

Trifecta Outcomes of Screening Detected and Patients with Lower Urinary Tract Symptoms after Open Radical Prostatectomy for Localized Prostate Cancer

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How to cite this paper: Kyei, M.Y., Mensah, J.E., Djagbletey, R., Akpali, E., Ahiaku, F., Ayamba, A., Adusei, B., Tackie, E., Bannerman-Williams, E. and Klufio, G.O. (2023) Trifecta Outcomes of Screening Detected and Patients with Lower Urinary Tract Symptoms after Open Radical Prostatectomy for Localized Prostate Cancer. *Open Journal of Urology*, 13, 282-292.

<https://doi.org/10.4236/oju.2023.138032>

Received: June 20, 2023

Accepted: August 7, 2023

Published: August 10, 2023

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Abstract

Background: Many studies have reported on trifecta outcomes after radical prostatectomy. There is however paucity of studies that compares the trifecta outcome between screen detected and patients presenting with lower urinary symptoms with localized prostate cancer after radical prostatectomy. This study compares the trifecta outcomes between these two groups after an open retropubic radical prostatectomy. **Methodology:** This is a retrospective study, on the trifecta outcomes (urinary continence, erectile function, and cancer control) of consecutive patients that had open radical retropubic prostatectomy for localized prostate cancer by a single surgeon. Patients were grouped into screen detected and presentation with lower urinary symptoms or retention of urine. The parameters considered were the age of the patients, the total prostate specific antigen (tPSA) at presentation, the clinical T stage, the Gleason score of prostate biopsies, the risk categories using the D'Amico risk groups and the trifecta outcomes after the procedure. **Results:** In all, 119 patients met the criteria for inclusion. The median follow up was 63.5 months (range 12 - 156 months). Of these 40.3% of the patients were diagnosed through screening with elevated PSA while 59.7% had presented with symptoms of lower urinary tract obstruction. The mean age for the patients was 60.8 ± 6.5 years, median PSA 12.6 ng/ml (IQR 8.6 - 19.7) and median prostate

weight of 50.0 (IQR 40.0 - 60 g). The urinary continence rate after the procedure was 93.3%, erection rate of 81.5%, cancer control rate of 71.4% and trifecta achieved in 57.1%. Comparing the screening and the symptomatic cases, the urinary continence rate was 91.7% vrs 94.3%; erectile function rate was 79.2% vrs 83.1%; cancer control 68.8% vrs 73.2% and trifecta achieved in 58.3% vrs 56.3%. There was no statistically significant difference between the two groups in terms of urinary continence $p = 0.564$, erection function $p = 0.588$, cancer control $p = 0.595$, and achieving trifecta $p = 0.829$. **Conclusion:** Patients with localized prostate cancer presenting with lower urinary symptoms compared to screen detected patients have similar outcomes in terms of urinary Continence, erectile function, cancer control and trifecta after open radical retropubic prostatectomy.

Keywords

Screening, Lower Urinary Tract Symptoms, Open Radical Prostatectomy, Functional Outcome, Trifecta

1. Introduction

Prostate cancer is the second most frequent cancer diagnosed in men worldwide and noted to be the fifth cause of cancer deaths [1]. The 2020 GLOBOCAN estimates 1,414,259 new prostate cancer cases and mortality of about 375,304 in 2020 [2] [3]. An earlier study in Ghana found prostate cancer to be the commonest cause of cancer mortality among men older than 40 years in Ghana [4]. The detection of prostate cancer is by way of screening, with patients presenting with elevated PSA > 4 ng/ml or abnormal DRE while being assessed during medical evaluation or being seen for some other conditions [1] [5].

There has been debate on the use of mass screening using PSA for prostate cancer. While some studies indicate no benefit with rather interference with quality of life [6], other studies indicate there is survival benefit in prostate cancer screening using PSA [7]. Despite this controversy, it is an accepted recommendation that, people of African ancestry undergo screening after 45 years due to the aggressiveness of the disease in this population group [1] [8]. Despite this recommendation, many patients in the West African sub region do not avail themselves for prostate cancer screening but present with symptoms [5] [9]. It has been observed that prostatic obstruction may be associated with changes in the detrusor muscles in response to bladder outlet obstruction. High bladder pressure induces adaptive changes in the bladder structure, which, in the long term, are visible as muscle enlargement and collagen deposition [10] [11] [12]. These changes have a potential to affect lower urinary function after radical prostatectomy.

For the management of localized prostate cancer, radical prostatectomy has been established as effective treatment for localized prostate cancer [13] [14] [15]

especially in the presence of lower urinary tract symptoms. Despite an increasing use of minimally invasive Robot assisted radical prostatectomy in high income countries [16], open radical retropubic prostatectomy remains the main modality for radical prostatectomy in lower middle income and low-income countries [17] due to the cost of Robotic equipment and consumables.

Many studies have reported on trifecta outcomes which have been noted to provide a good measure of functional and oncologic outcome [18] and its determinants as relates to urinary continence, erectile function, and cancer control [15]. Previous studies have investigated the effect of radical prostatectomy on urinary symptoms [19] [20]. There is however paucity of studies that compares the trifecta outcome between screening detected localized prostate cancer and in patients presenting with lower urinary tract symptoms. There could be variations as the presence of obstructive symptoms may lead to changes in the detrusor characteristics, having the potential to affect the trifecta outcome.

This study therefore compares the trifecta outcomes between patients that had localized prostate cancer diagnosed at screening and those that presented with lower urinary tract symptoms, after an open radical retropubic prostatectomy by a single surgeon.

2. Methodology

This is a retrospective study, on the trifecta outcomes (urinary continence, erectile function, and cancer control) of consecutive patients that had open radical retropubic prostatectomy for localized prostate cancer by a single surgeon. The procedures were done at the Korle Bu Teaching Hospital, the 37 Military Hospital and the Trust Specialist Hospital in Accra, Ghana over a 12-year period (1st January 2010-30th April 2022). Patients were grouped into screening detected and symptomatic presentation, lower urinary tract symptoms or retention of urine.

Screening for prostate cancer is not widely practiced in Ghana with the recommendation in the country being that of shared decision making based on patients presenting voluntarily or on the recommendation by health personnel and the patients should be above 40 years, asymptomatic and to be done bi-annually taking into consideration the total prostate specific antigen (tPSA) level at last screening. It entails doing tPSA and a digital rectal examination (DRE). They are subsequently referred for transrectal ultrasound guided prostate biopsy based on elevated total tPSA > 4 ng/ml or abnormal DRE or both. The patients in this study had a screening based on this practice and included in the study if prostate cancer has been diagnosed at biopsy. The patients with symptoms presented with lower urinary tract symptoms or acute urinary retention and on further evaluation had elevated tPSA or abnormal DRE. They subsequently had prostate cancer diagnosed after transrectal ultrasound guided biopsy. A localized prostate cancer was confirmed after doing either radioisotope bone scan or whole-body magnetic resonance imaging (MRI) to exclude metastasis.

The parameters considered were the age of the patients, the total prostate specific antigen (tPSA) at presentation, the clinical T stage, the Gleason score of prostate biopsies, the D'Amico risk stratification as low (Gleason score ≤ 6 and PSA ≤ 10), intermediate (Gleason score = 7 and PSA > 10 and ≤ 20) and high risk (Gleason score ≥ 8 and PSA > 20) [21] and the trifecta outcomes after the procedure. Urinary continence was defined as no need or no use of pads, normal erectile function was defined as erections sufficient for sexual intercourse with or without phosphodiesterase inhibitors or other oral aphrodisiacs, and cancer control defined as PSA < 0.2 ng/ml at follow up).

The inclusion criteria were patients that had at least a single nerve sparing procedure (as the recovery of erection and continence has been noted to be related to the procedure being performed with none nerve sparing procedures having poor outcomes), had normal erections before procedure, had a follow up of at least 12 months and had complete data as per the study.

All the patients had open radical retropubic prostatectomy using a lower midline incision with lymph node dissection depending on the risk category (Figure 1).

The patients were assigned to either of the two groups based on whether they were screening detected or had presented with lower urinary tract symptoms/

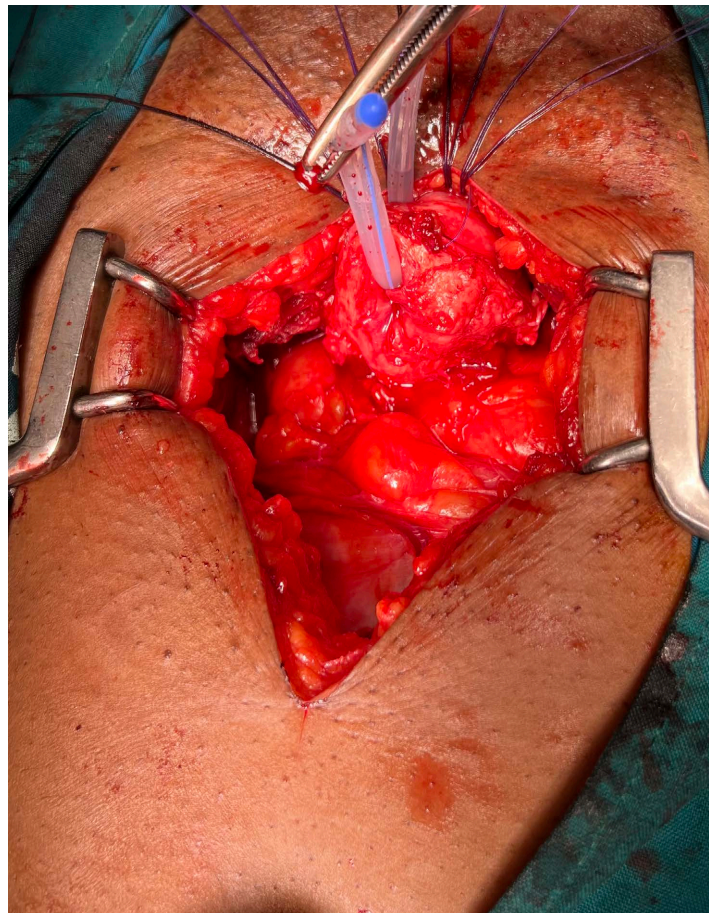


Figure 1. Lower midline incision with prostate dissected out (foley catheter in prostatic urethra).

acute retention of urine and meeting the inclusion criteria.

The data were analyzed using the SPSS (version 24) and summarised as mean (\pm SD), median (IQR) for continuous variables whilst frequencies and proportions for categorical variables. Chi-square test was used to compare post-operative outcomes, age, tPSA and risk groups between screening detected and symptomatic cases. Independent t-test was used to compare the mean age between screening detected and symptomatic cases. Median tPSA levels and prostate volume was also compared using Mann-Whitney U test. A p -value < 0.05 was considered statistically significant. Ethical approval was obtained as part of the study on management of localized ca prostate and use of nomograms by the 37 Military Hospital in Accra Institutional Ethical Committee.

3. Results

A total of one hundred and ninety (119) patients were included, consisting of forty-eight (48) localized prostate cancer diagnosed at screening and seventy-one (71) that presented with lower urinary tract symptoms after an open retropublic radical prostatectomy.

The median follow up was 63.5 months (range 12 - 156 months)

Of these 40.3% (48/119) of the patient were diagnosed through screening with elevated PSA while 59.7% (71/119) had presented with symptoms of lower urinary tract obstruction ($n = 66$) or retention of urine ($n = 5$).

The mean age for the entire group was 60.8 ± 6.5 years; median 61 years (range 43 - 76 years). The median PSA was 12.6 (IQR 8.6 - 19.7) with a median prostate weight of 50.0 (IQR 40.0 - 60 g).

For the screening detected group, the mean age was 57.9 ± 6.2 years and those with symptoms had a mean age of 62.8 ± 5.9 years.

The median prostate volume/weight was 50.0 (IQR 39.3 - 60.0) for the screening detected group and 50.0 (40.0 - 63.6) for the group with symptoms.

The median PSA was 11.2 ng/ml (IQR 7.8 - 19.8) for the screening detected group and 12.8 (9.4 - 20.3) for the group with symptoms (**Table 1**).

Overall, the urinary continence rate was 93.3% (111/119) and erection rate was 81.5% (97/119). The cancer control rate was 71.4% (85/119) with trifecta achieved in 57.1% (68/119) at a median follow up of 63.5 months.

Comparing the screening detected and the symptomatic cases, the urinary continence rate was 91.7% (44/48) and 94.3% (67/71) respectively and the erectile function rate was 79.2% (38/48) and 83.1% (59/71) respectively.

For cancer control, the rate was 68.8% (33/48) for the screening detected and 73.2% (52/71) for those that presented with symptoms with trifecta achieved in 58.3% (28/48) for the screening detected and 56.3% (40/71) for the symptomatic cases.

There was no statistically significant difference between the two groups in terms of continence preservation $p = 0.412$, erection function preservation $p = 0.588$, cancer control $p = 0.680$, and achieving trifecta $p = 0.852$ (**Table 2**).

Table 1. Patients age, PSA, prostate volume, and D'Amico risk category.

Variable	Total	Screening detected	Symptoms	p-value
Age, mean(\pm SD)	60.8 (\pm 6.4)	57.9 (\pm 6.2)	62.8 (\pm 5.8)	<0.0001
Age group [n (%)]				
40 - 49	6 (5.0)	6 (12.5)	0 (0.0)	
50 - 59	40 (33.6)	22 (45.8)	18 (25.4)	<0.0001
60 - 69	64 (53.8)	18 (37.5)	46 (64.8)	
\geq 70	9 (7.6)	2 (4.2)	7 (9.9)	
PSA, median (IQR)	12.6 (8.6 - 19.7)	11.2 (7.8 - 19.8)	12.8 (9.4 - 20.3)	0.446
PSA group [n (%)]				
\leq 4.0	1 (0.8)	0 (0.0)	1 (1.4)	
4.1 - 10.0	41 (34.4)	20 (41.7)	21 (29.6)	0.482
10.1 - 20.0	48 (40.3)	16 (33.3)	32 (45.1)	
>20.0	29 (24.4)	12 (25.0)	17 (23.9)	
Prostate volume, median (IQR)	50.0 (40.0 - 60.0)	50.0 (39.3 - 60.0)	50.0 (40.0 - 63.6)	0.741
Risk Group [n (%)]				
Low risk	25 (21.0)	11 (22.9)	14 (19.7)	
Intermediate risk	58 (48.7)	25 (52.1)	33 (46.5)	0.547
High risk	36 (30.3)	12 (25.0)	24 (33.8)	

Table 2. Comparing Post operative outcomes between Screening detected and Symptomatic cases.

	Total [n (%)]	Screening detected [n(%)]	Symptomatic [n (%)]	p-value
Urinary Continence				
Yes	111 (93.3)	44 (91.7)	67 (94.4)	0.412
No	8 (6.7)	4 (8.3)	4 (5.6)	
Erectile function				
Yes	97 (81.5)	38 (79.2)	59 (83.1)	0.588
No	22 (18.5)	10 (20.8)	12 (16.9)	
Cancer control				
Yes	85 (71.4)	33 (68.8)	52 (73.2)	0.680
No	34 (28.6)	15 (31.3)	19 (26.8)	
Trifecta				
Yes	68 (57.1)	28 (58.3)	40 (56.3)	0.852
No	51 (42.9)	20 (41.7)	31 (43.7)	

4. Discussion

The increasing incidence of prostate cancer makes management of prostate cancer an important component of a Urologist's practice. While in high income countries, most prostate cancers are diagnosed at an early stage due to screening practices, in low income and lower middle-income countries, patient usually present with advanced disease [5]. However, there is an increasing number of patients in the lower income and middle-income countries that present as a localized disease requiring curative treatment [5] [17] [22]. Among cases of localized prostate cancer diagnosed at low and lower middle-income countries, they present with symptoms rather than screening as screening uptake for prostate cancer is low [9]. Thus, though patients are considered as localized disease, the presence of lower urinary tract symptoms leading to acute retention in some cases may lead to urinary bladder changes that might affect the outcome after surgery especially with urinary continence.

In this study, the mean age of the patients was 60.8 years. this compares with study by Entebi *et al.* with a mean age of 59 years in their study [15] and 64.16 ± 6.54 years by Cachoeira *et al.* [23]. Of the cases in this study, more patients presented with lower urinary tract symptoms or acute retention of urine (59.7%) than screening detected (40.3%) supporting less screening among men in low and lower middle-income countries. However, this proportion is to be considered high in relation to the attitudes to prostate cancer screening in some of the countries with a finding of 81.3% men having never screened for prostate cancer in a study by Necku *et al.* [9].

The screening detected group and the symptomatic patients were matched as all had normal erection before the procedure, at least one nerve sparing procedure, and had undergone open radical prostatectomy. The results also showed they were matched for t PSA ($p = 0.446$), prostate weight ($p = 0.741$), and the risk categorization ($p = 0.547$) with no significant difference between the two groups.

The screening detected group had relatively lower mean age of 57.9 ± 6.2 years; compared with those with symptoms with a mean age of 62.8 ± 5.8 years and it was statistically significant ($p < 0.0001$). Thus, screening led to diagnoses of localized prostate cancer at an earlier age compared with those with lower urinary tract symptoms.

The Median pre-operative PSA was 12.6 (IQR 8.6 - 19.7) in this study. This is higher compared to a median preoperative PSA of 5.8 ng/mL reported by Entebi *et al.* in their series [15] and a median of 6.20 (IQR = 4.91 - 8.95) ng/dl by Cachoeira *et al.* [23]. In this study, 64.7% of the patients had PSA ≥ 10 ng/ml which places them in an at least intermediate risk group. The median PSA of both the screen detected (median 11.2 ng/ml; IQR 7.8 - 19.8) and the symptomatic patient's group (median 12.8 ng/ml; IQR 9.4 - 20.3 ng/ml) were all in the intermediate category. Thus, the PSA at diagnosis of prostate cancer in this population with African ancestry tended to be higher than found in the studies referenced

above.

The overall, urinary continence rate at a median follow up of 63.5 months was 93.3%. This compares with the study by Entebi *et al.* who had at a median follow up of 54 months rate of 94.5% for open radical retropubic prostatectomy [15] and an overall rate of continence of 93.5% by Cachoeira *et al.* after robotic laparoscopically assisted radical prostatectomy [23]. Though urinary incontinence is the most distressing functional complication of radical prostatectomy in the population under study, the relatively low incidence of 6.7% in this study should encourage more patients to opt for radical prostatectomy for the cure of a localized prostate cancer.

The erection rate was 81.5%. This compares favorably with an erection rate of 71% by Entebi *et al.* after open Radical retropubic prostatectomy [15].

The cancer control rate was 71.4% at 63.5 months follow up. Porter *et al.* reported a range of 54.5% - 84.8% cancer control rate after radical prostatectomy at 25 years [24].

The trifecta was achieved in 57.1% at a median follow up of 63.5 months in this study. This compares with trifecta achieved in 56% of patients with a median follow-up of 54 months by the study by Entebi *et al.* after open radical retropubic prostatectomy [15].

Prostatic obstruction may be associated with changes in the detrusor muscles in response to bladder outlet obstruction. There is hypertrophy of the detrusor muscles and an increased collagen deposition due to high bladder pressure induced adaptive changes in the bladder structure [10] [11] [12]. These changes have a potential to affect lower urinary function after radical prostatectomy as efficient bladder storage depends on low vesical pressure and a competent and closed bladder outlet and emptying on coordinated contraction of the urinary bladder with relaxation of the external urethra sphincter [25]. Increased deposition of collagen lead to loss of bladder distensibility and loss of compliance [26] that have the potential to affect lower urinary function and possible urgency and urge incontinence after radical prostatectomy for patients with prior bladder outlet obstruction. However, there was no statistically significant difference in the outcomes in terms of urinary continence ($p = 0.412$) among the two groups. Thus, the presence of lower urinary tract symptoms prior to presentation had no impact on the functional outcomes in relation to urinary incontinence.

A study by Namiki *et al.* found radical prostatectomy to significantly improve the international prostate symptoms score and single quality of life scores in men with moderate or severe urinary symptoms after radical prostatectomy. However they found that it seemed to have a deleterious effect on nocturia and voiding frequency for some men with only mild symptoms [20].

There was also no significant difference in the erectile function ($p = 0.588$) between the screening detected and patients presenting with lower urinary tract symptoms.

There was no statistically significant difference between the screening detected

and the patients with lower urinary tract symptoms in terms of cancer control $p = 0.680$ and achieving trifecta $p = 0.852$ at median follow up of 63.5 months.

5. Conclusion

Patients with localized prostate cancer presenting with lower urinary tract symptoms compared to screening detected patients, have similar outcomes in terms of urinary continence, erectile function, cancer control and trifecta after open radical retropubic prostatectomy. This needs to be taken into consideration in the counselling of patients.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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