

THE EFFECTIVENESS OF NETILMICIN SULPHATE INSTILATION ON THE URETHRA CATHETER REMOVAL PROCEDURE IN REDUCING THE INCIDENCE OF CATHETER ASSOCIATED URINARY TRACT INFECTION

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Objective: Catheter associated urinary tract infection (CAUTI) is the most common complication of short-term indwelling catheters. The risk of this complication is increase along with the length of catheter insertion. There is no complete agreement of intravenous administration of prophylaxis antibiotic in reducing the incidence of CAUTI. Currently, antibiotic instillation into bladder was developed, however it is still a controversial issue. Therefore in this study we would like to see the effectiveness of this procedure in reducing the risk of CAUTI. **Method:** Single blind randomized controle trial was conducted on 40 eligible male patients treated at surgical ward, Sanglah Hospital between March and August 2012. Twenty patients had netilmicin sulfate instillation and anathor 20 patients treated without instillation procedure. Urine culture was taken before and after catheter removal. The number of colonies were analyzed according to the WHO criteria. In this study WHO critirion 3 was used with a significant bacteriuria of more 10 5 CFU / mL. Data were analyzed with Chi-square table and processed statistically with SPSS. Significance was set at p value <0.05 with 95% CI. **Results:** The mean age was 50.07 (SD 15.49) years. The avarage length of urinary catheterization was 5 days (range from 4 to 14 days). CAUTI was observed in 18 patients (45%); symptomatic was 11 patients (61.1%) and asymptomatic was 7 patients (38.9%). Statistic analysis showed that netilmicin sulfate insilation significantly reduced the risk of CAUTI (OR 0.028 ; CI 0.004 - 0.172). **Conclusion:** Netilmicin sulfate instillation prior to catheter removal significantly reduced the risk of CAUTI after short-term indwelling catheter.

Keywords: Netilmicin sulfate instillation, short-term indwelling catheters.

INTRODUCTION

Urinary tract infections (UTI) reached 40% of all nosocomial infections and approximately 80% related to the use of catheters and has been reported to be accompanied by a mortality rate of 12.7%.¹⁻⁴

Bacteriuria occurs in 26% of patients with indwelling catheter on day 2nd – 10th and 24% of them developed catheter associated urinary tract infection/CAUTI.⁵ After 30 days of catheter insertion, bacteriuria occurs almost 100% on it.⁶ The ratio of bacteriuria in patients with short-term indwelling catheters were 10% per day during catheter insertion.^{7,8} When the catheter is removed and if there has been a high likelihood of bacteriuria, the urine culture should be taken 24 hours before removing the catheter.⁹ There is no agreement when replacing the use of antibiotic prophylaxis for urinary catheters reduced the incidence of bacteriuria nor UTI symptoms in the

short-term use of a catheter by a lack of evidence of effectiveness in using prophylactic.^{2,10}

Netilmicin sulfate and other aminoglycoside derivatives were soluble in water and have good activity against enterobacteria and Pseudomonas.¹¹ The nephrotoxic effects of aminoglycoside when administered intravenously was so often in handling cases of UTI, and the evidence that these groups were not absorbed in the walls of the bladder and lower urinary tract considered to use it via instillation.¹²⁻¹⁴

This study was trying to prove the effectiveness of netilmicin sulfate bladder instillation in reducing the incidence of CAUTI, judging from urine culture before and after catheter removal on surgical patients in Sanglah Hospital, Denpasar, Bali-Indonesia

MATERIALS AND METHOD

This study was a single-blind randomized control trial, from March to August 2012, with overall eligible samples were 40 patients, which were treated at the Surgical Ward in Sanglah Hospital, Denpasar, Bali. This trial was approved

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by the Regional Ethical Review Board in Indonesia by the Faculty of Medicine Udayana University/Sanglah General Hospital Ethic Commission. All patients recruited gave their informed consent to participate.

Samples were randomly allocated (1:1) into treatment and control group. For treatment group, 20 patients had netilmicin sulfate instillation and 20 other without instillation procedure. Urine cultures were taken before and after catheter removal procedure. The number of colonies was analyzed according to the 3rd WHO criteria with significant bacteriuria more than 10⁵ CFU/mL. Data were analyzed with Chi-square table and processed statistically with SPSS. Significance is determined by the value of $p < 0.05$ and 95% CI.

RESULTS

Samples that met the inclusion criteria were 40 subjects. All subjects were male with a mean age of 50.07 (SD 15.49) years. The day span urinary catheter insertions were 5 days average, with a minimum span 4 days to a maximum 14 days.

Overall results of the urine culture obtained 24 (60%) the growth of bacteria colonies $> 10^5$ CFU/mL, and 12 (30%) the growth of colonies of bacteria $< 10^5$ CFU/mL. Most classes of germs found are gram-negative bacteria. Five types of the most germs were *E. coli* (40%), *Stap. aureus* (17.5%), *Pseudomonas sp.* (10%), *Klebsiela oxytoca* (7.5%) and *Stap. epidermidis* (5%). According to WHO criteria, the growth of $> 10^5$ CFU/mL bacteria is UTI and significant bacteriuria in this 3rd Category were CAUTI. Of the total eligible subjects, found CAUTI by 18 (45%) subjects, consisting of symptomatic CAUTI 61.1% and 38.9% were asymptomatic.

These results shows that netilmicin sulfate instillation before the catheter removal was statistically significant ($p < 0.05$) lowering the risk of significant bacteriuria after indwelling short-term urethral catheter insertion (OR 0.028 95% CI 0.004 to 0.172).

DISCUSSION

Generally, from 40 samples in this study, after an urine culture done prior to catheter removal, earned 18 (45%) growth of bacterial colonies of more than 100,000 CFU/mL. Hyattsville, MD¹⁵, and Calvin Court¹⁶ gain a 40% incidence of UTI after short-term urethral catheter of all health care centers in the United States, while Getliffe & Newton¹⁷ gain 8% incidence of UTI patients treated on community setting. Striking difference of the two results may be related to different patient care areas, where the number of Healthcare Associated Infection (HAI) CAUTI result is higher than in the community. Abby, et al.¹⁸, reported a 24.83% CAUTI incidence of 13,771 cases of HAI.

In this research found that most types of bacteria is *E. coli* (40%). These results together with the results of research conducted by Suyasa Sastrodiharjo¹⁹, Stewart and Costerton²⁰ and Pascale, et al.²¹ and Jha, et al.²² that most germs that cause CAUTI was *E. coli* (49%). This is related to the pathophysiology of UTI, in which nearly 95% are due to ascending infection, so the germs that cause common enteric like a colony of *E. coli*.^{1,3,15} Meanwhile, research of Sumi, et al.²³ found the most germs that cause CAUTI was *Pseudomonas* (51%). Differences in results are likely due to the germs that cause CAUTI and sensitivity patterns varying according to patient-care areas where patients are admitted to intensive care is often caused by nosocomial bacteria (*Pseudomonas*), whereas outpatients are often caused by *E. coli*.

The reason for choosing an aminoglycoside type such as netilmicin sulfate are due to which soluble in water and has good activity against enterobacteria and *Pseudomonas*.¹¹ Nephrotoxic side effects when administered intravenously is often an obstacle in dealing with cases of UTI.¹² With netilmicin sulfate instillation then their nefrotocsic effects can be avoided, let alone have proved that aminoglycoside group not absorbed in the bladder wall and the lower urinary tract.^{13,14} Antimicrobial resistance against bacteria isolated from urine has been investigated by Ling, et al.²⁴, who conducted a study of two hospitals in Hong Kong, they get an average of 15.6% netilmicin resistance ($p < 0.01$). It was a pretty support the effectiveness of netilmicin kill the germs which grow from urine cultures such as the results of this study.

This study is similar to Puri, et al.²⁵ however, they are specifically examined patients in neurology and neurosurgery unit who were treated in intensive care. While this study using surgical patients who were admitted to the general surgical ward. The results apparently achieved prove the same thing that drugs known as aminoglycoside bladder instillation effective to reduce the risk of CAUTI. Netilmicin sulfate instillation at a price of drug IDR 296 thousand, much cheaper than the cost to be paid for each episode of CAUTI. According to research Saint,²⁶ the costs per episode of CAUTI for U.S. \$ 676 which is equivalent to IDR 6 million per patient. Although there are some weaknesses in this study, such as the installation is not in the same indications as well as the condition of the study was not double blinded, however the results of this research have proven the effectiveness of netilmicin sulfate instillation into the bladder on procedure of short term indwelling catheter removal, the procedure is easy to do and cost effective. So it can be recommended for routine procedures in the process of short-term catheters removal in hospitals.

Table 1
Data Summary

Category	Mean/Median	n	%
1. Age	50.07 (SD 15.49) years old		
2. Duration of catheter insertion	5 days (4 – 14 days)		
3. Germs type			
Negative Gram			
<i>Escherichia coli</i>		16	40.0
<i>Enterobacter cloacae</i>		1	2.5
<i>Pseudomonas sp.</i>		4	10.0
<i>Morganella morgagni</i>		1	2.5
<i>Actinobacter baumannii</i>		1	2.5
<i>Klebsiella oxytoca</i>		3	7.5
Positive gram			
<i>Strep. betahemolitikus</i>		1	2.5
<i>Stap. aureus</i>		7	17.5
<i>Stap. epidermidis</i>		2	5.0
<i>Stap. coagulase</i>		1	2.5
No Growth		3	7.5
4. Bakteriuria > 10 ⁵ CFU/mL		18	45.0
Symptomatic CAUTI		11	61.1
Asymptomatic CAUTI		7	38.9

Table 2
The Effectivity of Netilmicin sulfate Instillation

Parameter	Significant Bakteriuria				p	OR	95% CI	
	No		Yes					
	n	%	N	%				
Netilmicin sulfate instillation	No	4	20	16	80	0.001	0.028	0.004-0.172
	Yes	18	90	2	10			
Total		22	55	18	45			

CONCLUSION

Netilmicin sulfate instillation prior to catheter removal significantly reduced the risk of CAUTI after short-term indwelling catheter.

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