COMPARISON BETWEEN TRANSRECTAL ULTRASONOGRAPHY GUIDED TRANSRECTAL PROSTATE BIOPSY AND TRANSRECTAL ULTRASONOGRAPHY GUIDED TRANSPERINEAL PROSTATE BIOPSY

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ABSTRACT

Objective:*Prostate cancer is the fourth most common malignancy in men. TRUS guided transperineal prostate biopsy and TRUS guided transrectal prostate biopsy are two main approach to take prostate tissue as diagnostic of prostate cancer. To compare prostate biopsy approach between TRUS guided transrectal and TRUS guided transperineal toward duration of examination, pain perception, and complications.* ***Material & Method:*** *This study was an experimental study with prospective approach. There were two groups, group one was performed TRUS guided transrectal prostate biopsy (TRB) and group two was performed TRUS guided transperineal prostate biopsy (TPB). Evaluation was based on the duration of examination, pain perception, and complication. Data was analyzed using independent T test for duration of examination and Mann-Whitney test for pain perception. Data was performed using SPSS 21.0 version. The statistical significant difference was consider if p value <0.05.* ***Results:*** *There were 20 samples in this study. There was a significant difference in the duration of examination, the average duration of TPB examination (17.40 ±2.50) was longer than the duration of TRB examination (14.1 ± 2.77). There was no significant statistical difference between TPB group and TRB group in pain perception when USG probe into the anal (p=0.65), anesthesia process (p=0.28), prostate tissue sampling (p=1.00), and post biopsy (p=0.34). Rectal bleeding was found mostly in TRB group (40%) compared to TPB group (0%). Hematuria was experienced by three patients (30%) in TRB group and two patients (20%) in TPB group.* ***Conclusion:*** *TRB was more effective in duration of biopsy than TPB. The complications of rectal bleeding and hematuria were more in TRB group than TPB. The pain perception were the same between both groups. There were no fever, sepsis, hematospermia and vasovagal event in two groups.*

Keywords: *Prostate cancer, transrectal ultrasonography, prostate biopsy, transperineal.*

ABSTRAK

Tujuan: *Kanker prostat adalah keganasan ke-4 yang paling sering muncul pada laki-laki. TRUS guided transperineal prostate biopsy dan TRUS guided transrectal prostate biopsy adalah 2 pendekatan utama untuk mengambil jaringan prostat sebagai diagnosa kanker prostat. Membandingkan pendekatan biopsi prostat antara TRUS guided transrectal dan TRUS guided transperineal pada durasi pemeriksaan, persepsi nyeri, dan komplikasi.* ***Bahan & Cara:*** *Studi ini adalah studi eksperimental dengan pendekatan prospektif. Terdapat 2 kelompok dalam penelitian ini, kelompok pertama dilakukan TRUS guided transrectal prostate biopsy (TRB) dan kelompok ke 2 dilakukan TRUS guided transperineal prostate biopsy (TPB). Evaluasi berdasarkan durasi pemeriksaan, persepsi nyeri, dan komplikasi. Data dianalisa menggunakan independent T test untuk lama pemeriksaan dan Mann-Whitney test untuk persepsi nyeri. Studi ini menggunakan SPSS versi 21.0. Statistik perbedaan dinyatakan signifikan bila nilai p<0.05.* ***Hasil:*** *Terdapat 20 sampel pada studi ini. Terdapat perbedaan signifikan pada durasi pemeriksaan, rerata durasi pemeriksaan TPB (17.40 ±2.50) lebih lama dari durasi pemeriksaan TRB (14.1 ±2.77). Tidak terdapat perbedaan signifikan antara kelompok TPB dan kelompok TRB pada persepsi nyeri saat probe USG kedalam dubur (p=0.65), proses anastesi (p=0.28), sampel jaringan prostat (p=1.00), dan pasca biopsi (p=0.34). Pendarahan dubur kebanyakan ditemukan pada kelompok TRB (40%) dibandingkan kelompok TPB (0%). Hematuria didapatkan sebanyak 3 pasien (30%) pada kelompok TRB dan 2 pasien (20%) pada kelompok TPB.* ***Simpulan:*** *Durasi biopsi TRB lebih efektif dibandingkan TPB. Komplikasi pendarahan dubur dan hematuria lebih banyak pada kelompok TRB dibandingkan TPB. Persepsi nyeri sama pada kedua kelompok. Tidak didapatkan demam, sepsis, hematospermia dan kejadian vasovagal pada kedua kelompok.*

Kata kunci: *Kanker prostat, ultrasonografi transrektal, biopsi prostat, transperineal.*

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INTRODUCTION

Prostate cancer is the fourth most common malignancy in men.[1] The mortality rate due to prostate cancer in United States is about 30.000/year, it has decreased 25% compared to the previous decade. Although it is still a controversy, but early detection of prostate cancer still plays a significant role.[2,3]

The physical examination that has to be preformed to a patient with Benign Prostate Hyperplasia (BPH) is Digital Rectal Examination (DRE), to estimate the prostate volume and whether there is malignancy of the prostate or not. Another examination that is recommended is Prostate Specific Antigen (PSA), to eliminate probability of suffering prostate cancer in early stage.[4]

Prostate cancer is usually suspected when serum Prostate Specific Antigen (PSA) is above 4 ng/ml. This examination is offered to patients below 70 years in age. The increase of PSA level and presence of prostatic nodules need to perform prostate biopsy to assess the malignancy.[4] Some researches reported direct relationship between PSAD with prostate cancer, and a PSAD ≥ 0.15 is considered to be the threshold of recommending prostate biopsy to patients with PSA >4ng/mL, where PSAD 0.15 has a 59% sensitivity to detect prostate cancer.[1,4,5]

TRUS guided transperineal prostate biopsy and TRUS guided transrectal prostate biopsy are two main approaches to take prostate tissue for diagnosing prostate cancer. The main differences are the location and route of puncture.[6]

Other research have compared these to methods of obtaining prostate tissue. According to cancer detection rate (CDR) level, TRUS guided transperineal biopsy is preferred to take prostate samples in apical and peripheral zone where prostate cancer is usually found. But with the increase of core biopsy, more researches has stated that they were equal in CDR.[7] There are no significant difference was present between them in terms of complications. Guo et al., stated that infectious complications were more frequently occurred on TRB than TPB.[6]

OBJECTIVE

Currently the prospective study about duration of examination, pain perception, and complications between TRUS guided transrectal prostate biopsy and TRUS guided transperineal prostate biopsy has not been performed in Soetomo Hospital. Therefore, the aim of this study was to compare of the prostate biopsy approach between TRUS guided transrectal and TRUS guided transperineal, toward the duration of examination, pain perception, and complications.

MATERIAL & METHODS

This study was an experimental study with prospective approach. Samples of this study were patients with BPH, who will be performed TRUS guided prostate biopsy as indicated in the Minimal Invasive Urologic Instalation (IIU) Soetomo Hospital Surabaya. Samples were divided into two groups, group one was performed TRUS guided transrectal prostate biopsy and group two was performed TRUS guided transperineal prostate biopsy.

The inclusion criteria in this study were patients willing to take part as a research object, suspected of having prostate malignancy with PSA level > 4 ng/ml, PSAD level ≥ 0.15, and found hard, nodules, or an asymmetric prostate during DRE examination, patients with hypoechoic or hyperechoic lesion during prostate TRUS examination. The exclusion criteria of this study were patients who refuse to become a research object, patients with history of prostate biopsy, and having prostatitis, anal infection, hemmorrhoid, and anal fissure, patients with analgesic or blood thinner drug (anticoagulant/antiplatelet) consumption, or food with vitamin E, garlic, ginseng, or containing omega 3, patients with lidocaine and ketoprofen allergies, blind or cataract patients, and septic or patients with loss of conciousness.

Sample in this study were 20 patients and sample divided by two, trans rectal biopsy and trans perineal biopsy. The duration of examination starts when TRUS probe enters the anus until the sampling process is finished. Pain perception was measured with Wong Baker scale starting when the USG probe enters the anus, local anesthesia is administered, the prostate sample is obtained and briefly after the procedure.

In this study, data was analyzed using independent T test if normally distributed and Mann-Whitney test if not normally distributed for numeric data. Normality test was performed using Shapiro Wilk test. Data was analyzed using SPSS 21.0 version. Data was significant if p value <0.05.

RESULTS

Table 1. Baseline data table.

Characteristic	Group TPB (n=10)	Group TRB (n=10)	p value
Age (year)[a]	63.9 ± 8.57	64.6 ± 6.79	0.84
PSA (ng/mL)[b]			
Median	14.99	16.34	0.71
Minimum	8.45	6.51	
Maximum	1867	182.21	
Prostate volume (cc)[a]	45.92 ± 12.05	44.24 ± 18.86	0.82
PSAD (ng/mL/cm^3)[b]			
Median	0.35	0.43	0.79
Minimum	0.19	0.16	
Maximum	67.89	4.81	
PA result			
BPH	9 (90%)	9 (90%)	
Adenocarcinoma	1 (10%)	1 (10%)	

a: T Independent test, b: Mann-Whitney test

Table 2. Age differences between groups.

Age (year)	Groups		p value
	TPB n = 10 (%)	TRB n = 10 (%)	
<60	3 (50)	3 (50)	
60-70	5 (50)	5 (50)	0.84
>70	2 (50)	2 (50)	
Average + SD	63.9 ± 8.57	64.6 ± 6.79	

Table 3. Duration of examination.

Variable	TPB (n=10)	TRB (n=10)	*p*
Duration (minutes) [a]	17.40 ± 2.50	14.1 ± 2.77	0.01*

In this study we found patient baseline characteristics as follows:

From the table above showing that the characteristics of 2 groups were not statistically different (p>0.05).

The largest patient distribution was at age 60-70 for about 10 patients. There was no significant difference age distribution between both groups statistically (p=0.84) (Table 2).

From the table above there was no significant difference of the PSA level (p=0.71), prostate volume (p=0.82) and PSAD (p=0.79) before the biopsy between two groups. PA result that were obtained from this study were nine patients with BPH and one patient with prostate adenocarcinoma in each group.

Based on duration of examination, there was a significant difference between two groups statistically (p=0.01). The average duration of examination of TPB (17.40 ± 2.50) longer than the average duration of examination of TRB (14.1± 2.77).

In table 4, there was no significant statistical difference between TPB group and TRB group in Wong Baker pain perception when the USG probe was inserted into the anus (p=0.65), anesthesia process (p=0.28), prostate tissue sampling (p=1.00), and post biopsy (p=0.34).

Table 4. Wong Baker pain perception.

Wong Baker	Group TPB (n=10)	Group TRB (n=10)	p value
Probe in[b]			
Median	2.00	2.00	0.65
Minimum	2.00	2.00	
Maximum	4.00	4.00	
Anesthesia[b]			
Median	4.00	3.00	0.28
Minimum	2.00	2.00	
Maximum	6.00	4.00	
Sampling[b]			
Median	2.00	2.00	1.00
Minimum	2.00	2.00	
Maximum	4.00	4.00	
Post Biopsy[b]			
Median	2.00	2.00	0.34
Minimum	2.00	2.00	
Maximum	4.00	4.00	

Table 5. Complication between TPB with TRB.

Complication	TPB group (n=10)	TRB Group (n=10)
Rectal bleeding	0 (0%)	4 (40%)
Hematuria	2 (20%)	3 (30%)
Fever	0 (0%)	0 (0%)
Septic	0 (0%)	0 (0%)
Vasovagal event	0 (0%)	0 (0%)
Hematospermia	0 (0%)	0 (0%)

The table above shows rectal bleeding was mostly found in TRB group (40%) compared to TPB group (0%). Hematuria was experienced by three patients (30%) in TRB group and two patients (20%) in TPB group. There were no septic, fever, hematospermia or vasovagal complication in both groups.

DISCUSSION

TRUS guided transperineal prostate biopsy and TRUS guided transrectal prostate biopsy are two main approaches, to obtain the prostate tissue as a basic of diagnostics in prostate cancer. The main differences are the location and route of the puncture. In TRUS guided transperineal biopsy, the needle pierces the skin of perineum while TRUS guided transrectal biopsy, the needle pierces through the anterior wall of rectum.[6]

The first aim of this study was to assess the difference in duration of both biopsy techniques, where it starts when the TRUS probe entering the anus until the biopsy of the prostate tissue is obtained. Data that obtained in this study shows transperineal biopsy is longer in duration compared to transrectal biopsy (17.40 ± 2.50 vs 14.1 ± 2.77) with p value = 0.01.

This study was similar with the study of Guo et al., that showed TRB is shorter in duration than TPB. The prostate biopsy through transperineal probably takes more time due to the complicated procedure in patient's position, anesthesia, and obtaining the prostate sample.

Pain is one of the main complaints of patients undergoing the TRUS guided prostate biopsy that might come from two sources, the insertion of permanent TRUS probe into the rectum, innervated under the linea dentate inferior rectal branch of pudendal nerve, and multiple needle punctures into the prostate capsule, innervated by autonomic branch of neurovascular bundles (NVB) between posterolateral prostate and rectum.[8-10]

The result of this study shows that there is no significant difference in Wong Baker pain perception between TPB and TRB when the probe is inserted, anesthesia process, obtaining the sample, and after the procedure. To block the pain during the procedure, periprostatic nerve block is recommended. This procedure blocks the fibers located in the prostate capsule so can give better pain control.[6]

This data is similar to the study performed by Kubo et al., that there was no differences in pain perception between 14-core transperineal and 12-core transrectal prostate biopsy when the procedures is done by local anesthesia.[6]

In this study we also evaluate the complications between both biopsy procedures. Rectal bleeding is found more in TRB group than TPB group. 40% (4 out of 10 patients) patients experienced rectal bleeding in TRB group while in TPB group there was no rectal bleeding complications.

This study is similar to the study conducted by Guo et al., where 8.7% (14 out of 161 patients) experienced rectal bleeding. Rectal tampon is performed when the rectal bleeding is experienced.

Hematuria experienced in two patients (20%) who undergo transperineal prostate biopsy and three patients (30%) by transrectal prostate biopsy. These results are similar to those conducted by Stacy et al., showing that hematuria is experienced in 10-84% patients who undergo prostate biopsy.[11] Screening programme in Europe reported the hematuria about 23-63% after sextant biopsy.[3]

The rectum is rich in blood vessels, TRUS guided transrectal biopsy technique have higher risk of infection due to bacteria in feces which easily enters the blood through the wound puncture of the rectal wall during the biopsy process. It can be avoided by performing transperineal prostate biopsy, where the puncture route is not performed through the rectum.[6]

This study didn't find any fever or septic complications in both groups. The increasing risk of septic and urinary tract infection are life threatening due to the non-sterile transfaecal sample obtaining, and becomes the main attention when conducted. UTI in randomized clinical trial about between 25-87% in patients who undergo biopsy with TRUS without antibiotic prophylaxis. This high number promotes perioperative antibiotic routinely, which is proved significantly to reduce the bacteriuria compared to the patients with placebo (3-8%, p=0.009).[7] Infection complication can occur due to the interaction between the host (the body's defense system) and the agent (virulence germs) if the body's defense system is strong and virulence is weak, bacteria will not be able to cause infection.[12]

Hematospermia complication and vasovagal events are not experienced in this study. Udeh et al., stated that the absence of hematospermia in the study was because of participants was elderly and generally less sexually active which could explain the absence of hematospermia cases.[13] Pain and anxiety due to endorectal probe can result in moderate - severe vasovagal response in 1.4-5.3% patients, so the procedure should be stopped.11 In this study there is no vasovagal reflex because the patient does not experience severe pain and anxiety.

CONCLUSION

This study showed a significant difference between TRB and TPB. TRB is more effective in duration of biopsy than TPB. Rectal bleeding and hematuria appeared more in TRB group than TPB, but pain perception were the same between both groups. There are no fever, sepsis, hematospermia and vasovagal event in two groups.

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