$) before and after surgery, respectively. The Fecal Incontinence Quality of Life Score did not change significantly after surgery. The mean values for anal manometric parameters before and after surgery were, respectively: Resting Pressures of 64 ± 23 mmHg and 65 ± 17 mmHg ($p = 0.763$), Maximum Squeezing Pressures of 130 ± 41 mmHg and 117 ± 40 mmHg ($p = 0.259$), High Pressure Zones of 3.0 ± 0.9 cm and 2.7 ± 0.8 cm ($p = 0.398$), Rectal Sensory Thresholds of 76 ± 25 ml and 71 ± 35 ml ($p = 0.539$), Maximum Tolerated Rectal Volumes of 157 ± 48 ml and 156 ± 56 ml ($p = 0.836$), and Sphincter Asymmetry Indexes $22.4 \pm 9\%$ and $14.4 \pm 5\%$ ($p = 0.003$).

CONCLUSION: There was a significant decrease in the sphincter symmetry index after perineal prostatectomy. With the exception of the sphincter asymmetry index, perineal prostatectomy did not affect anal continence parameters.

KEYWORDS: Anal incontinence; Anorectal manometry; Perineal prostatectomy; Prostate cancer.

Guilger NR, Jorge JMN, Costa RP, Salla FC, Teixeira MG, Nahas SC, et al. Influence of perineal prostatectomy on anal continence. Clinics. 2011;66(12):2007-2012.

Received for publication on May 19, 2011; **First review completed on** June 22, 2011; **Accepted for publication on** August 9, 2011

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INTRODUCTION

Prostate cancer is the second most common cancer worldwide, the sixth leading cause of cancer death. Seventy-five percent of cases are diagnosed after 65 years of age, and its diagnosis is increasing due to the diffusion of screening policies.[1-3] There are many surgical techniques to treat this disease. The balance between cost-effectiveness and adverse events occurring due to these different techniques is being studied in the literature. In this context, perineal prostatectomy is distinguished from other approaches; this technique is less invasive and is safe and effective without compromising oncologic principles.[4]

Perineal prostatectomy is less time consuming, results in less blood loss and a faster postoperative recovery time with a consequent reduction in hospital stay; thus, perineal prostatectomy is an effective surgical approach for the treatment of localized prostate cancer.[2] However, concerns remain regarding the effects of this technique on the anal sphincter mechanism and the development of incontinence.

The correlation between anal incontinence and perineal prostatectomy has been described by many authors based on clinical observations.[5-7] However, the correlation between this surgical approach and postoperative anal incontinence is still controversial. The use of a more standardized evaluation of the symptoms of anal incontinence that can be examined using anorectal manometry parameters, including sphincter asymmetry, may provide a better assessment of the effects of perineal access on the posterior pelvic floor compartment.[8]

Anal incontinence is the inability to exert voluntarily control over the release of gas and stool. Anal continence is preserved by complex mechanisms that involve the volume and consistency of stool, rectal capacity and compliance,

No potential conflict of interest was reported.

rectal sensitivity, and the anatomical and functional integrity of the anal sphincter and pelvic floor muscles. This complex interaction of mechanisms is also affected by other individual characteristics and behaviors.[9]

Vector volume analysis allows the visualization of the pressure conformation in the anal canal, and a high sphincter asymmetry index has been associated with sphincter defects and anal incontinence.[9,10] The sphincter asymmetry index is based on an evaluation of the radial distribution of pressure along the anal canal. This parameter has primarily been used for research purposes, and it was first used to demonstrate anatomical sphincter disruption.[11-13] This index has subsequently been used to evaluate continence status after different therapeutic procedures.[8,14]

The prevalence of anal incontinence in the elderly population is approximately 11%, and the most important risk factor for this disorder is age.[15] Anal incontinence has a negative impact on a patient's confidence, self-image and social life, which contributes to the development of depressive symptoms.[16] The aim of this study was to evaluate the effects of perineal access on anal continence mechanisms after perineal prostatectomy.

METHODS

Overall study design and setting

A prospective before-after study[17] was conducted to evaluate anal incontinence in patients with prostate cancer. All patients were sequentially selected in July 2008 and all perineal prostatectomy performed in the period between August 2008 to October 2008 at Fundação Amaral Carvalho. The procedures were performed by the same surgeon. Before surgery and eight months after surgery, a clinical evacuation evaluation, including the Cleveland Clinic Incontinence Score (CCIS),[9] the Fecal Incontinence Quality of Life Score (FIQLS),[18] and anorectal manometry,[19] was used for the assessment. This study was approved by the Ethics Committee in Research of the two participating institutions, the Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, São Paulo, SP and Fundação Amaral Carvalho, Jaú, SP. Informed written consent was obtained from all volunteers.

Sampling and subjects

Patients with previous perineal and anorectal diseases and anal surgery were excluded. All consecutive patients who were diagnosed with prostate cancer and indications[20] for perineal prostatectomy were evaluated and underwent surgical procedures using the same standardized technique[20,21] with the same team of urologists at Fundação Amaral Carvalho, Jaú, SP.

Measures

All patients were evaluated using the clinical evacuation examination, CCIS,[9] FIQLS,[22] and anorectal manometry[19] before surgery and eight months after surgery. The period of eight months after surgery was chosen based on previous studies to ensure that transitory symptoms would not be overestimated.[22] All parameters were assessed by the same researcher. Anal incontinence was considered to be mild for a CCIS of 1-8 and moderate/severe for a CCIS greater than 9; an index of zero corresponds to complete continence.

Anorectal manometry

Anorectal manometry was performed using an 8-channel water perfusion system (Dynamed® model Dynapack II Slim; ProctoMaster version 7.0 software). A flexible plastic catheter with a diameter of 0.8 cm was used as a probe. The catheter contained eight channels that were radially distributed; each channel was perfused with distilled water at a constant flow rate of 0.56 ml/minute/channel using a pneumo-hydraulic system with hybrid nitrogen and electric propulsion. Channel one was positioned posterior to the anal canal (zero degree), and the other channels were sequentially positioned clockwise.

The following parameters were evaluated: resting pressure (mmHg), maximum squeeze pressure (mmHg), high pressure zone (cm), fatigue rate (mmHg/min), fatigue rate index (min), sphincter asymmetry index (%), rectoanal inhibitory reflex, rectal sensory threshold (ml), and maximum tolerated rectal volume or capacity (ml). Pressure parameters were collected during intermittent catheter withdrawal 6.0 to 1.0 cm from the anal verge. The functional anal canal length comprised the extent of pressures equal to or greater than 50% of the highest mean value that was achieved among the eight channels at the same level. The catheter was placed 2 cm from the anal verge to evaluate the sustained voluntary contraction and the Resting Anal Inhibitory Reflex (RAIR) test. Finally, the catheter was placed and moved 6.0 cm from the anal verge, and the rectal sensitivity and capacity were evaluated by inflating the balloon with water at room temperature. Rectal sensitivity was considered to be the minimum amount of liquid that was perceived by the patient, and the maximum tolerated capacity was considered to be the maximum amount of liquid tolerated before an urge to defecate occurred.

Statistical analyses

Fisher and McNemar tests were employed to analyze qualitative variables. Quantitative variables were analyzed using the Student's t-test and the paired-sample Wilcoxon test. A sample size of 18 patients undergoing perineal prostatectomy provide an 85% power to detect 15-mmHg and 1-point differences in the resting pressure and the FIQLS and incontinence index scores, respectively, before and after surgery. A two-tailed significance level of 0.05 was considered to be statistically significant.

RESULTS

A total of 30 consecutive patients with prostate cancer and indications for perineal prostatectomy completed the preoperative evaluation from May to July 2008. However, one patient underwent a retropubic prostatectomy, and two patients were submitted to radiotherapy. These three patients were excluded from the study. Postoperative evaluations were performed approximately eight months after surgery. Four patients did not attend the postoperative evaluation, and consequently, 23 patients completed all of the steps of the postoperative evaluation.

Thus, this study was conducted in 23 patients with a mean age of 66 years (range, 54-72) years, a mean prostate-specific antigen value of 8.8 ng/ml (range, 3.6 to 22.1 ng/ml), a mean Gleason Score of 6 (range 6-7) and a mean prostate weight at ultrasound of 34.4 g (range, 24-54 g). The patients reported no change in anal continence after early post-operative perineal prostatectomy.

The pre- and postoperative mean CCIS were, respectively: total scores of 0.9 and 0.7 ($p = 0.774$), incontinence to gas values of 0.17 and 0.4 ($p = 0.257$), incontinence to liquid stool scores of 0.57 and 0.26 ($p = 0.083$), incontinence to solid stool scores of 0 and 0 ($p = 1.0$), wearing of a pad scores of 0.04 and 0 ($p = 0.317$) and lifestyle alteration scores of 0.09 and 0 ($p = 0.317$) (Figure 1). The prevalence of anal incontinence before and after surgery was 48% and 35%, respectively, using the index of anal incontinence (CCIS). These values were not significantly different based on the McNemar test ($p = 0.508$).

The pre- and postoperative values of the FIQLS domains, respectively, were,as follows: depression values of 3.8 and 3.5 ($p = 0.737$), lifestyle scores of 3.9 and 4 ($p = 0.256$), behavior scores of 3.7 and 3.6 ($p = 0.8$) and constraint scores of 3.9 and 3.8 ($p = 0.671$) (Figure 2).

The pre- and postoperative values of manometric parameters were, respectively: resting pressures of 64 ± 23 mmHg and 65 ± 17 mmHg ($p = 0.763$) (Figure 3), maximum squeezing pressures of 130 ± 41 mmHg and 117 ± 40 mmHg ($p = 0.259$), high pressure zones of 3.0 ± 0.9 cm and 2.7 ± 0.8 cm ($p = 0.398$), fatigue rate ($p = 0.754$) and fatigue rate index ($p = 0.438$), anorectal reflexes present in 78% (18 patients) and 82% (19 patients) ($p = 0.398$), rectal sensitivity thresholds of 76 ± 25 ml and 71 ± 35 ml ($p = 0.539$) and maximum tolerated rectal volumes of 157 ± 48 ml and 156 ± 56 ml ($p = 0.836$) (Table 1).

However, the sphincter asymmetry index was significantly decreased after surgery. The pre- and postoperative index values were $22.4 \pm 9.1\%$ and $14.4 \pm 4.5\%$ ($p = 0.003$), respectively (Figure 4).

DISCUSSION

We found that perineal prostatectomy did not affect anal continence or quality of life in this subset of patients. This disease is socially stigmatized and an active investigation of patients who are at risk of this complication is crucial to its diagnosis.[23,24]

Bishoff et al.[5] were the first to note the potential association between perineal prostatectomy and anal incontinence. According to these authors, the prevalence of anal incontinence after perineal prostatectomy ranged from 8% to 16%. However, an important limitation of this study was that there were no records of clinical complaints regarding anal incontinence before surgery.[5] This bias may lead to the conclusion that perineal prostatectomy promoted anal incontinence. These earlier studies also detected that even patients who had severe symptoms and impaired quality of life only revealed their symptoms when actively asked by the physician.[5,6] It was emphasized that urologists must be aware of anal incontinence symptoms during anamnesis and should appropriately inform patients about the potential risks of these complications.[9,16,25]

Dahm et al.[6] have demonstrated that there is a significant correlation between perineal surgery and anal incontinence symptoms; however, most of these symptoms were transitory. In 2004, Korman et al.[7] published the results of a validated bowel function domain questionnaire (University of Michigan) that was expanded to the Prostate Cancer Index Composite (EPIC) and applied to patients who underwent perineal and retropubic prostatectomy. The authors used patients who underwent prostate biopsy as a control group. There was no clinical difference between groups in terms of bowel control, fecal incontinence, rectal urgency, and global bowel function, which varied from 4.8% to 6.4%.[6] Kirschner et al.[26] found that 6% of the studied patients presented with anal incontinence and a decreased quality of life before perineal prostatectomy.

The real prevalence of anal incontinence in the general population remains unknown. The results that are available are only estimated values because no standardized scores or specific scales for incontinence have been used. In the present study, most patients presented with mild symptoms, these results demonstrate the sensitivity of the applied instruments, which permits the detection of early forms of anal incontinence before its clinical features or the need for treatment of symptoms manifest.

The present study validated the use of the Anal Incontinence Score (CCIS) not only in the quantification of clinical symptoms but also as a tool for the early detection of symptoms of anal incontinence. This instrument can be helpful as an aid to improve a patient's knowledge of the symptoms of anal incontinence before the disease has a greater impact on their quality of life.

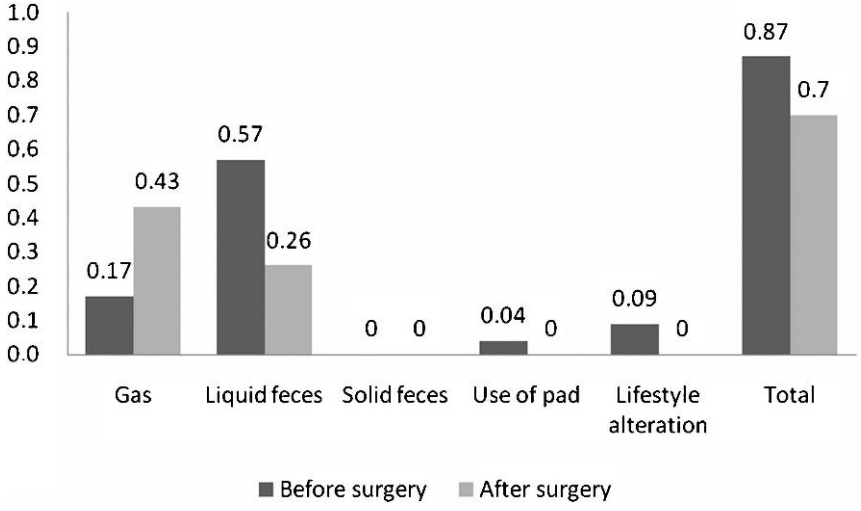

Figure 1 - Comparative analyses of Cleveland Clinic Anal Incontinence Index scores before and after perineal prostatectomy.

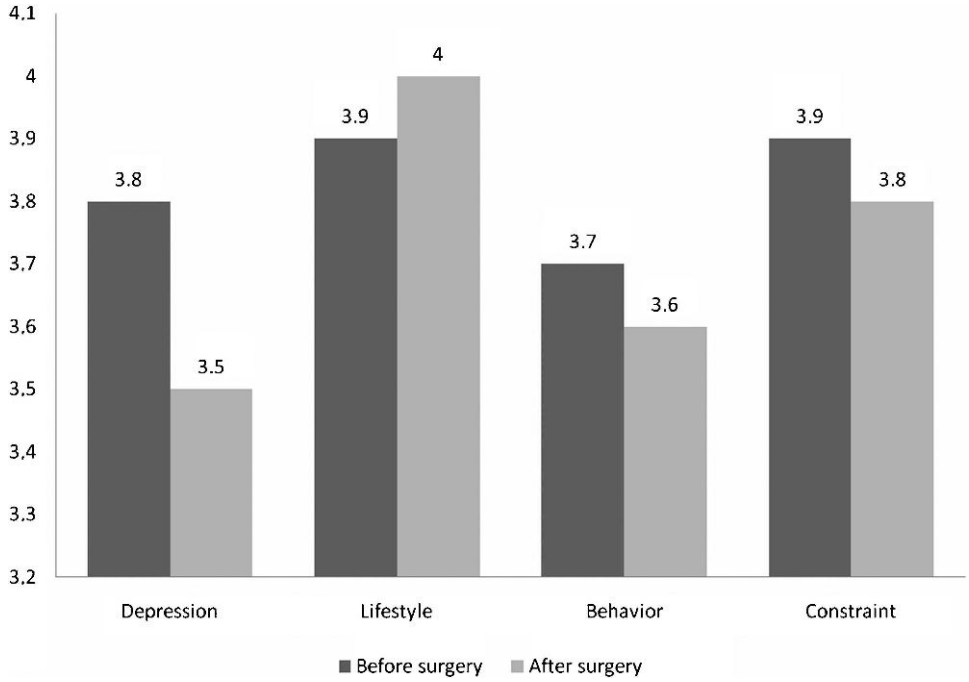

Figure 2 - Comparative analyses of Fecal Incontinence Quality of Life Scores before and after perineal prostatectomy.

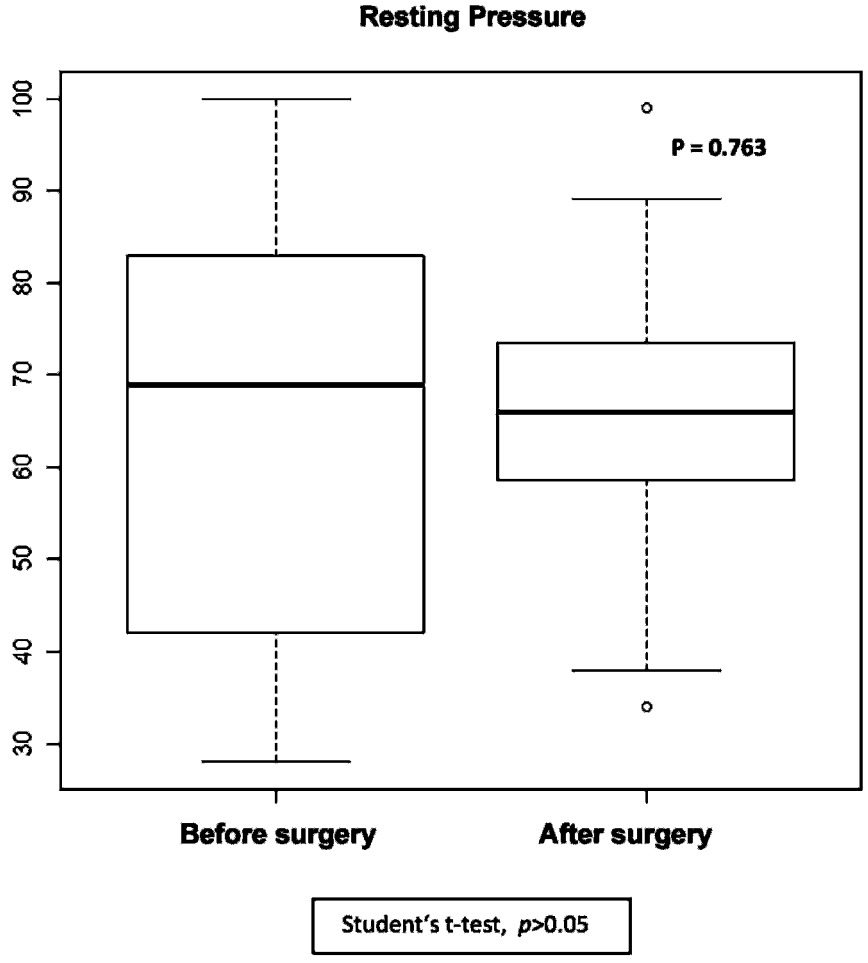

Figure 3 - Resting pressure before and after surgery in 23 patients who underwent perineal prostatectomy.

Table 1 - Anorectal manometry parameters in patients before and after perineal prostatectomy.

	Mean		Median		Standard Deviation		Minimum		Maximum		*p*-value*
	Before	After	Before	After	Before	After	Before	After	Before	After	
High pressure zone (cm)	3	2.7	3	3	1	0.8	1	1	5	4	0.398
Resting pressure (mmHg)	63.7	64.9	69	66	22.5	16.7	28	34	100	99	0.763
Maximum squeezing pressure (mmHg)	129.7	116.9	130	118	41.4	40.4	36	23	198	190	0.165
Fatigue rate (mmHg/min)	-46.6	-56.6	-34.9	-27.4	44.3	49.8	-161	-163	-28	-94	0.754
Fatigue rate index (min)	3	2.1	1.49	1.62	11.2	5.4	-16	-12	-54	-21	0.438
Sphincter asymmetry index (%)	22.4	14.4	20	14.7	9.1	4.5	9	7	46	18	0.003
Rectal sensitivity threshold (ml)	76	72	70	60	24.7	35.2	30	20	120	160	0.539
Rectal capacity (ml)	158	156	150	150	48	56	80	80	140	140	0.836

*Student's t-test and paired-sample Wilcoxon test.

There was no change in quality of life in relation to anal continence when the pre- and postoperative results of patients who underwent a radical perineal prostatectomy were compared. Therefore, the Anal Incontinence Index[9] and Fecal Incontinence Quality of Life questionnaire[18] enhanced the sensitivity of our evaluation and provide a more accurate evaluation of anal incontinence in the studied patients because both instruments have been validated and are recognized worldwide.

The anal canal is a naturally asymmetrical structure, especially considering the force vectors involved.[27-29] These force vectors are related to the distribution of the anal canal muscles and other structures, including the submucosa hemorrhoidal plexus. [29,30,31] However, a high sphincter

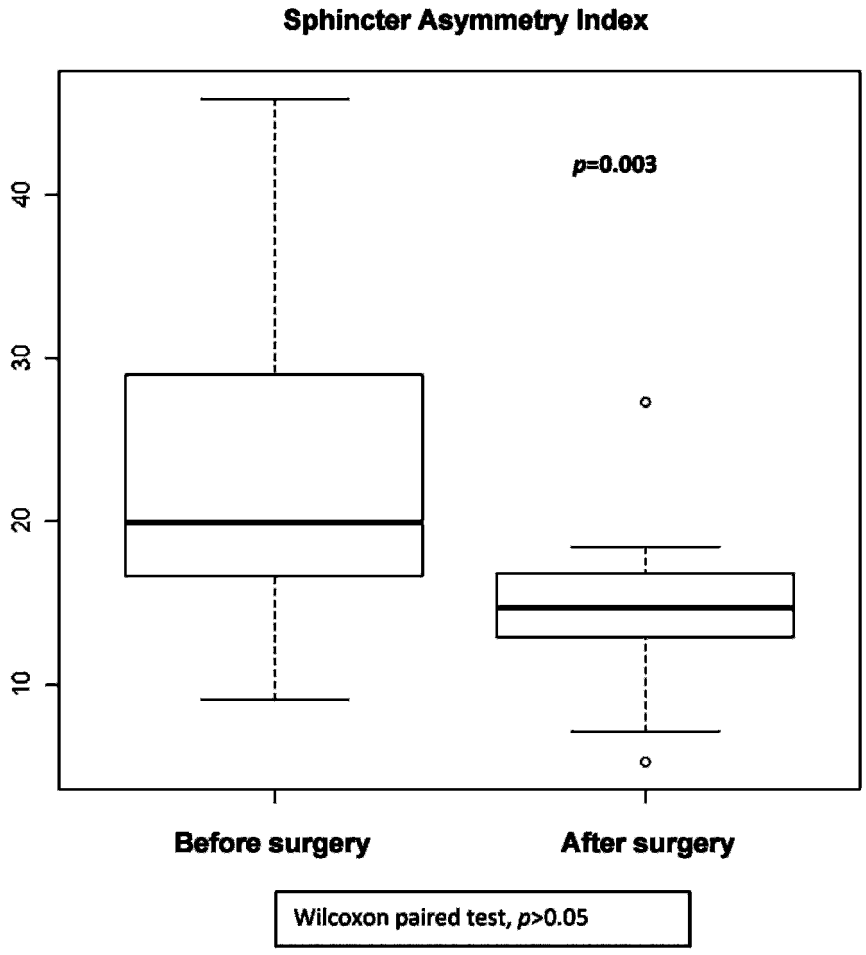

Figure 4 - Sphincter Asymmetry Index scores before and after surgery in 23 patients who underwent perineal prostatectomy.

asymmetry index has been associated with anal incontinence.[10,13]

There was no significant statistical change in anal pressure parameters after perineal prostatectomy. The only change noted was an improvement in the sphincter asymmetry index, and this finding may be related to the integral theory of the pelvic floor. This theory states that the involvement of anterior, medium and posterior pelvic floor compartments and the interrelation of its structures and organs with the pelvic fascia and ligaments are important in anal continence.[31-33]

In a perineal prostatectomy, structures important to the maintenance of the posterior pelvic floor dynamic are divided, including the rectouretheral muscle, the perineal body, and the *centrum tendineum*. Therefore, some aspects in the configuration of both the rectum and the anal canal may change.[32-36] One step in the perineal prostatectomy consists of perineal reconstruction and perineal body reattachment. Although visually imperceptible, this technical approach may have contributed to the change in reading patterns of sphincter asymmetry without a change in the absolute resting pressure values.

The improvement in anal canal symmetry may support the integral theory of the pelvic floor and the role of fibrosis and reattachment of the perineal body in anal continence.[32,33] This finding may be of value in further studies in the identification of beneficial technical approaches during perineal surgery that may prevent anal incontinence.

AUTHOR CONTRIBUTIONS

Guilger NR gathered the material and developed the discussion. Jorge JMN developed the statistical and discussion. Costa RP recruited patients. Teixeira MG drafted the article. Nahas S revised the article. Cecconello I revised the discussion of the article.

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