COMPARISON OF EPITHELIAL CELL COUNTS BETWEEN MIDDLE AND LATERAL LOBES IN BENIGN PROSTATIC HYPERPLASIA (BPH) PATIENT

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ABSTRACT

***Objective**: The aim of this study was to compare the epithelial cell counts in each lobe of prostate glands with benign prostatic hyperplasia (BPH). **Material & method**: Twenty-two BPH patients who underwent transurethral resection of the prostate (TURP) in Diponegoro Dua Satu Surgery Hospital Klaten, from May until November 2006 were enrolled in this study. Tissue from each lobe of the prostate gland was separately collected, from the middle (A), left lateral (B), right lateral lobes (C). All samples were fixed in 10% formalin buffer, embedded in paraffin and sectioned in 4 micrometer slices with microtome. After hematoxylin eosin (HE) staining, number of epithelial cells was counted under light microscopy. Difference in epithelial cell counts in each alveolus between the three lobes was statistically analyzed using t-test ($p<0,05$). **Results**: Twenty-two patients were included in this study from May to November 2006, mean age was 66,64±7,6 (54-88) years old. The most common occupation was farmer. Almost all patients had symptoms of chronic urinary retention (95,45%). Length of hospital stay was 8,77±2,7 (6-17) days, mean weight of prostate resected was 47,05±23,2 (5-90) grams, mean operative time 77,73±22,24 (45-115) minute, mean volume of irrigation fluid (sterile water) was 24,18±7,87 (5-34) liter. Mean number of cells in groups A, B, and C were 23,67±8,4 (13,6-44,4), 29,22±8,8 (16,4-41,2), and 29,11±8,7 (16,4-41,2) respectively. There was significant difference between groups A and B, and between groups A and C ($p<0,05$) respectively. **Conclusion**: There was statistically significant difference in epithelial cell count between the middle lobes compared to lateral lobes of the prostate in BPH surgical samples. These findings are supported by cystoscopic observation of smaller middle lobe compared to the lateral lobes in BPH.*

***Keywords:** BPH, middle lobe, lateral lobes, HE staining, epithelial cell number.*

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INTRODUCTION

The life expectancy of males at birth in third millennium will exceed 80 years in many countries. Benign prostatic hyperplasia (BPH) is a common disease for the male elderly people. In recent years, its incidence has obviously increased. The prevalence of histological, macroscopic, and symptomatic BPH all increase with age. The association with ageing may reflect an age-related hormonal imbalance between testosterone and estrogen. Prevalence estimates of symptomatic BPH range from 10-30% for men in their early 70 years, depending on how BPH is defined.[1,2]

Pathologically BPH is characterized by an increased proliferation of stromal and acinar cells leading to prostatic enlargement, which often causes obstruction of urinary outflow from the bladder, manifested clinically by lower urinary tract symptoms (LUTS) (urinary frequency, urgency, a weak and intermittent stream, straining, incomplete emptying, and nocturia), and can lead to complications, including acute urinary retention.[3] Some BPH patients present with severe symptoms (refractory urinary retention), and must undergo surgical procedures.[4]

In the majority of the cases, hyperplastic nodules of BPH originates from the preprostatic and transitional zones, compressing other prostatic regions, mainly the prostatic urethra.[4]

Despite decades of intensive research, progress has been slow, and information regarding the precise factors responsible for the pathogenesis of BPH remains incomplete. Additional etiologic factors also play a significant role in regulating prostatic growth. Therefore, a revised, broadened concept regarding etiological factors of BPH was proposed in 1997. The new concept proposes the existence of two major factors in relation to the prostate: intrinsic and extrinsic factor. Intrinsic factors consists of epithelial and stromal elements.[5] It is now well accepted that interaction between stromal and epithelial tissue plays a role in the development of the prostate.[3] The stromal tissue is composed of smooth muscle cells, with associated connective tissue, vessel, and nerve.[4] Prostatic epithelial cells consist of a mixture of at least three cell types. The cells are designated as luminal epithelial cells, basal cells, and neuroendocrine cells. Luminal cells are differentiated epithelial cells. They contribute a wide variety of secretory products in seminal plasma. They contain androgen receptors and are sensitive to androgen action.[5] Dihydrotestosterone (DHT) is the principal intracellular androgen involved in regulation of prostate growth. It is formed by the action of 5-alpha reductase on testosterone within the prostate. Testosterone produced by Leydig cell in the testes is converted into DHT by 5-alpha reductase enzyme. DHT is the active compound binding the androgen receptor in nuclei of prostate luminal epithelial cells thus promoting hyperplasia of prostate cells.[1,4]

Experience in cystoscopy prior to TURP in BPH patients since 1986 was a macroscopic appearance of a smaller middle lobe compared to either lateral lobe.

OBJECTIVE

The aims of this study are to compare number of epithelial cell counts between different prostate lobes of BPH patients and to study relationship of epithelial cell count and macroscopic pattern of each lobe in BPH patients.

MATERIAL & METHOD

This is a prospective study. Samples were selected from BPH patients presenting with chronic urinary retention who had underwent transurethral resection of the prostate (TURP) in Diponegoro Dua Satu Surgery Hospital Klaten from May to November 2006. Twenty-two patients were enrolled in this study.

Tissue was collected from the three lobes of the prostate gland and then grouped as the middle (A), left lateral (B), and right lateral lobe (C). Sample was stored into separate bottles, appropriately labeled, A for middle lobe, B for left lateral lobe, and C for right lateral lobe. The samples were routinely fixed in 10% formalin buffer.

Samples were sent to Department of Anatomical Pathology for definite diagnosis. All specimens were embedded in paraffin and sectioned in 4-micrometer thickness by microtome. After staining with hematoxylin eosin in Department of Anatomical Pathology, number of epithelial cells was counted under light microscopy.

Differences in epithelial cell counts in each alveolus between the three lobes were statistically analyzed using t-test ($p<0,05$).

RESULTS

Twenty-two patients were included in this study from May to November 2006, mean age was 66,64±7,6 (54-88) years old. The most common occupation was farmer (68,2%). Almost all patients had symptoms of chronic urinary retention (95,45%). Length of hospital stay was 8,77±2,7 (6-17) days, mean weight of prostate resected was 47,05±23,2 (5-90) grams, mean operative time 77,73±22,24 (45-115) minute, mean volume of sterile water for irrigation was 24,18±7,87 (5-34) liter. Mean number of cells in groups A, B, and C were 23,67±8,4 (13,6-44,4), 29,22±8,8 (16,4-41,2), and 29,11±8,7 (16,4-41,2) respectively. There was significant difference between groups A and B, and between groups A and C ($p<0,05$) respectively.

Table 1. Characteristics of study patients.

	Mean	Standart Deviation	Maximum	Minimum
Patient age (years)	66,64	8,8	54	88
Length of stay (days)	8,77	2,7	6	17
Weight of prostate gland (grams)	47,05	23,2	5	90
Operative time (minute)	77,73	22,24	45	115
Volume of irrigant (liter)	24,18	7,87	5	34
Occupation	Most common is farmer (68,2%)			
Symptom	Chronic urinary retention (95,45%)			

Table 2. Epithelial cell count of each prostate lobe.

Lobes of Prostate Gland	Mean	Standart Deviation	Minimum	Maximum
Middle lobe (A)	23,67	8,4	13,6	44,4
Left lateral lobe (B	29,22	8,8	16,4	41,2
Right lateral lobe (C)	29,12	8,7	16,4	41,2

Table 3. Age of BPH patients.

Category	N	Percent
50 - 59 years	2	9,09 %
60 - 69 years	14	63,64 %
≥ 70 years	6	27,27 %

Table 4. Result of t test of epithelial cell count between middle and left lateral lobes of the prostate gland in BPH patients.

t type	Sig
Equal variances assumed	0,0177

Table 5. Result of t test of cell number between middle and right lateral lobes of the prostate gland in BPH

t type	Sig
Equal variances assumed	0,0189

Table 6. Result of t test of cell number between left and right lateral lobes of the prostate gland in BPH patients.

t type	Sig
Equal variances assumed	0,4830

DISCUSSION

Benign prostatic hyperplasia (BPH) is a common disease, which affects millions of elderly men worldwide. In recent years, its incidence has obviously increased. The prevalence of histological, macroscopic, and symptomatic BPH all increase with age. In Indonesia BPH is the second number most common urology disease in many hospitals with practicing urologists (Cipto Mangunkusumo, Soetomo, Sardjito, Hasan Sadikin Hospital, etc).[1,3]

BPH is the most common cause of lower urinary tract symptoms (LUTS) (urinary frequency, urgency, weak and intermittent stream, straining, incomplete emptying, and nocturia) in elderly men, and can lead to complications, including acute urinary retention. Some BPH patients arrive in hospitals with severe symptoms (refractory urinary retention) and must undergo surgery.[4,5] Surgical treatment should be chosen for BPH patient who present: (1) urinary retention due to benign prostate obstruction (BPO), (2) recurrent urinary tract infection due to BPO, (3) macroscopic haematuria due to benign prostate enlargement (BPE), (4) bladder stone due to BPO, (5) renal insufficiency due to BPO, and (6) large bladder diverticle due to BPO.[6]

There are three surgical techniques recommended worldwide, (1) open prostatectomy for prostate volumes of 80-100 cm^3, (2) transurethral resection of the prostate (TURP) for prostates 30-80 cm^3, and (3) transurethral incision of the prostate (TUIP) for prostates less than 30 cm^3.[6]

From May to November 2006, there were twenty-two BPH patients included in this study. Mean age was 66,64, the youngest was 54 years old and the oldest was 88 years old (table 1). Two patients were between 50-59 years old (9,09%), 14 were 60-69 years old (63,64%), and 4 were 70-79 years old (27,27%) (table 3). This study suggests that prevalence of symptomatic BPH increases with age, almost all BPH patients were over 60 years of the age (90,91%). Data from the Baltimore Longitudinal Study of Aging suggest that prevalence of symptomatic BPH is around 14% in men in their 40s, 24% in men in their 50s, and 43% in men beyond the age of 60.[1] Data from Singodimedjo study (2000) on 58 BPH patients, mean age 66,97 years old.[7]

The most common occupation is farmer (68,2%), showing that most patients come from agricultural areas.

Almost all patients had symptoms of chronic urinary retention (95,45%). The BPH patient arrive in the hospitals with severe degree (refractory urinary retention) maybe due to symptoms obstruction are frequently present in elderly who do not consider themselves as patient,[8] and maybe due to low level of education (most common occupation is farmer).

Mean length of stay in hospital BPH patient post TURP in this study was 8,7 days (table 1). Borboroglu et al provides data on 520 consecutive patient who underwent TURP between 1991-1998, mean hospital stay was 2,4 days (1,1 days from 1997 to 1998).[8]

In this study, the average weight of the prostate gland was 47,05 grams (5-90 grams) (table 1). The data from Prawito study on 58 BPH patients who underwent TURP showed the same average weight of the resected prostate gland (47,2 grams).[7] Borboroglu et al reported that from 520 patients who underwent TURP, average weight of resected tissue was 18,8 grams. Uchida et al have also reported on 1931 patient who underwent TURP from 1985 to 1996, the amount of tissue resected was 23 grams.[8]

Mean operative time in this study was 77,73 minute (45-115 minute) with mean weight of the prostate gland was 47,05 grams (table 1). Singodimedjo study on 58 BPH patient who underwent TURP reported mean operative time was 50 minute (20-55 minute). Silber (1997) wrote that to avoid TURP syndrome, the resection time should not last longer than 60 minutes. Fitzpatrick (2003) wrote that the risk of TURP syndrome is increased if the gland is larger than 45 g and the resection time is longer than 90 minutes.[7,9,10]

Mean volume of sterile water for irrigation in this study was 24,18 liters (5-34) liters (table 1). The result of this study similar with suggested by Silber (1997) that approximately 30 L of fluid was used for irrigation during operation.[9]

Table 2 showed that mean number of cells in the middle lobe (group A), the left lateral lobe (group B), and the right lateral lobe (group C) were 23,67±8,4 (13,6-44,4), 29,22±8,8 (16,4-41,2), and 29,11±8,7 (16,4-41,2) respectively. Statistical analysis with t-test found significant difference between groups A and B in table 4 ($p<0,05$), and between groups A and C in table 5 ($p<0,05$) respectively. Difference in mean cell count between groups B and C (table 5) was not statistically significant ($p>0,05$). Our study indicated that epithelial cell count may be one of the causes of macroscopic appearance of the middle lobe as smaller than two lateral lobes of the prostate gland on cystoscopy.

CONCLUSION

The difference on the epithelial cell number between the middle lobes to the lateral lobes of the prostate gland in BPH surgical samples were statistically significant, indicating that number of epithelial cells may be one the causes of macroscopic appearance of the middle lobe as smaller than two lateral lobes of the prostate gland on cystoscopy.

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