Reduction in Bacteremia Rates after Rectum Sterilization before Transrectal, Ultrasound-Guided Prostate Biopsy: A Randomized Controlled Trial

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Objective: *To determine the efficacy of rectum sterilization before TRUS guided prostate biopsy in order to decrease bacteremia rate and sepsis complication.*

Material and Method: *From August 2008 to March 2009, 100 volunteers who had an indication for prostate biopsy were recruited into the present study in a randomized controlled trial. The present study was approved by the Ethics Committee on Human Experimentation of Ramathibodi Hospital Faculty of Medicine, Mahidol University. The volunteers received unison enema one day before and Ciprofloxacin 500 mg 0.5-1 hr before the procedure. These 100 volunteers were divided into two groups; 50 were randomly assigned in the group of rectum cleaning with 10% povidone-iodine, whereas the other 50 volunteers were placed in the control group. Twelve cores of TRUS guided prostate biopsy were performed. After the procedure, peripheral blood samples were taken for cultures for aerobic and anaerobic bacteria. A clinical follow-up at 48-72 hrs after the procedure was done via telephone.*

Results: *Hemocultures were positive for 9 cases in the rectum cleaning group and 2 cases in the control group ($p = 0.025$). Three volunteers (one in the rectum cleaning group and two in the control group) had a post-operative fever but it spontaneously resolved. Two volunteers in the control group came back to the hospital because of urinary tract infections and rectal bleeding. None of the volunteers had clinical sepsis or went to other hospitals.*

Conclusion: *Sterilization of the rectum before TRUS guided prostate biopsy was found to reduce post-operative bacteremia and might reduce clinical infections.*

Keywords: *Prostate, Biopsy, Bacteremia, Povidone-iodine*

J Med Assoc Thai 2009; 92 (12): 1621-6
Full text. e-Journal: *http://www.mat.or.th/journal*

Transrectal ultrasound (TRUS) guided prostate biopsy is a common procedure in urology. More than 200 cases of transrectal prostate biopsy each year were performed at Ramathibodi Hospital. Recent studies have shown that approximately 2% of the patients develop febrile urinary tract infection, bacteremia, or acute prostatitis and require hospitalization for intravenous antibiotics[1,2]. Last year, two patients came back to Ramathibodi Hospital because of sepsis complications, and hemocultures showed E.coli in both patients. Although infection complications are infrequent after TRUS guided prostate biopsy, they are serious for some patients and may lead to prosecution.

In 1978, Ashby et al[3] reported that bacteremia was found in 16 out of 21 patients at only 5 minutes after transrectal prostate biopsy. Two years later, Ashby et al[4] used 10% povidone-iodine solution to clean the rectum before TRUS guided prostate biopsy and reported septicemia in 4 patients out of 23 patients. In

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1984, Ali Khan et al[5] suggested cleaning the rectum with 10% povidone-iodine solution in TRUS guided-prostate biopsy, but there were not enough data to support the idea. There are many subsequent studies about this topic, but most of them are not randomized controlled trial. Because of inadequate evidence, the topic of rectum sterilization rectum before TRUS guided prostate biopsy is still of controversial. The objective of the present study was therefore to conduct a randomized controlled trial to clarify this problem.

Material and Method

From August 2008 to March 2009, the authors undertook a randomized controlled trial at the Faculty of Medicine Ramathibodi Hospital, Mahidol University. One hundred volunteers who had indication for prostate biopsy were recruited from the out-patient urology clinic. The authors excluded volunteers who had the symptoms of urinary tract infection, chronic infection, internal prosthesis, rectal disease, and those who received chemotherapy or immunosuppressive drugs. All volunteers were informed about the research protocol and the research consent was obtained after having been completed. The study protocol was reviewed and approved by the Ethics Committee on Human experimentation, Faculty of Medicine Ramathibodi Hospital, Mahidol University.

Procedure

All volunteers received unison enema one day before, followed by oral antibiotic prophylaxis (Ciprofloxacin 500 mg) 0.5-1 hr before the procedure. The authors opened sealed envelops to randomly assign 100 volunteers into two groups. Fifty volunteers received rectum cleaning with povidone-iodine and the other fifty volunteers were in a control group. Volunteers were placed in the lithotomic position and the digital rectal examination was then performed. Perianal area was cleaned with aseptic solution in both groups. In the rectum cleaning group, gauze soaked with 10% povidone-iodine solution was inserted into the rectum through a proctoscopy and left in the rectal lumen for 5-10 minutes (Fig. 1). Transrectal ultrasound of prostate was done using BK medical-Falcon 2010 technology with simultaneous biplane transrectal probe. Prostate volume was calculated by using the formula: Volume = Height x Width x Length x Prostate factor (0.523). Twelve cores needle biopsy of prostate was performed under ultrasound guidance with 18 Fr needle spring-loaded guns. Prostate tissue from biopsy was sent for pathology. After the prostate biopsy for 5-10 minutes, 10 ml of peripheral blood samples were taken for aerobic and anaerobic cultures. A clinical follow-up at 48-72 hrs after the procedure was performed via telephone. For volunteers having unresolved complications, the authors had a second follow-up by telephone after 1 week.

Statistical analysis

Differences between the two groups in terms of age, PSA value, prostate volume and pathological reports were analyzed by Student's t-test and Mann-Whitney U-test. Comparisons of underlying diseases and post-operative complications were analyzed by Chi-square test and Fisher's exact test. Results of the hemocultures between the two groups were compared by Chi-square test.

Results

Demographic data of the volunteers are shown in Table 1. There were no significant differences in age, underlying disease, PSA level, prostate volume and pathological report between the two groups.

From 100 volunteers, hemocultures were more positive in the control group (9 volunteers) than in the rectum cleaning group (2 volunteers) with a statistical significance ($p = 0.025$) Microbiological data are also shown in Table 2.

There were 95 volunteers who received a clinical follow-up by telephone. Overall complications are shown in Table 3. No significant difference in complications was found between the rectum cleaning group and the control group. The duration of hematuria and that of hematochezia are shown in Fig. 2 and 3. Three volunteers (one in the rectum cleaning group and two in the control group) had post-operative low graded fever but spontaneously resolved on the second day.

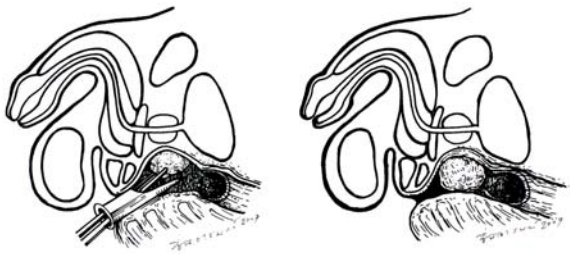

Fig. 1 Gauze soaked with 10%povidone-iodine solution was inserted into the rectum through a proctoscopy and left in it for 5-10 minutes

Table 1. Demographic data of the volunteers

	Rectum cleaning group (n = 50)	Control group (n = 50)	p-value
Age (yrs)	68.44 (SD 7.93)	67.64 (SD 7.71)	0.610
PSA level (ng/ml)	16.56 (SD 17.51)	22.22 (SD 50.49)	0.871
Prostate volume (cm^3)	51.24 (SD 25.34)	51.40 (SD 30.39)	0.944
Underlying disease			
HT	14 (28%)	17 (34%)	0.517
DM	7 (14%)	5 (10%)	0.538
IHD	4 (8%)	5 (10%)	1.000
COPD	3 (6%)	3 (6%)	1.000
Gout	3 (6%)	3 (6%)	1.000
Hyperlipidemia	6 (12%)	8 (16%)	0.499
Other diseases	9 (18%)	6 (12%)	0.401
Pathology confirmed prostate cancer	11 (22%)	7 (14%)	0.320

Age, PSA level, Prostate volume are shown in "Mean (SD)"; Underlying diseases are shown in "Number (%)"
HT: hypertension, IHD: ischemic heart disease, DM: diabetes mellitus, COPD: chronic obstructive pulmonary disease

Table 2. Microbiological data

	Aerobic hemoculture	Anaerobic hemoculture
Control group		
66 yrs		*Bacteroides distasonis*
69 yrs		*Clostridium ramosum*
70 yrs	*Streptococcus* gr B *Staphylococcus aureus*	*Eubacterium lentum*
59 yrs		*Bacteroides fragilis*
75 yrs		*Streptococcus intermedius*
73 yrs	*Eschericia coli* (ESBL) *Enterobacter cloacae*	
68 yrs		*Bacteroides distasonis*
69 yrs		*Bacteroides vulgaris*
77 yrs	*Arcanobacterium pyogenes*	
Cleaning group		
55 yrs		*Bacteroides vulgaris*
80 yrs		*Bacteroides fragilis*

Table 3. Post-operative complications

	Rectum cleaning group (n = 48)	Control group (n = 47)	p-value
Fever	1 (2.08%)	2 (4.25%)	0.617
Urinary retension	1 (2.08%)	2 (4.25%)	0.617
Hematuria	18 (37.5%)	17 (36.17%)	0.957
Hematochezia	5 (10.42%)	8 (17.02%)	0.349
Hematospermia	2 (4.25%)	0	0.242
Came back to hospital	0	2 (4.25%)	0.242

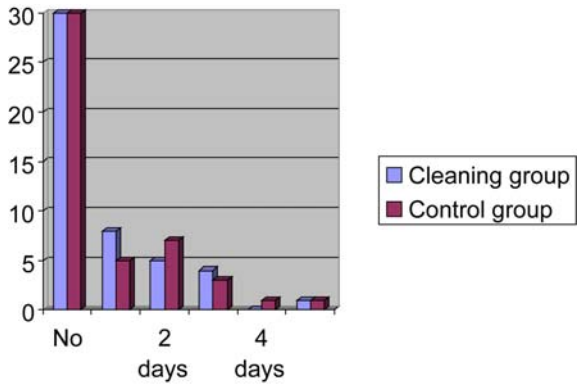

Fig. 2 Duration of hematuria

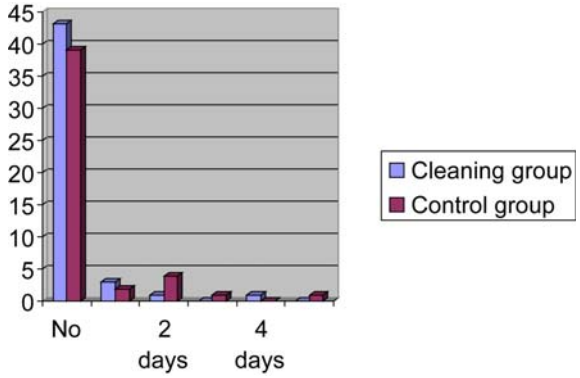

Fig. 3 Duration of hematochezia

Hemocultures of one volunteer in the control group who had post-operative fever showed *Eschericia coli* (ESBL) and *Enterobacter cloacae*. None of the volunteers had clinical sepsis.

Two volunteers in the control group came back to Ramathibodi Hospital, one suffering from lower urinary tract infection and the other suffering from rectal bleeding. The one who had lower UTI developed dysuria in post-operative day 1. He had no fever or costovertebral angle tenderness. He came to the emergency department and his urinalysis showed pyuria. He received oral antibiotic and his symptoms improved within two days. His post-operative hemocultures showed *Clostridium ramosum*, though his urine was not collected for culture at the emergency department.

The volunteer who had rectal bleeding developed blood stained stool in post-operative day 1 and fresh blood per rectum in post-operative day 3. His underlying disease was diabetes mellitus and ischemic heart disease. He stopped aspirin 7 days before the operation and did not start at post-operation. His hematocrit was 28.5% and received 1 unit of blood transfusion. He was admitted for three days until no further bleeding was observed.

Discussion

In the present communication, the authors have shown the effectiveness of rectum cleaning with 10% povidone-iodine before transrectal prostate biopsy with regard to the reduction of bacteremia rate. Although most of post-operative bacteremia is transient and not related with clinical sepsis, the authors have shown that the more reduction of bacterial colonization in the rectum, the more reduction of bacteria in blood stream after transrectal prostate biopsy.

None of the volunteers in the present study had clinical sepsis. There were two volunteers in the control group who had problems, one who had post-operative fever on day 1 and one who came back to the hospital with lower UTI. Both had post-operative hemocultures positive. These lines of evidence may show effectiveness in the reduction of clinical infection by rectum cleaning with povidone-iodine, but the authors could not show a statistically significant difference due to antibiotic prophylaxis and low prevalence of sepsis after prostate biopsy.

The microbiological result could not be compared with that of the previous studies[1,3,4], because the previous studies did not use pre-operative antibiotic prophylaxis. Antibiotic prophylaxis had a major effect in the reduction of septicemia rate in the present study. Standard textbooks recommend a dose of an oral fluoroquinolone 30 to 60 minutes before biopsy and continued therapy for 2 to 3 days. In the present study, the authors followed the standard regimen and used oral ciprofloxacin as an antibiotic prophylaxis. Ciprofloxacin is good in eradicating gram negative aerobe organisms. This can explain why most of the organisms from hemocultures are in the anaerobic group. However, gram negative aerobe pathogens (*Eschericia coli* (ESBL) and *Enterobacter cloacae*) were found from one volunteer in the control group.

Although anaerobic organisms might cause post-operative bacteremia, most volunteers who had post-operative anaerobic bacteremia had no clinical sepsis. Furthermore, the common sepsis pathogens in post prostate biopsy were gram-negative aerobe

organisms. These lines of evidence raise the controversial problem in addition to Metronidazole as an antibiotic prophylaxis in transrectal prostate biopsy.

Due to the effectiveness of antibiotic prophylaxis, post biopsy infection complications requiring hospitalization from previous studies are about 2%[1,2]. Although 2% of post-operative infection is small, it has a significant problem in clinical practice and may lead to prosecution. Previous studies[6,7] reported fatal septic shock and disseminated intravascular coagulation from transrectal prostate biopsy, and the causative organisms in the report are *E.coli* (ESBL) resistant to ciprofloxacin. Thus, pre-operative oral fluoroquinolone cannot protect them from infection. Hence, reducing bacterial colonization in the rectum may be a strategy to prevent this problem.

Conclusion

Sterilization of the rectum before TRUS guided prostate biopsy was found to reduce post-operative bacteremia and might reduce clinical infection. However, the authors could not show a statistically significant difference in the reduction of clinical infection due to antibiotic prophylaxis and low prevalence of post-operative sepsis.

Acknowledgement

The authors wish to thank Professor Amnuay Thithapandha for his constructive comments and useful suggestions. We also wish to thank Dr. Boosakorn Vijchulata for her English proof reading and editing.

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การศึกษาเปรียบเทียบประสิทธิภาพการลดเชื้อแบคทีเรียในกระแสเลือดหลังการเจาะเนื้อต่อมลูกหมากทางทวารหนักระหว่างวิธีทำความสะอาดทวารหนักด้วยน้ำยาฆ่าเชื้อและไม่ใช้

ภาณุพงศ์ กาญจนวงศ์ดีงาม, วิทย์ วิเศษสินธุ์, พิทักษ์ สันตนิรันดร์, ประภาพรรณ ประถมบุตร, สุพรรณี นิลล์กุลวัฒน์

วัตถุประสงค์*: เพื่อศึกษาถึงประสิทธิภาพของการทำความสะอาดทวารหนักด้วยน้ำยาฆ่าเชื้อ ในการลดเชื้อแบคทีเรียในกระแสเลือด (bacteremia) และการลดภาวะแทรกซ้อนจากการติดเชื้อในกระเลือด (sepsis complication) หลังการเจาะเนื้อต่อมลูกหมากทางทวารหนัก*

วัสดุและวิธีการ*: อาสาสมัคร 100 คน ที่มีข้อบ่งชี้ในการการเจาะเนื้อต่อมลูกหมาก เข้าร่วมการศึกษาระหว่างเดือนสิงหาคม พ.ศ. 2551 ถึง เดือนมีนาคม พ.ศ. 2552 ทุกคนรับการสวนทวารหนักด้วย unison enema ก่อนทำหัตถการหนึ่งวัน และรับประทานทานยา ciprofloxacin 500 มิลลิกรัม ก่อนทำหัตถการ 0.5-1 ชั่วโมง อาสาสมัครทั้งหมดถูกสุ่มแบ่งอยู่ในกลุ่มทำความสะอาดทวารหนักด้วยน้ำยาฆ่าเชื้อจำนวน 50 คน และกลุ่มควบคุม 50 คน อาสาสมัครแต่ละคนรับการเจาะเนื้อต่อมลูกหมากจำนวน 12 ชิ้น และรับการเจาะเลือด 10 มิลลิลิตร เพื่อส่ง เพาะเชื้อ aerobe และ anaerobe ผู้นิพนธ์โทรศัพท์สอบถามอาการของอาสาสมัครหลังจากหัตถการ 48-72 ชั่วโมง*

ผลการศึกษา*: พบเชื้อแบคทีเรียในกระแสเลือดของอาสาสมัครกลุ่มควบคุมจำนวน 9 คนและในอาสาสมัครกลุ่มทำความสะอาดทวารหนักจำนวน 2 คน (p = 0.025) อาสาสมัครสามคนมีไข้หลังทำหัตถการ (สองคนอยู่ในกลุ่มควบคุมหนึ่งคนอยู่ในกลุ่มทำความสะอาดทวารหนัก) และอาการไข้หายไปได้เอง อาสาสมัครสองคนในกลุ่มควบคุมกลับมาโรงพยาบาลด้วยการติดเชื้อระบบทางเดินปัสสาวะและเลือดออกทางทวารหนัก ไม่มีอาสาสมัครคนใดเกิดภาวะแทรกซ้อนจากการติดเชื้อในกระแสเลือด*

สรุป*: การทำความสะอาดทวารหนักด้วยน้ำยาฆ่าเชื้อสามารถลดเชื้อแบคทีเรียในกระแสเลือด และอาจลดภาวะแทรกซ้อนจากการติดเชื้อในกระเลือดหลังการเจาะเนื้อต่อมลูกหมากทางทวารหนัก*