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## Prostate operations: long-term effects on sexual and urinary function and quality of life. Comparison with an age-matched control population

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**Abstract** The purpose of this study was to investigate the effects of radical prostatectomy (RP) for prostate cancer, transurethral resection of the prostate (TURP) for benign prostate hyperplasia (BPH), and the alterations induced by ageing on quality of life, urinary and sexual function, and bother. We evaluated 283 patients who filled in and returned the questionnaire used. A total of 105 were treated with RP and were selected prostate cancer patients with localised disease without recurrences. An additional 98 underwent TURP for BPH and a third group consisted of 80 apparently healthy men. The general quality of life was estimated by the Rand 36-Item Health Survey 1.0. Urinary function was estimated by the AUA Symptom Index and the UCLA Prostate Cancer Index (urinary function and bother scale). Sexual function and bother, were explored using the Brief Male Sexual Function Inventory for Urology. Patient outcome 2 years post treatment was compared to the pre-treatment status and to that of the matched control population. General quality of life was not affected by RP or TURP, with the exception of an increase in the emotional/well being domain in RP patients to control group levels. After RP there was more bother reported for the urinary function than urinary malfunction itself, while TURP, as expected, restored urinary function and bother to normal population norms. Elderly males had urinary function and bother similar to the operated patients. Estimating sexual function on RP patients, erectile dysfunction (ED) predominates, leading to decreased sexual life. TURP marginally affects sexual life, mainly due to the loss of ejaculation, while in men from the control group, sexual function, although affected, was still present.

**Keywords** Quality of life · Radical prostatectomy · TURP · Aging male

### Introduction

After the age of 50, the prostate exhibits a marked propensity for pathologic behaviour. Lower urinary tract symptoms (LUTS) increase with age, and although conservative therapy can help, surgery is often needed. Prostate cancer incidence also increases with age and even if conservative management is possible, radical surgery is often indicated. Because of the prostate's anatomical position and its close proximity to important structures such as the neurovascular bundles and the internal and external urinary sphincters, its removal can significantly affect both urinary and sexual functions and therefore lead to a deterioration in the patient's quality of life (QoL).

Transurethral resection of the prostate (TURP) can change the patient's QoL for psychological reasons [1], or due to ejaculation disorders [2, 3, 4], while radical prostatectomy (RP) can do so by causing impotence and/or incontinence [5, 6]. Nevertheless, LUTS and sexual dysfunction can also occur as a consequence of aging and therefore influence the QoL as well.

In this study, we compared the changes in general QoL, as well as sexual and urinary function, induced by TURP for benign prostatic hyperplasia (BPH) and radical retropubic prostatectomy (RRP) for prostate cancer.

### Materials and methods

A total of 441 patients were evaluated. They were divided into three groups: group 1 comprised 142 patients treated with nerve sparing radical prostatectomy for clinically and pathologically localized prostate cancer (PSA < 10 ng/ml, Gleason score < 7, pT2NoMo). Group 2 included 151 consecutive patients treated with TURP for BPH, and group 3 consisted of 148 healthy elderly men with no obvious prostate cancer (by rectal examination and PSA), selected from national health registers. Patients responded to a

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self-administered questionnaire twice. Once 2 weeks before the procedure and then 2 years following the operation. The healthy men received the questionnaire once. All participants received the questionnaires through regular mail.

This questionnaire was a combination of the Rand 36-Item Health Survey 1.0 [7], the University of California Los Angeles Prostate Cancer Index (UCLA PCI) [8], the American Urological Association Symptom Index (AUA SI) [9] and the Brief Male Sexual Function Inventory for Urology (BMSFI) [10]. These questionnaires evaluate general QoL, urinary leakage, urinary obstruction and sexual dysfunction, respectively. They were translated into Greek, validated and have been used by our and other departments in several studies.

The Rand 36-Item Health Survey 1.0 is scored on an overall scale of 0–100 points, with higher values representing better outcomes. Values from each of the eight scales evaluated (physical function, social function, body pain, emotional well-being, energy/fatigue, general health perceptions, role limitations due to physical problems and role limitations due to emotional problems) are averaged together to create the eight scaled scores.

The UCLA PCI urinary scale is scored on a scale of 0–100 points with higher values representing better outcomes. For both this and the Rand 36 questionnaires, a difference of 5–10 points is considered clinically important [11]. The AUA SI is scored on a scale of 0–35, with higher scores corresponding to worse outcomes. It was used to evaluate urinary obstruction more accurately. Incontinence was defined as the leakage of a few drops of urine daily needing only a pad for protection.

The BMSFI is scored on a 5-point scale of 0 to 4. Higher scores correspond to better outcomes. The final score is the sum of the score in each domain.

#### Statistical analysis

Group comparisons were made using one way analysis of variance. Pair wise group comparisons were made, adjusting for multiple comparisons, using the post hoc test (Bonferroni). The comparison of the variables with an irregular distribution was made using the Kruskal-Wallis test ( $\chi^2$ ). The mean, SD, the  $F$  function or  $\chi^2$  value and the probability ( $P$ ), were also calculated.

Correlation coefficients were derived using the Pearson correlation analysis. The correlation coefficient ( $r$ ), the coefficient of determination ( $r^2$ ) and the probability ( $P$ ) were calculated.

## Results

Initially, 441 patients were enrolled to participate in the study. In group 1, nine patients (6.3%) presented recurrence, two (1.4%) died from unrelated causes and 26 patients (18.3%) did not respond to our invitation to participate. In group 2, four (2.6%) patients died from unrelated causes and 49 (32.5%) did not return our questionnaires. Finally, in group 3, 68 patients (45.9%) did not respond to our invitation to participate in the study. Therefore, in group 1, 105 patients completed both questionnaires and were found negative for disease recurrence during follow up (PSAng/ml). In groups 2 and 3, 98 and 80 participants, respectively, answered and returned both questionnaires. Thus, a total of 283 people participated. The mean age of the three groups was, respectively, 67.4 (range 55–75), 70.3 (range 58–74) and 72.4 years (62–80). Age differences between the groups were not significant.

General QoL, as estimated by the Rand-36 questionnaire in RP and TURP patients at baseline and 2 years post treatment, is presented in Table 1. The only domain found to be statistically different 2 years after treatment was that of emotional well being, which had improved in RP patients 2 years after surgery (50.3 vs 62.9,  $P=0.001$ ). Patients treated with TURP did not express significant changes in their general QoL after surgery.

General QoL after surgery was compared between the age matched population control group and the two intervention groups. Mean values for each domain of QoL for all groups are presented in Table 2. No statistically significant differences were observed between the two intervention groups and the age matched control group.

Results from the UCLA PCI questionnaire, the AUA SI score and the BMSFI for the RP and TURP patient

**Table 1** Quality of life (QoL) outcome before and 2 years after surgery. (\*  $P=0.001$ )

HRQOL scale	Radical prostatectomy		TURP	
	Baseline	Post-treatment	Baseline	Post-treatment
Physical functioning	83.1	81.5	77.5	78.1
Role functioning/physical	78.1	76.1	78.1	80.3
Role functioning/emotional	73.8	77.2	75.9	77.2
Energy/fatigue	71.0	66.9	61.0	63.4
Emotional well-being	50.3	62.9*	58.8	59.9
Social functioning	90.1	88.5	82.1	85.3
Pain	88.8	90.4	83.1	86.1
General health	60	56.8	63.2	61

**Table 2** Mean values for each domain of QoL 2 years post-treatment for the three study groups as estimated by RAND 36 score (a higher score corresponds to better QoL)

HRQOL scale	Radical prostatectomy	TURP	Control	$P$
Physical functioning	81.5	78.1	82.3	0.255
Role functioning/physical	76.1	80.3	79.7	0.534
Role functioning/emotional	77.2	77.2	73.4	0.350
Energy/fatigue	66.9	63.4	67.1	0.321
Emotional well being	62.9	59.9	63.3	0.707
Social functioning	88.5	85.3	88.2	0.558
Pain	90.4	86.1	85.8	0.089
General health	56.8	61.0	59.1	0.800

groups before and 2 years after surgery are shown in Table 3. RP patients had a trend towards worse urinary function 2 years after surgery (UCLA urinary function, leakage, domain: 85.1 vs 80.2,  $P=0.121$ ), but the difference was not significant. On the other hand, urinary bother significantly deteriorated (85.1 vs 70.6,  $P=0.021$ ). When evaluated by the AUA SI (obstruction), urinary function seems to improve, but not significantly (11.1 vs

8.6,  $P=0.812$ ). An improvement of urinary function in TURP patients after surgery is evident in both questionnaires (UCLA PCI urinary function, leakage, domain: 71.2 vs 87.3,  $P=0.005$ , AUA SI, obstruction: 24.2 vs 8.2,  $P=0.001$ ), and bother is also less (UCLA urinary bother 65.1 vs 80.2,  $P=0.003$ ) (Table 3).

In Table 4, incontinence rates before and after RP and TURP, as well as the percentage of patients with

**Table 3** Radical prostatectomy and TURP outcome. Results of the UCLA questionnaire, the AUA score and the Brief Male Sexual Function Inventory (BMSFI) for the TURP and RP before and 2 years after surgery. (\* all together form the sexual function domain)

UCLA PCI	Radical prostatectomy		TURP			
	Pre-treatment	Post-treatment	<i>P</i>	Pre-treatment	Post-treatment	<i>P</i>
Urinary function	85.1	80.2	0.121	71.2	87.3	0.005
Urinary bother	85.1	70.6	0.021	65.1	80.2	0.003
AUA SI	11.1	8.6	0.812	24.2	8.2	0.001
BMSFI						
Sexual drive*	4.5	4.4	0.525	4.3	4.1	0.244
Erections*	7.3	1.6	0.002	5.8	5.3	0.211
Ejaculations*	6.2	0	–	6.0	3.3	0.002
Libido bother	3.1	2.8	0.825	3.4	3.2	0.351
Erection bother	3.3	1.9	0.033	3.0	2.7	0.312
Ejaculation bother	3.0	2.4	0.063	3.0	1.8	0.041
Overall satisfaction	3.2	1.3	0.007	2.8	2.0	0.050

**Table 4** Problem assessment before and 2 years after surgery for RP and TURP patients

	Radical prostatectomy		TURP	
	Baseline	Post-treatment	Baseline	Post-treatment
Incontinence (leaking urine every day)	2%	9%	12%	2.78%
Urinary bother				
No/small problem	97.0%	78.2%	59.8%	93.2%
Middle problem	2.0%	12.5%	25.2%	5.5%
Big problem	1.0%	9.3%	15.0%	1.3%
Libido				
Not at all	3.1%	7.3%	5.1%	8.2%
Sometimes	31.6%	42.1%	54.2%	50.7%
Often	65.3	50.6	40.7	41.1
Erections (firm enough for intercourse)				
Never	5.0%	75.2%	30.0%	30.9%
Occasionally	29.7%	19.5%	31.2%	24.4%
Usually/always	65.3%	5.3%	38.8%	44.7%
Ejaculation				
Not at all	1.1%	100.0%	32.3%	58.5%
With difficulty	20.2%	0.0%	19.2%	20.5%
No problem	78.7%	0.0%	48.5%	21.0%
Bother libido				
Big problem	3.9%	5.3%	3.1%	5.3%
Small problem	33.1%	39.1%	30.1%	31.5%
No problem	63.0%	55.6%	66.8%	63.2%
Bother erections				
Big problem	2.2%	46.3%	2.8%	5.3%
Small problem	21.8%	27.4%	31.2%	42.1%
No problem	76.0%	26.3%	66.0%	52.6%
Bother ejaculation				
Big problem	1.1%	3.6%	5.8%	50.3%
Small problem	22.1%	28.1%	31.2%	37.4%
No problem	76.8%	68.3%	63.0%	12.3%
Overall bother				
Big problem	9.8%	63.2%	14.1%	61.3%
Small problem	33.2%	26.3%	30.8%	23.5%
No problem	57.0%	10.5%	55.1%	15.2%

associated bother, are tabulated. Incontinence after RP increased from 2 to 9% ( $P=0.002$ ) after the operation, as did the percentage of patients that experienced bother from this incontinence (3% vs 21.8%,  $P=0.001$ ). For TURP patients, incontinence decreased (12% vs 2.78%,  $P=0.002$ ) as did the associated percentage of patients that expressed bother (40.2% vs 6.8%,  $P=0.001$ ) (Table 4).

In Table 5, urinary function and bother rates after TURP and RP are compared to the control group. Urinary function did not differ between RP patients and the patients in the control group (80.2 vs 85.4,

$P=0.115$ ). Similarly, urinary function after TURP was equivalent to the control group (87.3 vs 85.4,  $P=0.249$ ). When urinary function was evaluated by the AUA SI, patients treated with RP and TURP did not differ from the control group (8.6 vs 9.2,  $P=0.327$  and 8.2 vs 9.1,  $P=0.123$ ). Urinary bother from the UCLA PCI questionnaire deteriorated significantly in RP patients compared to the control population (70.6 vs 84.2,  $P=0.021$ ), but was similar between the TURP and control groups (80.2 vs 84.2,  $P=0.549$ ).

In Table 4, incontinence rates and the percentage of patients with corresponding postoperative urinary

**Table 5** Postoperative outcome and age-matched control population. Results of the UCLA questionnaire, the AUA score and the BMSFI. (\* = consist sexual function domain)

UCLA PCI	RP	TURP	Control group	$P$ RP vs control	$P$ TURP vs control
Urinary function	80.2	87.36	85.4	0.115	0.249
Urinary bother	70.6	80.2	84.2	0.021	0.549
AUA SI	8.6	8.2	9.2	0.327	0.123
BMSFI					
Sexual drive*	4.4	4.1	4.8	0.343	0.436
Erections*	1.6	5.3	5.9	0.003	0.346
Ejaculations*	0	3.3	5.2	—	0.002
Libido bother	2.8	3.2	3.0	0.614	0.377
Erection bother	1.9	2.7	3.3	0.014	0.355
Ejaculation bother	2.4	1.8	3.3	0.05	0.030
Overall satisfaction	1.3	2.0	2.6	0.010	0.510

**Table 6** Problem assessment in the three different groups

	Radical prostatectomy	TURP	Control
Incontinence (leaking urine every day)	9%	2.78%	5.78%
Urinary bother			
No/small problem	78.2%	93.2%	89.0%
Middle problem	12.5%	5.5%	7.2%
Big problem	9.3%	1.3%	3.8%
Libido			
Not at all	7.3%	8.2%	11.2%
Sometimes	42.1%	50.7%	44.4%
Often	50.6%	41.1%	44.4%
Erections (firm enough for intercourse)			
Never	75.2%	30.9%	27.2%
Occasionally	19.5%	24.4%	19.7%
Usually/always	5.3%	44.7%	53.1%
Ejaculation			
Not at all	100.0%	58.5%	66.6%
With difficulty	0.0%	20.5%	16.7%
No problem	0.0%	21.0%	16.7%
Bother libido			
Big problem	5.3%	5.3%	3.5%
Small problem	39.1%	31.5%	35.3%
No problem	55.6%	63.2%	61.2%
Bother erections			
Big problem	46.3%	5.3%	3.7%
Small problem	36.9%	27.4%	42.1%
No problem	26.3%	52.6%	59.4%
Bother ejaculation			
Big problem	3.6%	50.3%	4.8%
Small problem	28.1%	37.4%	23.3%
No problem	68.3%	12.3%	71.9%
Overall bother			
Big problem	63.2%	61.3%	12.3%
Small problem	26.3%	23.5%	37.7%
No problem	10.5%	15.2%	50.0%

bother are compared to the control group. Incontinence in the control population was 5.78%, which was not statistically different from the other two groups. Moreover, more patients expressed bother after RP compared to the control population (21.8% vs 11%,  $P=0.002$ ) than did patients after TURP when compared to men of similar age (6.8% vs 11%,  $P=0.1$ ).

When evaluating the BMSFI questionnaires before and after surgery (Table 3), RP patients had unaffected libidos (4.5 vs 4.4,  $P=0.525$ ) since 92.6% of patients 2 years post surgery still expressed sexual desire (Table 4). On the other hand, the ability to have an erection was seriously affected after surgery (7.3 vs 1.6,  $P=0.002$ ), since of the 95% of patients who reported having an erection before surgery, only 24.8% continued to have one after RP ( $P=0.002$ ). Ejaculation was of course absent after RP. Bother regarding libido did not differ postoperatively (3.1 vs 2.8,  $P=0.825$ ), with 94.7% of patients after RP considering its absence as a “small or no problem at all” (Tables 3, 4). Losing the ability to have an erection bothered patients more (3.3 vs 1.9,  $P=0.033$ ), since 46.3% considered this a “big problem” after RP, when compared to the 2.2% before surgery. Loss of ejaculation did not bother patients (3.0 vs 2.4,  $P=0.063$ ), since 99% before and 96.4% after RP considered it as a “small or no problem at all”. Overall satisfaction with their sexual life decreased after RP (3.2 vs 1.3,  $P=0.007$ ), since 63.2% considered the impairment of sexual function as a big problem, compared with the 9.8% concerned before the operation.

TURP did not affect erection (5.8 vs 5.3,  $P=0.211$ ) (Tables 3, 4) or sexual drive (4.3 vs 4.1,  $P=0.244$ ), but it did effect ejaculation (6.0 vs 3.3,  $P=0.002$ ) since 58.5% reported a complete absence of ejaculation post-treatment. Bother from the loss of this function was considered to be a “big problem” in 50% of patients, which was significantly higher than the 5.8% present at baseline (3.0 vs 1.8,  $P=0.041$ ). Bother regarding libido (3.4 vs 3.2,  $P=0.351$ ) and erection (3.0 vs 2.7,  $P=0.312$ ) were not affected after surgery. Overall satisfaction with sexual life was marginally affected after TURP (2.8 vs 2.0,  $P=0.05$ ) (Tables 3, 4).

When comparing RP patients with controls (Tables 5, 6), sexual desire and bother, in terms of libido, were similar (4.4 vs 4.8,  $P=0.343$ ) (2.8 vs 3.0,  $P=0.614$ ). Erectile function, however, was decreased (1.6 vs 5.9,  $P=0.003$ ) with only 24.8% of patients having a firm erection compared to 72.8% of the control population. As expected, ejaculation was worse than in the control population. Worth mentioning was the absence of ejaculation in 66.6% of the control population. Bother was mainly due to the loss of erectile function, while ejaculation marginally bothered the RP patients (1.9 vs 3.3,  $P=0.014$  and 2.4 vs 3.3,  $P=0.05$ , respectively). Finally, bother from decreased overall sexual function was increased compared to the control group (1.3 vs 2.6,  $P=0.010$ ).

TURP patients after the operation had the same sexual desire and erectile function compared to the control group (4.1 vs 4.8,  $P=0.436$ ) (5.3 vs 5.9,

$P=0.346$ ) (Table 5). Ejaculation differed significantly (3.3 vs 5.2,  $P=0.002$ ), as well as the bother associated with it (1.8 vs 3.3,  $P=0.030$ ). Bother from libido status (3.2 vs 3.0,  $P=0.377$ ) and erection status (2.7 vs 3.3,  $P=0.355$ ) were similar to the control group. Overall sexual bother was not seriously affected (2.0 vs 2.6,  $P=0.510$ ) (Tables 5, 6).

## Discussion

RP is a major operation with potentially serious post-operative complications. Nevertheless, it has been reported not to influence general QoL [6]. Indeed, Litwin et al [11] reported that 12 months after RP, the Rand 36 scores had returned to pre-treatment levels in 86–97% of the patients. Lubeck et al. [15] reported that improvement in general QoL usually occurred 1–2 years after the operation. In our study, emotional well-being was significantly better 2 years postoperatively in the RP group. This fact can be attributed to several reasons. On one hand, the pre-treatment questionnaires were answered only 2 weeks before surgery, at a time when significant distress from the newly diagnosed disease was present. On the other hand, post-treatment questionnaires were evaluated 2 years postoperatively by patients with a cancer free status, minimal postoperative complications, and in a moment where their prostate cancer was only an bad, old memory. Indeed, RP patients preoperatively presented the lowest score (50.3) of all study groups (Table 1). Two years later, their emotional well being had reached a score comparable to the two other groups (62.9, Table 2). Therefore, RP did not induce a rise in emotional well being above the mean level but restores a lowered emotional status to that of the general population.

Urinary dysfunction includes incontinence and obstructive symptoms. These two components are present in various degrees in elderly patients and in patients after RP and TURP. Elderly patients suffer both from obstructive symptoms and urinary leakage. RP patients mainly suffer from incontinence, while the removal of the prostate might improve a possible pre-operative obstruction. On the other hand, obstruction and lower urinary tract symptoms are relieved to various degrees after TURP, and incontinence is a rare event. In order to better evaluate obstructive symptoms, we used the AUA SI, while for assessing leakage, the UCLA PCI was used. Our results indicate that RP does not induce changes in urinary function, while TURP, as expected, improves it. When operated patients and the control population were compared, no differences were found, and overall urinary function was similar in all groups. Patients who were bothered significantly by their current urinary function were 9.3%, 1.3% and 3.8% in the RP, TURP and control groups, respectively. RP patients usually remained continent after an anatomical radical retropubic prostatectomy and our percentage of incontinent men, at 9%, is similar to that reported in other

studies [12]. It is interesting though, that bother in terms of urinary function increased postoperatively (UCLA function domain: 85.1 vs 70.6,  $P=0.021$ ) as only 1% preoperatively vs 9.3% after the operation expressed severe bother. Urinary function improves with time after RP [12]. It is possible that increased bother was due to the fear of a possible unexpected leakage, such as the one experienced during the early days after the operation, than to the actual urinary function itself.

Sexual function consists of sexual drive, the capability of having an erection and the existence of an ejaculation. All these parameters are investigated in the various domains of the BMSFI.

Sexual drive was not different in the three groups, since it is more a mental function than an organic one. Sexual drive was not seriously affected by an operation like TURP or RP and was still present even in older men.

Erections, as expected, were statistically affected in the RP group and our rate of 75.2% impotence is higher from that reported from centers of excellence [17], a finding that supports the already known effect of RP in erectile function. Our patents reported a 30.9% impotence rate after TURP. Although impotence following TURP has been reported to extend from 4 to 40%, the 13% reported by the AUA cooperative study [2] implies that a 40% impotence rate after TURP is an overestimate. A possible explanation is that patients falsely equate impotence with ejaculatory dysfunction and therefore misjudge their erectile status [4]. Overestimation is also supported by the fact that the reported impotence by patients and the findings of nocturnal penile tumescence by Rigiscan do not coincide [4]. Nevertheless, we must also point out that 30% of patients in our study group reported severe erectile dysfunction before TURP. The 27.2% impotence reported in the elderly patient group is reasonable and reflects the effect that age can have on the ability to have sexual contact. According to the Massachusetts Male Aging Study, the overall probability of complete impotence in men 70 years old is 15%, while other reported rates of erectile dysfunction are as high as 71% [18].

No ejaculation was observed after RP, as expected, and our percentage of 58.5% of retrograde ejaculation after TURP is within the limits reported by others [3, 13]. Of significance is the 66.6% rate of absence of ejaculation in the elderly population, possibly attributed to the lack of sexual intercourse at their age.

Sexual life is rather complex, and in order to discriminate possible differences in overall sexual bother, this needs to be evaluated separately for each subcategory of sexual function (libido, ejaculation, erectile function).

After RP, libido is not lost which explains why bother about the loss of this function is also not affected. On the other hand, loss of ejaculation, although 100%, is not followed by significant bother. This can be explained by the fact that sexual activity does not necessarily end with the act of ejaculation, and since the feeling of orgasm is intact, this seems to be enough to satisfy the post RP patient. Obviously the significant erectile dysfunction

caused by RP is reflected in the higher bother that this presented, caused by the loss of this function. Nevertheless, the bother related to the loss of erectile function does not exactly parallel the occurrence of impotence. Indeed, although 75.2% of patients reported complete absence of erections, only 46.3% expressed severe bother. This probably happened because some patients feel grateful for being cancer free, and this is more important to them than having erections. In addition, informed consent on treatment options excludes patients that are more concerned about their erectile function than cancer control. These patients opt for therapies other than RP.

In the TURP group, bother in terms of libido and erectile function were low, matching the absence of erectile dysfunction after such surgery and the fact that libido is mainly a mental function. It was interesting to find out that bother from the loss of ejaculation was more pronounced in patients treated with TURP than in elderly men. Patients with BPH were not prepared for the sudden loss of ejaculation caused by the operation. On the contrary, an elderly man experiences this loss progressively and adjusts to it. The severe bother relating to the loss of ejaculation after TURP has also been reported by others [1]. It seems that patients should be informed by their doctor of this possible adverse effect of the operation so that they are mentally prepared and can adjust more easily to their new sexual situation.

In the elderly men, group rates of significant bother were low but intermediate bother rates were high (near 30%) for all domains of sexual function. These findings suggest that sexual life is still a concern for the older male, but perhaps it is no longer his primary concern in life. They have adjusted to a progressive loss of sexual function due to ageing. This is reflected in the overall satisfaction rates. Old men were significantly less bothered overall than the RP group but were equally as bothered as the TURP group. Although RP patients were the unhappiest of all, the TURP patients were dissatisfied as well. This must be considered when informing a patient undergoing surgical treatment for BPH.

From a total of 441 patients, only 283 responded to all of the questionnaires. We partly attribute this significant loss of patients to the extended length of the questionnaires used. In addition, some patients of the RP group were excluded because of disease recurrence and were not evaluated. It was difficult to determine for the operated patients whether they did not answer the questionnaire because there were pleased with their current condition and they did not feel the need to deal with it, or whether they were disappointed and thought that it was useless to respond to any question regarding their health. For the control population, the most obvious reason might have been that they simply did not find any point in responding to such a questionnaire. The patients that had a recurrence were excluded because we did not want to bias our study with cancer related complications (physical or emotional). Therefore, since the reason for drop out in RP and TURP patients is not operation-related, or if it is related

positively or negatively to the outcome of the operation, the risk of bias to the study due to the drop out rate is rather small.

It should be pointed out that TURP and RP were not compared as two treatment options since they are not performed for the same reasons. We tried to compare the changes these two operations caused on general QoL, sexual and urinary function and compare them with aged normal males.

General QoL was not affected after a major operation such as RP. Similarly unaffected was general QoL following TURP. Two years after the operation, patient's outcome had returned to baseline levels and did not differ from that of men of similar age without prostate cancer.

Urinary function was restored after TURP, while after RP bother from urinary dysfunction was more pronounced than the actual malfunction itself.

Sexual dysfunction was reported after both operations, although different domains were affected by each procedure. Erectile dysfunction was the main problem after RP and retrograde ejaculation after TURP. The fact that changes in sexual life do not affect general QoL implies that patients have made their choice and selected a radical treatment for their problem despite the impairment this will bring to their sexual life. Nevertheless, every effort must be made during RP to preserve potency and to thoroughly explain the possible side effects on sexuality prior to a TURP operation for BPH.

Ageing, although it induces changes in everyday life, does not seriously affect general QoL. People learn to adjust in new situations, and although urinary and sexual function is diminished, they learn to accept it as a normal consequence of life without expressing severe bother.

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