

ORIGINAL ARTICLE

Pre-operative Bladder Irrigation with 1% Povidone Iodine in Reducing Open Prostatectomy Surgical Site Infection (SSI) at University Teaching Hospital, Lusaka

S. Mukosai, K. Bowa, M. Labib and N. Spasojevic

ABSTRACT

Purpose: The aim of the study is to assess the effectiveness of using preoperative bladder irrigation with 1% povidone iodine in reducing post transvesical prostatectomy surgical site infections.

Study design: This was a prospective randomized cohort study with blinding of patients and outcome adjudicator regarding group assignments.

Methodology: One hundred and thirty patients were recruited from the waiting list of Urology unit II in the department of surgery during the period between July 2011 to December 2012. The non-probability convenience sampling technique was used. Any consenting patient who presented to the department of surgery for open prostatectomy and fulfills the inclusion criteria was selected.

The patients were randomly allocated to each of the two groups. Each group had 65 patients. Patients in the study group had their bladder irrigated with 1% 50cc povidone-iodine which was drained upon opening the bladder followed by enucleating the adenomatous prostate gland. Hemostasis was ensured and a 3 way Foley's catheter inserted via the urethral into the bladder and ballooned appropriately for draining and irrigation. The bladder was sutured in 2 layers using 0 or 1 chromic catgut. In the control group povidone-iodine was not used. Both groups received pre-operative antibiotics 30 minutes before

incision and post-operative for 5 days. Pre-operative, intraoperative and post-operative data were collected on a standardized data collection forms.

Post-operative irrigation was done for 9 to 12 days after which the catheter was removed as an outpatient. Patients were followed up in the urological clinic at 1 week, 2 weeks and at 4 weeks post-operatively to assess whether they had developed surgical site infections according to CDC guidelines. Data was analyzed using SPSS version 16.

Results: The patients mean age was 71.1 in the control group and 71.4 in the study group with no statistically significant difference ($t=0.318$; $p=0.75$; $df=126.89$). The overall surgical infection rate was 16.2%. In the control group 15 out of 65 patients (23.1%) developed SSIs. While in the study group 6 out of 65 patients (9.2%) developed SSIs. The difference in the rates of SSI between the two groups was statistically significant (χ^2 ; $p<0.05$; $df=126.89$) *Escherichia coli* was the most predominant organism 13/37 (35%), *streptococcus* 7/37 (18.9), *Citrobacter koseri* 5/37 (13.5%), *Klebsiella sp* 4/37 (10.8%). *Escherichia coli*, *Streptococcus* and *Citrobacter* were sensitive to ciprofloxacin; *Pantoea agglomerans* was sensitive to ceftazidime while *Staphylococcus coagulase* was sensitive to imipenem. *Enterobacter cloace* was resistant to all antibiotics used.

Conclusion: The study found that irrigating the bladder with 1% povidone-iodine resulted in significant reduction in post prostatectomy surgical site infection, *Escherichia*

Corresponding Author

Department of Surgery, School of Medicine, University of Zambia, P.O. Box 50110, Lusaka. Zambia 10101, Email: smukosai@yahoo.com

Key words: *Benign prostatic hyperplasia, transvesical prostatectomy, povidone iodine, surgical site infections.*

coli as the most common causative organism, reduced morbidity and post-operative hospital stay in the povidone iodine group.

INTRODUCTION

Benign prostatic hyperplasia (BPH) is histologically defined as non-malignant nodules arising in the region of the transition zone [1]. It is one of the most common disease processes affecting the ageing male. The aetiology of BPH is multifactorial [1]. Clinical manifestation of BPH includes symptoms, signs and sequelae of bladder outlet obstruction (BOO) caused by abnormal growth and age induced detrusor dysfunction [1]. Different treatment modalities worldwide exist for BPH which include; watchful waiting, medical therapy, minimally invasive surgery, open and endoscopic prostatectomy [2]. Open prostatectomy is the enucleation of the hyperplastic adenomatous growth of the prostate gland [3]. For the purpose of this study Transvesical prostatectomy was used since this is the most commonly used surgical method for benign prostatic enlargement at the University Teaching Hospital due to limited facilities.

Benign prostatic hypertrophy (BPH) accounted for over 42% of the total urological diseases attended to at UTH during the period 2006 to 2012 [4]. Majority of these patients present with acute or chronic urinary retention. Due to the long waiting list for surgical operative procedures these patients are usually on long term catheterization. Over 80% of these patients come from rural area and cannot afford medical therapy [4]. Long term urethral catheterisation is a risk factor for urinary tract infection [5]. And urinary tract infection is a risk factor for subsequent development of prostatectomy surgical site infection [6]. Various methods have been used to reduce post-operative surgical site infections [6]. In this study we investigate the efficacy of using povidone iodine pre-operative bladder irrigation in reducing open prostatectomy surgical site infections (SSIs).

METHODOLOGY

This was a prospective randomized cohort conducted in the department of surgery, urology section at the University Teaching hospital for a period of 18 months from June 2011 to December 2012. The study involved 130 patients estimated using Open Epi 2.3. The study and control group each had 65 patients randomly allocated using cards. HIV test was done as per routine according to Ministry of Health guidelines.

Pre-operative, intraoperative and post-operative data were collected on a standardised data collection forms.

The study group had their bladder preoperatively irrigated with diluted povidone iodine 1% 50cc and drained upon opening the bladder. In the control group transvesical prostatectomy was performed without prior bladder irrigation. Both groups received pre-operative antibiotic prophylaxis.

Post operatively both the study and the control groups received post-operative antibiotic prophylaxis e.g. Ciprofloxacin, Ceftriaxone, Cefotaxime, respectively for 5 days as is routinely done at UTH. Wounds were exposed on day 2 and cleaning was done with methylated spirit twice per day. Post-operative bladder Irrigation with normal saline was done in all patients for 12 to 24 hours to clear the blood clots. Fr 24 or 22 3way Foley's catheter was used for irrigation and removed after 9 to 12 days in our outpatient urology clinic 7.

Each patient was followed up in clinic 7 after discharge on day 12, 19 and day 30. After which they were declared either free or having acquired SSI using the CDC guidelines. Pus swab were obtained from surgical incision and transported to laboratory within an hour of collection.

RESULTS AND DISCUSSION

Benign prostatic hyperplasia (BPH) is a common urinary problem with an average age at presentation of 60 to 70 years [7]. In this study the mean age is 71.2 and the median is 72 years with the range of 54 to 80 years. This is comparable to other reported studies[8,9]. The majority of the patients (82.3%) come from rural area.

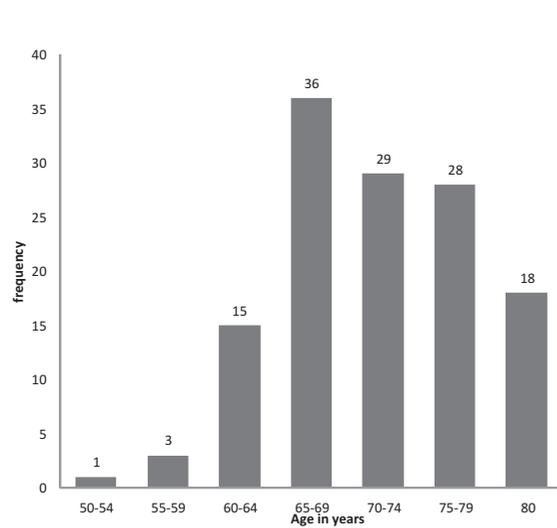


Figure 1. Age of patients in years

The rate of SSI is 16.2% which is lower than that reported by Mwalla et al, 2011[10] who reported overall SSI rate of 26%. Amoran et al, 2006[11] reported overall SSI rate of 13%. Other studies by Emori et al., 1993[12] reported SSI rate of between 14 to 16%. And Auerbach[13] reported SSI rate of up to 20%. Shirimpaka, 2007[14] (Unpublished) reported rate of SSI of 8.7% which is much lower than what we have found. This may be attributed his small sample size and the nature of the operations in his study. In this study 15 out of 65 (23.1%) patients in the control group and 6 out of 65(9.2%) patients in the study group respectively developed SSI. The difference is statistically significant, $p < 0.05$. This compares favourably with the study reported by Richter et al, 1991[15] with SSI rate of 23.5% in the control and 8.7% in the study group. This is due to the effects of povidone-iodine in making the urine sterile and hence reducing post prostatectomy SSI. Sidebar and Mason 1996[16] reported infection rate of 15.1% in the control group and 2.9% in the treatment group. Their findings of magnitude of infection rate is much lower than what has been reported in this study. This may be attributed to multiple different surgical operations on which their study was based.

Table1. Number of patients with surgical site infections

	No. of operations	No. of SSI	SSI rate
Control group	65	15	23.1
Study group	65	6	9.2
Total	130	21	16.2

The most predominant organism cultured from infected surgical wounds following prostatectomy was Escherichia coli 35% (table 2) followed by streptococcus sp accounting for 18.9%. These results compares favourably with results from a study done by Salim et al, 2004[17]. The second most common species of bacterial cultured was Streptococcus. This may be attributed to the nature of these pathogens commonly colonising the urinary system. Shrimpaka 2007[14](Unpublished) reported Escherichia coli as the most common causative organism in his study.

Table 2. Organisms cultured from surgical wounds

Pathogens isolated	Frequency	Percent
Escherichia coli	13	35.1
Streptococcus sp	7	18.9
Citrobacter koseri	5	13.5
Klebsiella sp	4	10.8
Pantoea agglomerans	2	5.4
Staphylococcus Coagulase negative	2	5.4
Enterobacter cloacae	1	2.7
Pseudomonas sp	1	2.7
Serratia Marcescens	1	2.7
Staphylococcus aureus	1	2.7
Total	37	100.0

All the three most common causative organisms were sensitive to ciprofloxacin. Pantoea agglomerans was sensitive to ceftazidime. Staphylococcus aureus was sensitive chloramphenicol. Enterobacter cloacae was resistant to all the available antibiotics used to test for sensitivity pattern.

The post-operative hospital stay ranged from 4 to 13 days with an average of 6.2 days. The mean post-operative hospital stay was 6.9 days in the control and 5.4 days in the study group, $p < 0.05$. The results are fairly comparable with that reported by Salim et al, 2004[17]. The research has shown that pre-operative bladder irrigation with 1% povidone-iodine was effective in reducing the incidence of post prostatectomy surgical site infection. Furthermore pre-operative bladder irrigation with povidone-iodine significantly reduced the bed occupancy post-operatively in the iodine-povidone group. *Escherichia coli* is the most common causative organism in prostatectomy SSI. The three most common isolated organisms were sensitive to ciprofloxacin.

CONCLUSION

The study found that irrigating the bladder with 1% povidone-iodine resulted in significant reduction in post transvesical prostatectomy surgical site infections, *Escherichia coli* is the most common causative organism. The use of pre-operative povidone iodine resulted in significant reduction in morbidity and post-operative hospital stay.

ACKNOWLEDGEMENT

I am greatly indebted to Dr Nenad Spasojevic, Prof. Kasonde Bowa, and Prof. Labib Mohammed as supervisors. Dr Ben Andrews and Dr Akakandelwa for statistical input. Thanks to the University of Zambia, Vanderbilt University for funding and my colleagues, nurses and clerks from clinic 7.

REFERENCES

1. Marwan, R.H. Kamel and Roja, K. Epidemiology, Aetiology and Pathogenesis of Benign Prostatic Hyperplasia (BPH) and Lower Urinary Tract Symptoms (LUTS). *Lebanon. Arab Journal of Urology* 2003; 1:15-21.
2. Roger, S.K.(ed.). Patient Pictures Prostatic diseases and treatments, 2nd ed. Health Press Oxford. 1999.
3. James,F.G and Thomas, E.K. Glenss Urological Surgery 6ed. Philadelphia. Lippincott Williams & Wilkins 2004. 235.
4. Department of Surgery of the University Teaching Hospital Lusaka, clinic 7 medical records 2006 to 2012.
5. Stamm, A.M. and Countino, M.S. Urinary Tract Infection associated with indwelling bladder catheter; Incidence and risk factors. *Rev. Assoc. MedBras* 1999; 45(1):27-33.
6. Richter, S., Lang, R, Zur, F,Nissenkorn I. Infected urine as a risk factor for post prostatectomy wound infection. *Journal of the Society of Hospital Epidemiologists of America* 1991a 12(3):147-9
7. Abdus S.M. Transurethral prostatectomy for benign prostatic hyperplasia, an experience of 200 cases in Hyderabad. *Journal of the college of physicians and surgeons Pakistan* 1993;3 (4):119-122.
8. Thomas A.Z, Thomas A.A, Conlon P, Hickey D, little D.M. Benign prostatic hyperplasia with renal failure: what is the role of transurethral resection of the prostate (TURP)? *Ireland Medical Journal* 2009; 102(2): 43-44.
9. Amos H.P, Loh, Kok K.N, Foo C.N. Presentation and progression of benign prostatic hyperplasia: A Singapore experience profiling differences in a multiracial study cohort. *Annals of academy of medicine* 2009;38 (5): 451-6.
10. Mawalla, B., Mshana,S.E , Chalya, P.L ,Imzalioglu,C and Mahalu, W. Predictors of surgical site infections among patients undergoing major abdominal surgery at Bugando Medical Centre i Northern Tanzania. *BioMed Central* 2011;11:21.
11. Amoran, O.E., Sogebi, A.O and Fatugase, O.M. 2013. Rates and risks factors associated with surgical site infections in a tertiary care center in south-western Nigeria. *International journal of tropical disease and health* 2013;1:25-36.
12. Emori T.G. and Gaynes, R.P. An overview of nosocomial infections, including the role microbiology laboratory. *Clin. Microbiol. Rev* 1993; 6:(4) 428-42.
13. Auerbach, A.D. Prevention of surgical site infections. In: Shojania KG, Duncan BW, McDonald KM, et al., eds. Making health care safer: a critical analysis of patient safety practices. Evidence report/ technology assessment no. 43 AHRQ publication no 01-E058 2001; 221-44.

14. Shirimpaka, E. Use of single dose pre-operative antibiotics in abdominal Surgery, at University Teaching Hospital. Masters, Dissertation, University of Zambia 2007.
15. Richter, S., Kotliroff, Nissenkorn, O.I. Single preoperative bladder Instillation of povidone-iodine for the prevention of post prostatectomy bacteriuria and wound infection. *Infection Control Hospital Epidemiology* 1991b; 12:579-82.
16. Sindelar, W.F., G.R. Manson, G.R. Efficacy of povidone iodine irrigation in Prevention of surgical wound infection. *Sur. Forum* 1996; 28:48-51.
17. Salim, K., Asghar, K and Aziz, M.K. Surgical treatment of benign prostatic hyperplasia: outcome of transvesical prostatectomy. *Biomedica. New Journal* 2004.