Research Article

# The Risk of Urinary Tract Infection in Post-Operative Pelvic Organ Prolapse is Increasing in Patients with Shorter Urethral-Anal Distance

## *Infeksi Saluran Kemih Pascaoperasi Prolaps Organ Panggul Meningkat pada Pasien dengan Jarak antara Uretra dan Anus yang lebih Pendek*

**Emir Fakhrudin[1], Amir Fauzi[1], Kms Yusuf Effendy[1], Theodorus[2]**

*[1]Department of Obstetrics and Gynecology*
*[2]Medical and Health Research Unit*
*Faculty of Medicine University of Sriwijaya/*
*Dr. Mohammad Hoesin Hospital*
*Palembang*

## Abstract

**Objectives**: The purpose of our study was to find the correlation between urethral-anal distance and urinary tract infection (UTI) after surgery for grade III and IV uterine prolapse.

**Methods**: Cross sectional study of 57 consecutive women who underwent surgery for grade III and IV uterine prolapse Fisher exact test was used to determine independent risk factors.

**Results**: Eight (14%) women developed a UTI. The risk of UTI was significantly increased in women whose distance between the urethra and the anus was less than 50.27 mm, with PR: (95%CI): 43.75 (6.05-303.61) and p: 0.001.

**Conclusion:** There is correlation between urethral-anal distance and urinary tract infection (UTI) after surgery for grade III and IV uterine prolapse.

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**Keywords**: cystocele, pelvic organ prolapse, rectocele, urinary tract infection, uterine prolapse

## *Abstrak*

***Tujuan**: Untuk menemukan hubungan infeksi saluran kemih (ISK) dan jarak antara uretra dan anus pada pasien pascaoperasi prolaps uteri grade III dan IV.*

***Metode**: Studi potong lintang pada 57 perempuan yang akan menjalani operasi prolaps uteri grade III dan IV. Kasus-kasus yang didefinisikan sebagai ISK budaya-dikonfirmasi dalam waktu 2 hari dari operasi. Fisher exact test digunakan untuk menentukan faktor risiko independen.*

***Hasil**: Delapan (14%) perempuan menderita ISK. Risiko ISK secara signifikan meningkat pada perempuan dengan jarak uretra dan anus < 50,27 mm dengan PR: (95% CI): 43,75 (6,05-303,61) dan p: 0,001.*

***Kesimpulan**: Didapatkan hubungan antara infeksi saluran kemih dan jarak uretra dan anus pada pasien pascaoperasi prolaps uteri grade III dan IV.*

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***Kata kunci**: infeksi saluran kemih, prolaps organ panggul, prolaps uterus, rektokel sistokel*

***Correspondence***: Emir Fakhrudin. Department of Obstetrics and Gynecology Faculty of Medicine University of Sriwijaya, Palembang. Telephone: 085788233277. Email: efmed2001@gmail.com

## INTRODUCTION

Urinary tract infection is the most common morbidity in patients with postoperative pelvic organ prolapse. This condition often occurs mainly in women, which from some research, found one in nine women postoperative pelvic organ prolapse had urinary tract infections.

Krieger (2001), in a study of 98 postoperative pelvic organ prolapse women, found that urethral-anal distance of less than 5 cm have a higher risk for urinary tract infection ($p<0.05$).[1] Falagas (2008) in a study of 113 postoperative gynecological women, found that 4.5 cm is cut off point as a risk factor for urinary tract infections. In women with urethral-anal distance less than 4.5 cm, the incidence of urinary tract infection increases, with p value 0.0013.[2] A multivariable logistic regression study by Sutkin and colleagues (2010), found that urethral-anal distance and urinary tract infection had meaningful relationship, whereby the greater the distance between the urethra and anus are at increased risk for urinary tract infection with p value 0.02 (adjusted odds ratio 1.4, 95% CI 1.1-1.9).[3]

Some of the risk factors associated with the occurrence of urinary tract infections in patients with postoperative pelvic organ prolapse, which has many factors studied were age, diabetes, obesity, menopause, the use of catheters, hygienic and prophylactic antibiotics preoperatively.

The bacteria agents that caused most often are Escherichia coli, Proteus sp., Klebsiella sp., Serratia, Pseudomonas sp. The main cause of urinary tract infections (about 80%) are bacteria Escherichia coli.[4-6] Escherichia coli can infect the urinary tract by way of migration to the urethra and grow there. That's why the distance between the urethra and the anus is considered to be one of the risk factors to consider its role in urinary tract infections in patients with postoperative prolapse.

Referring from several previous studies that give different results, we found that it is necessary to study the relationship between urinary tract infections in patients with grade III and IV postoperative uterine prolapse grade III and IV and the urethral-anal distance, so the anticipation of it can be done by better management to reduce the morbidity.

## METHOD

After obtaining approval from the institutional review board at the University of Sriwijaya, we collected the patient that underwent surgery for grade III and IV uterine prolaps between January 2011 and October 2012 as target population. The method for sampling is consecutive sampling.

Our exclusion criteria were previous history of UTI, obesity, diabetic, sexually active, hormonal therapy.

All subjects were interviewed to assess demographic characteristics of the subjects, and urine culture examination by mid stream urine collection. This was done to rule out an urinary tract infection which may be suffered by the patient at the time. Patients with preoperatively positive bacteriuria, were excluded from the sample. Then samples were performed the operation in accordance with the indications and the degree of uterine prolapse.

On the 3rd after surgery, postoperative urine culture was done by mid stream urine collection in the microbiology Laboratory of Dr. Mohammad Hoesin Palembang. From 59 women that underwent surgery grade III and IV uterine prolaps collected, 2 were excluded because of preoperative bacteriuria and sexually active.

Urethral-anal distance was measure by adding genital hiatus length and perineal body length based on POP-Q system. The data obtained were processed using the statistical program SPSS for Windows and tested with Fischer's exact test for to see the influence of risk factors on the incidence of urinary tract infection.

## RESULTS

In this research, 57 of 59 women who will undergo surgery uterine prolapse grade III and IV who met the inclusion criteria in the period of January 1, 2011 up to October 2012.

**Table 1.** Demographic Characteristic of Subject.

| Characteristic | Frequency | |
|---|---|---|
| | n | % |
| Age | | |
| • ≤ 62 | 27 | 47.4 |
| • > 62 | 30 | 52.6 |
| Parity | | |
| • 0 | 1 | 1.8 |
| • 1 - 4 | 21 | 36.9 |
| • 5 - 12 | 35 | 61.5 |
| Degree of uterine prolaps | | |
| • III | 27 | 47.4 |
| • IV | 30 | 52.6 |
| Degree of cystocele | | |
| • I | 2 | 3.5 |
| • II | 35 | 61.4 |
| • III | 20 | 35.1 |
| Degree of rectocele | | |
| • I | 2 | 3.5 |
| • II | 17 | 29.8 |
| • III | 4 | 7.0 |
| Surgery technique | | |
| • TVH + AC | 30 | 52.6 |
| • TVH + AC + PC | 22 | 38.6 |
| • TVH + colpocleisis | 5 | 8.8 |
| Bacteriuria | | |
| • Positive | 8 | 14.0 |
| • Negative | 49 | 86.0 |
| Kind of bacteria | | |
| • Enterococcus faecalis | 3 | 5.3 |
| • Escherichia coli | 5 | 8.7 |
| • No bacteria | 49 | 86.0 |

The mean age of the study subjects at 62.23 ± 8.30 years. Age groups were divided into two groups based on the median value. Distribution of subjects in the group were aged ≤ 62 years a total of 27 subjects (47.4%) and > 62-year total of 30 subjects (52.6%).

Most are on parity 4 and 8, respectively by 9 subjects (15.8%) and the second largest is parity 6 by 8 subjects (14.8%). All subjects had a normal

body mass index (18.5 to 25) with a mean of 22.63 ± 1.39. This is consistent with the inclusion criteria set (Table 1).

Grade IV uterine prolapse was found in 30 subjects (52.6%), while grade III uterine prolapse was found in 27 subjects (47.4%). Almost half of the subjects (40.3%) experienced rectocele, and most (29.8%) suffered from grade II rectocele. Operating techniques most widely used in uterine prolapse surgery is a combination of total vaginal hysterectomy (TVH) + anterior colporrhaphy (AC) that was performed in 30 subjects (52.6%), followed by total vaginal hysterectomy (TVH) + anterior colporrhaphy (AC) + posterior colphorrhaphy (PC), performed in 22 subjects (38.6%). The mean length of uterine prolapse surgery of subjects was 74.04 ± 14.98 minutes.

Postoperative UTI in this study were found in 8 subjects (14%), while 49 subjects (86%) did not experience UTI. The type of bacteria commonly found in subjects with positive UTI was Escherichia coli in 5 subjects (8.7%) and Enterococcus faecalis bacteria in 3 subjects (5.3%).

The mean distance between the urethral-anal was 58.50 ± 5.89 mm. The subjects with positive UTI has shorter urethral anal than the negative subjects (UTI 48.36 ± 1.90 mm vs 60.15 ± 4.48 mm). There is a significant difference in the distance the urethral-anal between subjects with positive to negative UTI.

The cut off point of urethral-anal distance was 50.27 mm. There were seven subjects (12.2%) with urethral-anal distance < 50.27 mm who had UTI, while 1 subjects with urethral-anal distance < 50.27 mm did not have UTI. Based on the statistical analysis of the Fisher exact test, there was a significant distance between the urethral-anal distance and the incidence of UTI (p = 0.001) with a value of prevalence ratio (PR) of 43.75 times.

Operating time factor was divided into 2 groups based on the mean value of the operating time, ≥ 74 minutes and < 74 minutes. There was 5 subjects (8.8%) with operating time ≥ 74 minutes and positive UTI and 23 subjects with negative UTI. Based on Fisher's exact test statistical analysis, there was no significant relationship between the incidence of UTI and operating time (p = 0.414) with prevalent Ratio (PR) of 1.73 times.

From all the subject with UTI, 4 subjects (7.0%) undergoing TVH (Total Vaginal Hysterectomy) combined with AC (Anterior Colporrhaphy) and 2 subjects (3.5%) on undergoing + AC + PC (Posterior Colporrhaphy ) and TVH + positive colpocleisis. Based on the statistical analysis of the Fisher test, there was no significant correlation with the incidence of UTI and surgical technique (p = 0.197) with the values prevalent Ratio (PR) of 0.93 times.

## DISCUSSION

In this study, the results were based on the variables of age, almost similar study conducted by Sutkin and colleagues (2010), where the average age of patients with uterine prolapse grade III and IV is the age of menopause, and also similar to the study conducted by Fauzi A and Anhar K (1999-2003) in which patients with uterine prolapse is most postmenopausal age, and also according to research Jaffar Siddik where a majority (69%) patients had during menopause.[3,7] The age of menopause is a risk factor for pelvic organ prolapse. In menopausal women, in addition to a lack of estrogen produced by the ovaries as well as the age factor could cause the pelvic floor muscles such as the pelvic diaphragm, urogenital diaphragm and fascia ligament will undergo atrophy and weaken. This situation will make the muscles and fascia can not perform its function well as a proponent of organ that causes genital to prolaps.

From this study, multiparous, or grande multipara was concluded as a cause that play a role in the occurrence of uterine prolapse, according to some of the existing literature, where more and

**Table 2.** The Correlation between Urethral-Anal Distance and the Incidence of UTI.

| Urethral-anal distance (ROC) | UTI | | | | p | PR (95%CI) |
|---|---|---|---|---|---|---|
| | Positive | | Negative | | | |
| | n | % | n | % | | |
| < 50.27 mm | 7 | 12.2 | 1 | 1.8 | 0.001 | 43.75 (6.05 - 303.61) |
| ≥ 50.27 mm | 1 | 1.8 | 48 | 84.2 | | |

*Fisher exact test*

more parity, the more often the possibility of obstetric trauma can weaken the muscle of strength of pelvic floor, and also the strength of uterine ligaments. In the study conducted Sutkin and colleagues (2010), the majority of patients with grade III and IV uterine prolapse are multiparous or grande multipara. In line with research Fauzi A and Anhar K (1999-2003) at the Hospital Dr. Moh. Hoesin Palembang found 43 cases of uterine prolapse women grande multipara 47% with grade III uterine prolapse as much as 77%.[3,7]

The prevalence of UTI in this study was slightly higher than the research done by Sutkin (2010), which was 9%, or a total of 35 of 389 samples (case-control study with 35 cases and 334 controls).[2] The research conducted by Falagas, found UTI prevalence of 10%.[2] Research conducted by Krieger (2001) obtain the incidence of UTI by 15%, which is not much different from the results obtained in this study.[1]

These findings are consistent with the existing literature, where the most common causative organism is Escherichia coli, which is responsible for about 80% of UTI, Staphylococcus saprophyticus, which is about 20%, and various Enterococci.[1,4] In the study conducted by Sutkin , the dominant bacteria in samples of UTI were E. Coli (n = 14), Proteus mirabilis (n = 4), Pseudomonas aeruginosa (n = 3), Klebsiella pneumoniae (n = 3), Enterobacter (n = 3), and streptococci (n = 3). The type of bacteria obtained by Sutkin more varied, this might be due to a study conducted Sutkin have more number of samples.[2] In the research conducted by Falagas, found that E.coli are bacteria whose dominant (62%) compared to other bacteria.[2]

The mean distance between the urethral-anal was 58.50 ± 5.89 mm. The subjects with positive UTI has shorter urethral-anal distance than the subjects with negative UTI (48,36 ± 1,90mm vs 60,15 ± 4,48mm). This is contrasting with the research conducted by Sutkin (2010), where the research obtained from patients suffering from UTI has a longer urethral anal distance than those who did not suffer from UTI at 7.5 ± 1.9 cm versus 6.8 ± 1.5 cm.[2] Meanwhile, the study by Krieger (2001), had similar results with the results of this study, in which patients who suffer from UTIs had a shorter urethral anal distance compared to those not suffering from UTI is 4.8 ± 0.6 cm versus 5.0 ± 0.7 cm. This study had the same result with the study done by Krieger and Falagas, in which it was found that women with urethral-anal distance less than 5 cm have a higher risk for urinary tract infections ($p<0.05$).[2] Falagas (2008) in his study had a score of 4.5 cm as cut off point as a risk factor for urinary tract infections. In women with urethral-anal distance less than 4.5 cm, the incidence of urinary tract infection increases with p value 0.0013.[22] However, in contrast to the results obtained in the study conducted by Sutkin and colleagues (2010), that a urinary tract infection have a significant association, where the greater the distance between the urethra and anus are at increased risk for urinary tract infections with a p value 0.02 (adjusted odds ratio 1.4, 95% CI 1.1-1.9).[23] This different result may be caused by different method of study, different samples, and geographic difference.

## CONCLUSION

Prevalence of urinary tract infection in women after surgery for uterine prolapse is 14%. Most types of bacteria infecting the urinary tract in patients with postoperative uterine prolapse grade III and IV is the bacterium Escherichia coli (8.7%) and Enterococcus faecalis (5.3%). The cut off point of urethral-anal distance that causes urinary tract infections is less than 50.27 mm. There is a significant distance between the urethral-anal distance with the incidence of urinary tract infections in women after surgery for uterine prolapse.

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