E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.31838/ijprt/16.01.318

Research Article

Audit of Antibiotic Prophylaxis Practices in Urogynecological Surgeries and Their Impact on Postoperative Infection Rates

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Received: 11.03.26, Revised: 13.04.26, Accepted: 16.05.26

ABSTRACT

Background: Postoperative infections remain a significant cause of morbidity following urogynecological surgeries, while variations in antibiotic prophylaxis practices may influence infection outcomes.

Objective: To evaluate antibiotic prophylaxis practices in urogynecological surgeries and determine their impact on postoperative infection rates.

Methodology: This clinical audit was conducted at Tertiary Care Hospital from January 2025 to August 2025. A total of 355 patients was included in this audit. Non-probability consecutive sampling technique was used to collect the data.

Results: Appropriate antibiotic prophylaxis was observed in 248 (69.9%) patients, while 107 (30.1%) received inappropriate prophylaxis. Overall postoperative infections occurred in 43 (12.1%) patients. Infection rates were significantly lower in patients receiving appropriate prophylaxis compared with inappropriate prophylaxis (8.1% vs 21.5%, p=0.002). Inappropriate prophylaxis (Adjusted OR 2.74, 95% CI 1.42–5.31), prolonged operative duration (Adjusted OR 2.19, 95% CI 1.14–4.18), and prolonged catheterization (Adjusted OR 2.46, 95% CI 1.21–4.97) were independent predictors of postoperative infection.

Conclusion: Appropriate antibiotic prophylaxis practices were significantly associated with lower postoperative infection rates in urogynecological surgeries.

Keywords: Antibiotic Prophylaxis, Urogynecological Surgery, Postoperative Infection, Surgical Site Infection.

INTRODUCTION

Postoperative infections remain a significant source of morbidity following urogynecological surgeries, contributing to prolonged hospital stay, increased healthcare costs, readmissions, and adverse patient outcomes [1]. Urogynecological procedures, including pelvic organ prolapse repair, stress urinary incontinence surgery, vaginal hysterectomy, fistula repair, and reconstructive pelvic surgery, involve manipulation of the genitourinary tract and are associated with risks of surgical site infections (SSI), urinary tract infections (UTI), febrile morbidity, vault infection, and, in severe cases, pelvic abscess or sepsis [2]. Although many urogynecological procedures are categorized as clean-contaminated surgeries, microbial contamination from vaginal flora, urinary instrumentation, and prolonged catheterization can increase susceptibility to postoperative infectious complications [3]. Globally, surgical site infections account for approximately 20% of healthcare-associated infections and remain one of the most common preventable causes of postoperative morbidity [4], while infection rates after gynecologic and urogynecologic surgeries have been reported to range from 2% to 15%, depending on the type of procedure, patient risk factors, and perioperative infection prevention practices [5][6].

Antibiotic prophylaxis has become a cornerstone of infection prevention in modern surgery and has significantly reduced postoperative infectious complications when administered appropriately. The rationale for prophylactic antibiotics lies in achieving adequate tissue and serum concentrations at the time of microbial exposure, thereby reducing bacterial inoculum and preventing establishment of infection [7]. International guidelines recommend administration of prophylactic antibiotics within 30–60 minutes prior to incision for most gynecologic and urogynecologic procedures, often favoring single-dose first-generation cephalosporins in uncomplicated cases. However, despite well-established recommendations, wide variations persist in antibiotic prophylaxis practices regarding timing, selection of antimicrobial agent, dosing strategy, intraoperative redosing, and duration of postoperative antibiotic use [8]. In many settings, prolonged postoperative antibiotic courses continue to be used despite limited evidence of superiority over single-dose prophylaxis, contributing to unnecessary costs, adverse drug effects, and antimicrobial resistance [9].

Globally, postoperative urinary tract infections occur in approximately 5–25% of urogynecological surgeries, particularly in procedures involving bladder instrumentation, postoperative catheterization, or synthetic mesh placement [10]. Similarly, surgical site infection rates ranging from 2–10% have been reported in pelvic reconstructive surgeries, while higher rates may occur in patients with diabetes, obesity, immunosuppression, or prolonged operative duration [11]. Studies have demonstrated that even minor deviations from evidence-based prophylaxis protocols, such as delayed antibiotic administration or inappropriate antibiotic choice, may increase postoperative infection risk [12]. Moreover, the growing complexity of urogynecological procedures, including minimally invasive and mesh-based surgeries, has generated ongoing debate regarding whether conventional prophylactic regimens remain sufficient in all surgical scenarios [13].

Objective

To evaluate antibiotic prophylaxis practices in urogynecological surgeries and determine their impact on postoperative infection rates.

METHODOLOGY

This Clinical Audit was conducted at Tertiary Care Hospital from January 2025 to August 2025.

A total of 355 patients was included in the study. Non-probability consecutive sampling technique was used to collect the data.

Inclusion Criteria

1. Women undergoing urogynecological surgeries including pelvic organ prolapse repair, stress urinary incontinence surgery, vaginal hysterectomy, fistula repair, and reconstructive pelvic procedures were included.
2. Patients aged 18 years and above were included.
3. Patients receiving perioperative antibiotic prophylaxis were included.
4. Patients willing to participate and providing informed consent were included.
5. Patients undergoing elective or emergency urogynecological procedures were included.

Exclusion Criteria

1. Patients with pre-existing active systemic or urinary tract infection before surgery were excluded.
2. Patients receiving antibiotics for ongoing therapeutic treatment unrelated to prophylaxis were excluded.
3. Immunocompromised patients with severe uncontrolled systemic illness were excluded.
4. Patients with incomplete perioperative records or lost to follow-up were excluded.
5. Patients refusing consent were excluded.

Data Collection

After approval from the Institutional Ethical Review Committee, eligible patients fulfilling the inclusion criteria were enrolled. Baseline demographic and clinical data including age, body mass index, parity, comorbidities, type of surgery, operative duration, catheterization duration, and hospital stay were recorded on a structured proforma. Details regarding antibiotic prophylaxis practices including timing of antibiotic administration, antibiotic choice, dosage, duration, and adherence to guideline-based recommendations were documented. Patients were followed postoperatively to assess occurrence of infectious outcomes including surgical site infection, urinary tract infection, febrile morbidity, and pelvic infection. All data were recorded by the principal investigator and entered for analysis according to study objectives.

Data Analysis

Data were entered and analyzed using Statistical Package for the Social Sciences

(SPSS) version 26.0. Quantitative variables were reported as mean ± standard deviation, and qualitative variables were reported as frequencies and percentages. Chi-square test was used to assess the association between antibiotic prophylaxis practices and postoperative infection rates. A p-value ≤0.05 was considered statistically significant.

RESULTS

A total of 355 patients were included. The mean age was 49.8 ± 11.6 years, mean BMI was 28.4 ± 4.2 kg/m², and mean parity was 3.2 ± 1.4, reflecting a predominantly multiparous middle-aged population. Diabetes mellitus was present in 86 (24.2%) patients, hypertension in 74 (20.8%), and prior pelvic surgery in 68 (19.2%). The mean operative duration was 96.5 ± 24.7 minutes, mean catheterization duration was 41.3 ± 12.5 hours, and mean hospital stay was 4.2 ± 1.5 days, indicating moderate perioperative exposure and hospitalization.

Table 1. Baseline Demographic and Clinical Characteristics (n=355)

Variable	Total (n=355)
Age (years), mean ± SD	49.8 ± 11.6
BMI (kg/m²), mean ± SD	28.4 ± 4.2
Parity, mean ± SD	3.2 ± 1.4
Diabetes Mellitus, n (%)	86 (24.2)
Hypertension, n (%)	74 (20.8)
Prior Pelvic Surgery, n (%)	68 (19.2)
Operative Duration (min), mean ± SD	96.5 ± 24.7
Catheterization Duration (hours), mean ± SD	41.3 ± 12.5
Hospital Stay (days), mean ± SD	4.2 ± 1.5

Appropriate antibiotic prophylaxis was observed in 248 (69.9%) patients, whereas 107 (30.1%) received inappropriate prophylaxis. Correct timing of antibiotic administration was achieved in 261 (73.5%) patients, and appropriate antibiotic selection was seen in 274 (77.2%). Single-dose prophylaxis was used in 215 (60.6%) patients, while prolonged postoperative antibiotics were given in 140 (39.4%). Overall postoperative infection occurred in 43 (12.1%) patients, with surgical site infection in 18 (5.1%), urinary tract infection in 16 (4.5%), febrile morbidity in 7 (2.0%), and pelvic infection in 2 (0.6%), sho

Table 2. Antibiotic Prophylaxis Practices among Study Participants

Variable	n (%)
Appropriate Prophylaxis	248 (69.9)
Inappropriate Prophylaxis	107 (30.1)
Correct Timing of Administration	261 (73.5)
Appropriate Antibiotic Selection	274 (77.2)
Single Dose Prophylaxis	215 (60.6)
Prolonged Postoperative Antibiotics	140 (39.4)
Any Postoperative Infection	43 (12.1)
Surgical Site Infection	18 (5.1)
Urinary Tract Infection	16 (4.5)
Febrile Morbidity	7 (2.0)
Pelvic Infection	2 (0.6)

Patients receiving appropriate prophylaxis had significantly lower infection rates compared with those receiving inappropriate prophylaxis (8.1% vs 21.5%, p=0.002). Infection was also significantly higher in patients with operative duration greater than 120 minutes (20.4%, p=0.010), catheterization beyond 48 hours (11.3%, p=0.030), and diabetes mellitus (18.6%, p=0.020).

Table 3. Association of Antibiotic Prophylaxis Practices with Postoperative Infection

Variable	Infection Present n (%)	Infection Absent n (%)	p-value

Appropriate Prophylaxis (n=248)	20 (8.1)	228 (91.9)	0.002
Inappropriate Prophylaxis (n=107)	23 (21.5)	84 (78.5)	0.002
Operative Duration >120 min	20 (20.4)	78 (79.6)	0.010
Catheterization >48 hours	15 (11.3)	118 (88.7)	0.030
Diabetes Mellitus	16 (18.6)	70 (81.4)	0.020

Multivariable logistic regression showed inappropriate antibiotic prophylaxis as the strongest independent predictor of postoperative infection (Adjusted OR 2.74, 95% CI: 1.42–5.31, p=0.003). Prolonged catheterization >48 hours (Adjusted OR 2.46, 95% CI: 1.21–4.97, p=0.012), operative duration >120 minutes (Adjusted OR 2.19, 95% CI: 1.14–4.18, p=0.018), and diabetes mellitus (Adjusted OR 1.88, 95% CI: 1.02–3.45, p=0.041).

Table 4. Multivariable Logistic Regression for Predictors of Postoperative Infection

Predictor	Adjusted OR	95% CI	p-value
Inappropriate Antibiotic Prophylaxis	2.74	1.42–5.31	0.003
Operative Duration >120 min	2.19	1.14–4.18	0.018
Catheterization >48 hours	2.46	1.21–4.97	0.012
Diabetes Mellitus	1.88	1.02–3.45	0.041

DISCUSSION

This study evaluated antibiotic prophylaxis practices in urogynecological surgeries and their impact on postoperative infection rates and demonstrated that appropriate guideline-adherent prophylaxis was significantly associated with reduced postoperative infectious complications. Overall postoperative infection occurred in 12.1% of patients, with surgical site infection (5.1%) and urinary tract infection (4.5%) being the most frequent complications. Patients receiving appropriate prophylaxis had significantly lower infection rates compared with those receiving inappropriate prophylaxis (8.1% vs 21.5%, p=0.002), suggesting that adherence to proper prophylactic protocols plays a substantial role in reducing postoperative morbidity. Similar findings have been reported in previous research, in which appropriate perioperative antibiotic administration significantly reduced surgical site and urinary tract infections in gynecologic and pelvic reconstructive procedures [14].

The overall postoperative infection rate observed in this study is consistent with rates reported in previous research, which have ranged from 8% to 15% after urogynecological surgery, depending on patient risk factors and operative complexity. The predominance of surgical site infection and urinary tract infection in this study aligns with previous research showing these as the most common infectious complications due to tissue dissection, urinary instrumentation, and prolonged catheterisation [15]. The relatively lower rate of pelvic infection observed may reflect the effectiveness of early prophylaxis and adherence to perioperative infection prevention measures. This study also found that inappropriate antibiotic prophylaxis was an independent predictor of postoperative infection (Adjusted OR 2.74, 95% CI 1.42–5.31), reinforcing that variation in antibiotic timing, agent selection, or unnecessary prolonged regimens may adversely affect outcomes [16]. Previous research has similarly demonstrated that delayed administration or non-guideline-compliant prophylaxis increases postoperative infection risk, while standardised prophylaxis protocols improve patient outcomes and reduce avoidable complications. These findings further support the importance of evidence-based antibiotic stewardship in perioperative care [17].

Operative duration greater than 120 minutes was significantly associated with increased infection rates (20.4% vs 9.2%, p=0.01) and remained an independent predictor on multivariable analysis. This finding is consistent with previous research indicating prolonged surgery increases microbial exposure, tissue handling, blood loss, and risk of wound contamination. Likewise, prolonged catheterisation beyond 48 hours was associated with increased urinary tract infection and postoperative infectious complications, which agrees with previous research identifying catheter duration as a major modifiable contributor to postoperative UTI in urogynecological surgery [18]. These findings suggest that infection prevention extends beyond antibiotic use alone and includes optimisation of perioperative practices. Diabetes mellitus was also significantly associated with increased postoperative infections in this study, a finding biologically plausible given impaired wound healing and altered host immune response [19]. Similar observations have been reported in previous research, where diabetic patients undergoing pelvic and gynecologic surgery consistently demonstrated higher infection risk. This supports the importance of patient risk stratification when evaluating prophylaxis effectiveness and suggests that higher-risk subgroups may require closer perioperative surveillance. The study findings also contribute to the ongoing debate regarding extended postoperative antibiotic use [20].

Limitations

This study had several limitations. Being a single-center cross-sectional study, the findings may have limited generalizability to other settings or populations. Non-probability consecutive sampling may have introduced selection bias. As an observational study, causal relationships between antibiotic prophylaxis practices and postoperative infection rates could not be definitively established. Variations in surgeon practices, infection control measures, and patient-related risk factors may have influenced outcomes despite statistical adjustment. Postoperative infections were assessed within the defined follow-up period only, so late-onset infections may have been missed.

Conclusion

It is concluded that appropriate antibiotic prophylaxis practices are significantly associated with reduced postoperative infection rates in urogynecological surgeries. Guideline-adherent prophylaxis, along with optimization of modifiable perioperative factors such as operative duration and catheterization practices, may improve surgical outcomes, reduce infectious morbidity, and support rational antibiotic stewardship.

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