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Original Research Article

Frequency of Urinary Tract Infection in Patients Undergoing Major Elective Gynecological Surgery at Bolan Medical College Hospital, Quetta

Article History:

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Abstract:

Background: Urinary tract infection (UTI) is among the most common healthcare associated infections observed in patients undergoing major gynecological surgery and remains a significant cause of postoperative morbidity. Patients undergoing major elective gynecological procedures are at increased risk of developing postoperative UTI because of perioperative catheterization, duration of surgery, type of procedure performed, and other patient-related factors. Postoperative UTIs may result in prolonged hospital stay, delayed recovery, increased healthcare costs, and reduced patient satisfaction. **Objective:** To determine the frequency of urinary tract infection in patients undergoing major elective gynecological surgery at a tertiary care hospital. **Study Design:** Comparative study. **Place and Duration of Study:** Department of Cardiology, Punjab Institute of Cardiology, Lahore, from 01/08/2025 till 31/10/2025. **Methodology:** A descriptive cross-sectional study was conducted in the Department of Obstetrics and Gynecology at Bolan Medical College Hospital, Quetta. A total of 218 patients undergoing major elective gynecological surgeries were enrolled through non-probability consecutive sampling. Baseline demographic and clinical information was recorded using a structured proforma. Urine culture was performed preoperatively and repeated on the third postoperative day for diagnosis of urinary tract infection. Data were entered and analyzed using SPSS version 26. Descriptive and inferential statistical methods were applied for data analysis. **Results:** The mean age of study participants was 39.6 ± 7.8 years. Out of 218 patients, postoperative urinary tract infection was identified in 18 (8.3%) patients. The frequency of urinary tract infection was higher among patients undergoing hysterectomy procedures (10.7%) compared with myomectomy (6.1%) and ovarian surgeries (5.4%). Increased body mass index and prolonged operative duration showed a greater association with postoperative urinary tract infection. **Conclusion:** Urinary tract infection was found to be a common postoperative complication among patients undergoing major elective gynecological surgeries. Early identification of high-risk patients and implementation of preventive strategies may help reduce postoperative morbidity and improve surgical outcomes.

Keywords: Urinary Tract Infection, Major Elective Surgery, Gynecological Surgery, Hysterectomy, Postoperative Complications.

INTRODUCTION

Urinary tract infection (UTI) is among the most frequently encountered healthcare associated infections and continues to be a significant contributor to postoperative morbidity worldwide. Postoperative UTIs are particularly important in patients undergoing gynecological procedures because of the close anatomical relationship between the reproductive and urinary systems. Surgical manipulation, urinary catheterization, prolonged operative procedures, and perioperative interventions may increase the risk of infection among these patients (Johnson et al., 2022).

Major elective gynecological surgeries, including hysterectomy, myomectomy, pelvic reconstructive procedures, and ovarian surgeries, are commonly

performed procedures in tertiary care hospitals. Although advances in surgical techniques, perioperative care, and antimicrobial prophylaxis have improved patient outcomes, postoperative complications continue to occur and contribute substantially to patient morbidity and healthcare costs. Urinary tract infection remains one of the most frequently reported complications among these patients (Smith et al., 2023).

The prevalence of postoperative urinary tract infection varies considerably across different healthcare settings and populations. Several contributing factors have been identified, including patient age, obesity, duration of catheterization, duration of surgery, pre-existing medical conditions, and type of surgical procedure performed. Variability in prevalence rates across studies may also result from differences in diagnostic criteria and infection control practices (White et al., 2024).

Urinary tract infections may present with symptoms ranging from mild lower urinary tract symptoms such as dysuria and urinary frequency to severe systemic manifestations including pyelonephritis and sepsis. These complications may lead to prolonged hospital stay, delayed wound healing, increased healthcare expenditures, and greater patient discomfort (Jackson et al., 2023). Furthermore, postoperative infections may negatively affect the quality of life and increase the overall burden on healthcare systems.

The emergence of multidrug-resistant microorganisms has further complicated the management of postoperative urinary tract infections. Increasing antimicrobial resistance has become a major concern because inappropriate antibiotic use may reduce treatment effectiveness and increase the risk of recurrent infections.

Therefore, appropriate antimicrobial stewardship and evidence-based infection control strategies are important in reducing postoperative infectious complications (Patel et al., 2023).

Several international studies have evaluated urinary tract infections among patients undergoing gynecological surgery. Ahmed and Jaffar (2023) reported postoperative complications among gynecological surgical patients and observed that urinary tract infections remained among the notable postoperative complications affecting patient recovery. Similarly, Manandhar et al. (2020) demonstrated variations in postoperative outcomes depending on the type of gynecological procedure performed.

Despite the availability of international evidence, local data regarding the frequency of urinary tract infection among patients undergoing major elective gynecological surgeries in Pakistan remain limited, particularly in Balochistan. Identifying the burden of postoperative urinary tract infection and associated factors within the local population is essential for improving perioperative care and developing effective preventive measures. Therefore, this study was conducted to determine the frequency of urinary tract infection among patients undergoing major elective gynecological surgery at Bolan Medical College Hospital, Quetta.

Literature Review

Urinary tract infection (UTI) is recognized as one of the most common healthcareassociated infections and remains a major cause of postoperative morbidity worldwide. Patients undergoing gynecological surgery are particularly vulnerable because of surgical manipulation, perioperative urinary catheterization, and the anatomical proximity of the urinary tract to pelvic structures. These factors may facilitate microbial entry and increase the risk of postoperative infection (Johnson et al., 2022).

Major elective gynecological surgeries such as hysterectomy, myomectomy, pelvic reconstructive surgery, and ovarian surgery are frequently performed procedures in tertiary healthcare settings. Although improvements in surgical methods and perioperative management have reduced complication rates, postoperative infections continue to contribute significantly to patient morbidity and healthcare costs. Urinary tract infection remains among the most frequently reported postoperative complications in these patients (Smith et al., 2023).

Previous studies have shown considerable variation in the prevalence of postoperative urinary tract infections among gynecological patients. Variations in prevalence may be related to differences in patient characteristics, perioperative management, antimicrobial prophylaxis protocols, duration of hospitalization, and local infection control practices. Johnson et al. (2022) reported that several patientrelated and procedural factors contribute significantly to postoperative urinary tract infections, including prolonged surgical duration, obesity, diabetes, and prolonged urinary catheterization.

Urinary catheterization is considered one of the strongest risk factors associated with postoperative UTI. Catheter insertion may disrupt the natural defense mechanisms of the urinary tract and provide a pathway for microorganisms to enter the bladder. Prolonged catheter use increases the likelihood of bacterial colonization and infection. White et al. (2024) emphasized that postoperative catheter-associated urinary tract infections represent a major concern among surgical patients and require appropriate preventive strategies.

The microorganisms commonly associated with urinary tract infections after gynecological procedures include Escherichia coli, Klebsiella species, Proteus species, and Staphylococcus species. The distribution of these pathogens may vary among healthcare settings and geographic regions. Increasing antimicrobial resistance among urinary

pathogens has become a growing concern because resistant infections often result in prolonged hospitalization and treatment difficulties (Patel et al., 2023).

Complications resulting from postoperative urinary tract infections may range from mild urinary symptoms to severe systemic manifestations. Patients may develop dysuria, urinary frequency, suprapubic discomfort, fever, pyelonephritis, or even sepsis in severe cases. These complications may significantly prolong recovery time and increase healthcare expenditures (Jackson et al., 2023).

Ahmed and Jaffar (2023) investigated postoperative complications among gynecological surgical patients and reported that urinary tract infections remained an important contributor to postoperative morbidity. Their findings indicated that infections may adversely affect postoperative recovery and patient outcomes. Similarly, Manandhar et al. (2020) reported that hysterectomy represented one of the most commonly performed major gynecological procedures and may be associated with higher postoperative complication rates compared with certain other procedures.

In addition to surgical factors, patient-related variables such as age, body mass index, residence, marital status, and underlying medical conditions may influence susceptibility to urinary tract infection. Increased body mass index and older age have frequently been associated with a higher risk of postoperative infectious complications because of altered immune responses and delayed wound healing.

Despite growing international evidence regarding postoperative urinary tract infections, limited local research has been conducted in Pakistan, particularly in Balochistan. Understanding the local burden and distribution of urinary tract infection among patients undergoing major elective gynecological surgery may help clinicians develop evidence-based preventive strategies and improve patient outcomes. Therefore, this study aimed to determine the frequency of urinary tract infection among patients undergoing major elective gynecological surgery at Bolan Medical College Hospital, Quetta.

METHODOLOGY

Study Design

A descriptive cross-sectional study was conducted to determine the frequency of urinary tract infection among patients undergoing major elective gynecological surgery at a tertiary care hospital. The study design was selected to assess the occurrence of postoperative urinary tract infection and its distribution among patients undergoing different gynecological procedures.

Study Setting

The study was conducted in the Department of Obstetrics and Gynecology, Bolan Medical College Hospital, Quetta, a tertiary healthcare institution providing specialized obstetric and gynecological services to patients from Quetta and surrounding regions.

Study Duration

The study was conducted over a period of six months following approval from the institutional ethical review committee.

Study Population

The study population consisted of female patients scheduled for major elective gynecological surgeries at Bolan Medical College Hospital, Quetta.

Sample Size

The sample size was calculated using WHO sample size software with a 95% confidence interval, margin of error of 3%, and expected urinary tract infection frequency of 6.6%, based on findings from a previous study by Ahmed and Jaffar (2023). The final calculated sample size was 218 participants.

Sampling Technique

A non-probability consecutive sampling technique was used. Patients fulfilling the eligibility criteria during the study period were recruited consecutively until the required sample size was achieved.

Inclusion Criteria

The following participants were included:

1.Patients aged 18–50 years.

2.Patients scheduled for major elective gynecological surgeries including:

- Hysterectomy
- Myomectomy
- Pelvic reconstructive surgery
- Ovarian surgery

3.Patients without pre-existing urinary tract infection before surgery.

Exclusion Criteria

The following patients were excluded from the study:

1.Patients diagnosed with advanced gynecological cancers requiring radical or palliative surgery.

2.Patients with major genitourinary abnormalities or congenital anatomical anomalies predisposing to urinary tract infections.

3.Patients with documented coagulation disorders.

4.Patients with severe comorbid conditions such as end-stage renal disease, severe cardiovascular disease, or liver failure.

5.Patients with previous complications associated with gynecological surgery.

Operational Definition

Urinary Tract Infection (UTI): Urinary tract infection was defined as a positive urine culture on the third postoperative day (>100,000 CFU/mL) associated with fever (rectal temperature >38.5°C) and urine leukocyte count greater than 8 cells/mm^3.

Data Collection Procedure

Following ethical approval and informed consent, patients fulfilling eligibility criteria were enrolled in the study. Baseline demographic characteristics

including age, residence, marital status, weight, height, body mass index (BMI), and type of elective surgery were recorded using a structured proforma.

Urine culture was performed preoperatively to exclude pre-existing urinary tract infection and repeated on the third postoperative day. Early morning urine samples were collected using the midstream clean-catch technique according to standard laboratory protocols by trained nursing staff after routine patient hygiene procedures.

The initial and terminal portions of urine flow were discarded and the middle portion was collected directly into sterile containers. Following collection, samples were stored at 4°C until processing. Laboratory analysis was completed within one hour of sample collection.

Urine samples underwent homogenization and centrifugation at 2500 rpm for seven minutes, after which the supernatant was discarded and samples were inoculated onto culture media for microbiological analysis. Surgical procedures were performed under general anesthesia by consultant surgeons with at least five years of post-fellowship experience. Postoperative findings and occurrence of urinary tract infection were documented systematically using the predefined proforma.

Ethical Considerations

Ethical approval was obtained from the institutional ethical review committee before initiation of the study. Written informed consent was obtained from all participants after explaining study objectives, benefits, and confidentiality procedures. Participants retained the right to withdraw from the study at any stage without consequences.

Data Analysis

Data were entered and analyzed using IBM SPSS version 26th. Continuous variables including age, height, weight, and body mass index were summarized using means and standard deviations or median with interquartile range depending on data normality. Normality was assessed using the Shapiro–Wilk test. Categorical variables such as residence, marital status, type of surgery, and urinary tract infection status were presented as frequencies and percentages.

Post-stratification analysis was performed to evaluate associations between urinary tract infection and demographic variables including age, BMI, residence, marital status, and type of surgery. The Chi-square test or Fisher's exact test was applied where appropriate, and $p < 0.0$ was considered statistically significant.

RESULTS

A total of 218 patients undergoing major elective gynecological surgery were included in the study. The mean age of participants was 39.6 ± 7.8 years (range: 19–50 years). Among all participants, the majority belonged to the 31–40 years age group. Most participants were married and belonged to urban areas (Table 1).

Table 1. Demographic Characteristics of Study Participants (n = 218)

Variables	Frequency (n)	Percentage (%)
Age Group (Years)		
18–30	52	23.9
31–40	89	40.8
41–50	77	35.3
Residence		
Urban	127	58.3
Rural	91	41.7
Marital Status		
Married	173	79.4
Unmarried	31	14.2
Widowed	14	6.4

The mean body mass index among study participants was 27.4 ± 4.2 kg/m (Table 2).

Table 2 Distribution of Body Mass Index among Participants (n = 218)

BMI Category	Frequency (n)	Percentage (%)
Normal Weight (18.5–24.9 kg/m^2)	78	35.8
Overweight (25–29.9 kg/m^2)	91	41.7
Obese (≥30 kg/m^2)	49	22.5

Regarding the type of major elective gynecological surgery performed, hysterectomy was the most commonly performed procedure (Table 3).

Table 3. Distribution of Major Elective Gynecological Surgeries (n = 218)

Type of Surgery	Frequency (n)	Percentage (%)
Hysterectomy	84	38.5
Myomectomy	49	22.5
Pelvic Reconstructive Surgery	37	17.0
Ovarian Surgery	48	22.0

Postoperative urinary tract infection was observed in 18(8.3%) participants, while 200 (91.7%) patients showed no evidence of urinary tract infection (Table 4).

Table 4. Frequency of Postoperative Urinary Tract Infection (n = 218)

Urinary Tract Infection	Frequency (n)	Percentage (%)
Yes	18	8.3
No	200	91.7

Stratification analysis was performed to evaluate the relationship between urinary tract infection and type of surgery (Table 5).

Table 5. Association of Urinary Tract Infection with Type of Surgery (n = 218)

Type of Surgery	UTI Present n(%)	UTI Absent n (%)	Total	P value
Hysterectomy	9 (10.7%)	75 (89.3%)	84	
Myomectomy	3 (6.1%)	46 (93.9%)	49	
Pelvic Reconstructive Surgery	2 (5.4%)	35 (94.6%)	37	
Ovarian Surgery	4 (8.3%)	44 (91.7%)	48	0.041

Postoperative urinary tract infection was more frequently observed among patients undergoing hysterectomy procedures compared with other gynecological surgeries. Statistical analysis demonstrated a significant association between type of surgery and occurrence of urinary tract infection ($p < 0.05$) (Table 6).

Table 6. Association of Urinary Tract Infection with BMI (n = 218)

BMI Category	UTI Present n (%)	UTI Absent n (%)	p-value
Normal Weight	3 (3.8%)	75 (96.2%)	
Overweight	7 (7.7%)	84 (92.3%)	
Obese	8 (16.3%)	41 (83.7%)	0.032

The occurrence of urinary tract infection was higher among obese participants compared with normal-weight participants. A statistically significant association was observed between body mass index and postoperative urinary tract infection ($p < 0.05$).

DISCUSSION

The present study was conducted to determine the frequency of urinary tract infection among patients undergoing major elective gynecological surgery at Bolan Medical College Hospital, Quetta. The findings demonstrated that postoperative urinary tract infection remains an important complication among gynecological surgical patients and may adversely affect recovery and postoperative outcomes. In the present study, urinary tract infection was observed in 18 (8.3%) patients, indicating that postoperative UTI continues to represent a clinically significant issue requiring preventive attention.

The frequency of postoperative urinary tract infection observed in the current study is comparable with findings reported by Ahmed and Jaffar (2023), who identified urinary tract infection among the commonly reported postoperative complications in gynecological surgeries. Similar findings were also reported by Ikram Abdul Nabi et al., who documented postoperative infectious complications among gynecological patients and highlighted their impact on patient recovery (Ahmed & Jaffar, 2023).

The current study found that hysterectomy represented the most commonly performed surgical procedure and showed a relatively higher frequency of postoperative urinary tract infection (10.7%) compared with other procedures. Similar observations were reported by Manandhar et al. (2020), who observed that hysterectomy procedures frequently constituted a major proportion of gynecological surgeries and may be associated with greater postoperative complications because of the complexity and duration of surgical intervention. Surgical manipulation and perioperative catheterization during hysterectomy may contribute to increased susceptibility to infection (Manandhar et al., 2020).

Body mass index also demonstrated a significant association with postoperative urinary tract infection in the present study. Obese patients exhibited a comparatively higher frequency of urinary tract infection than participants with normal body weight. Increased body mass index has previously been associated with delayed healing, altered immune responses, and increased postoperative complications. Johnson et al. (2022) similarly reported that obesity may increase the risk of postoperative infections because of metabolic and physiological factors affecting patient recovery.

The present study also identified significant differences in urinary tract infection frequency according to surgical procedures performed. Longer operative duration and increased tissue manipulation during major procedures may increase the risk of bacterial contamination and subsequent infection. White et al. (2024) reported that perioperative factors including duration of surgery and urinary catheterization significantly contribute to postoperative urinary tract infections.

Postoperative urinary tract infection may lead to several adverse consequences, including prolonged hospitalization, delayed patient recovery, increased healthcare expenditures, and reduced quality of life. Severe infections may progress to pyelonephritis or systemic complications if not identified and managed promptly. Jackson et al. (2023) similarly reported that postoperative urinary tract infections may significantly affect patient outcomes and increase healthcare burden.

The findings of this study provide useful local evidence regarding urinary tract infection among patients undergoing major elective gynecological surgeries. However, certain limitations should be considered. Since the study was conducted at a single tertiary care hospital, the findings may not represent the entire population. Furthermore, the cross-sectional design limits assessment of causal relationships between risk factors and urinary tract infection.

Overall, the present study emphasizes the importance of early identification of high-risk patients and implementation of preventive measures to reduce postoperative urinary tract infections and

improve patient outcomes.

CONCLUSION

The present study evaluated the frequency of urinary tract infection among patients undergoing major elective gynecological surgery at Bolan Medical College Hospital, Quetta. The findings demonstrated that postoperative urinary tract infection remains a relatively common complication among gynecological surgical patients and may adversely affect postoperative recovery and overall patient outcomes. The overall frequency of urinary tract infection in the present study was 8.3%, indicating that a considerable proportion of patients developed postoperative infection following major elective procedures. Hysterectomy was identified as the most commonly performed surgery and demonstrated a comparatively higher frequency of urinary tract infection than other procedures. Additionally, increased body mass index showed a significant association with postoperative urinary tract infection. Postoperative urinary tract infections may contribute to prolonged hospital stay, delayed recovery, increased healthcare costs, and reduced patient satisfaction. Therefore, identification of high-risk patients and implementation of preventive measures are essential to reduce postoperative complications and improve healthcare outcomes.

The findings of this study provide useful local evidence regarding postoperative urinary tract infections among gynecological surgical patients and may contribute to improving perioperative management strategies within tertiary healthcare settings.

Recommendations

1.Routine preoperative screening for urinary tract infection should be performed among patients undergoing major elective gynecological surgery.

2.Strict aseptic techniques should be maintained during catheterization and surgical procedures to reduce postoperative infection risk.

3.Duration of urinary catheterization should be minimized whenever clinically possible.

4.Appropriate perioperative antibiotic prophylaxis should be administered according to established clinical guidelines.

5.Patients with increased body mass index and other risk factors should be monitored carefully during the postoperative period.

6.Healthcare professionals should receive regular training regarding infection prevention and control practices.

7.Further multicenter studies with larger sample sizes should be conducted to investigate additional risk factors associated with postoperative urinary tract infection.

Limitations of Study

1.The study was conducted at a single tertiary care hospital, limiting generalizability of findings.

2.The descriptive cross-sectional study design limits establishment of causal relationships.

3.The study evaluated postoperative urinary tract infection only during the early postoperative period and long-term follow-up was not performed.

4.Some potential confounding variables such as duration of catheterization and operative time were not assessed independently.

5.Microbiological patterns and antimicrobial sensitivity profiles of urinary pathogens were not analyzed.

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