

Comparison of Port Site Infection Between Disposable Plastic and Metallic Ports in Total Laparoscopic Hysterectomy: A Single Center Retrospective Cohort Study

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How to cite: Afzal Z, Saleem S, Bano A, Laique T. Comparison of Port Site Infection Between Disposable Plastic and Metallic Ports in Total Laparoscopic Hysterectomy: A Single Center Retrospective Cohort Study. J Lahore Med Dent Coll. 2026;3(1):23-28

DOI: 10.70384/jlmdc.v3i01.99

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Abstract

Background: Laparoscopic surgery has revolutionized gynecological procedures by offering a minimally invasive approach, faster recovery, and reduced postoperative pain.

Objective: To compare the incidence of Port Site Infection (PSI) in patients undergoing Total Laparoscopic Hysterectomy (TLH) using disposable plastic ports versus reusable metallic ports at a private tertiary care hospital.

Methodology: It was a retrospective cohort study held at the Department of Gynae Endoscopy & Obstetrics following ethical approval. Retrospective data was collected from 2010 to 2025. Women who underwent total laparoscopic hysterectomy at the institution within the defined study period were enrolled. All the data was processed by SPSS 28.0. Quantitative variables were presented as mean \pm SD. Qualitative variables were presented as frequencies and percentages. Comparisons between groups were performed using Fisher's exact test, with a p-value \leq 0.05 considered statistically significant.

Results: A total of 24 patients were included in the study. The mean age was 50.4 ± 4.1 years in Group A and 48.9 ± 6.5 years in Group B, with a mean BMI of 28.4 ± 12.5 kg/m². All patients in both groups had positive PSI. No significant differences were observed in demographic or clinical parameters between the groups. However, wound debridement was more frequent in the disposable port group, showing a statistically significant difference (p-value = 0.05).

Conclusion: Port-site infections occurred in both plastic and metallic port groups, with no statistically significant difference between them. These findings indicated that port material alone may not be a major independent determinant of infection risk.

Key words: Surgical wound Infection, Laparoscopy, Hysterectomy

Introduction

Laparoscopic surgery has become the acknowledged standard of care for many procedures in the modern

world. Due to the rapid improvement of technology and the skill of surgeons, almost all major surgical procedures that were previously only possible using open techniques may now be performed laparoscopically.¹ The rapid advancement of laparoscopic hysterectomy has a profound effect, particularly in gynaecology. New pathways could be investigated with the introduction of laparoscopy for hysterectomy, urogynecological procedures, and oncological surgery, including lymphadenectomy in different physiological compartments.

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Submission Date: January 22, 2026
1st Revision Received: February 10, 2026
2nd Revision Received: April 12, 2026
Copyedited and Corrected: April 28, 2026
Final Revisions Accepted: May 15, 2026

As a result, it became widely accepted in urology, surgery, and gynaecology among other fields.² This minimal access surgery (MAS) has caused a drastic shift in the approach to modern surgery, by limiting the access related morbidities. It involved making tiny skin incisions away from the surgical site to implant reusable metallic or disposable plastic trocars.³ Better aesthetics, less pain, early ambulation and hospital discharge with an early return to work, and a reduction in the patient's financial load have all contributed to its growing popularity.⁴

In total laparoscopic hysterectomy (TLH) the complete operation, including vault closure and suspension, is performed laparoscopically.⁵ Laparoscopic assisted vaginal hysterectomy (LAVH) begins with a laparoscopic procedure, which is followed by a vaginal phase and a final laparoscopic phase. LAVH is the more common technique despite this clear inefficiency since most gynecologist regard TLH to be technically difficult and need lengthy operating durations. However, LAVH is less likely to be successful than TLH or abdominal hysterectomy in many women, such as those with a narrow pubic angle, tiny vagina, or high immobile uterus.⁴

Nevertheless, laparoscopic surgery carries several avoidable risks, with port-site infection being the most frequent complication, which not only concerns patients due to the possibility of persistent infection but may also lead to loss of confidence in the operating surgeon, thereby diminishing its overall benefits.⁶ The risk of port site infection may vary depending on the type of material of the port, sterilization efficacy, tissue trauma during insertion, and cost-effectiveness.^{7,8} There is limited comparative data from low-middle-income countries regarding the incidence of port site infection (PSI) between metallic and disposable plastic port types in TLH. The current project was planned to compare the incidence of port site infection in patients undergoing TLH using disposable plastic port versus reusable metallic port at a private hospital-Karachi. Therefore, this study filled that gap and guided clinical practice by providing evidence-based recommendations.

Methodology

It was a single-center retrospective cohort study conducted at the Department of Gynae Endoscopy & Obstetrics, Patel Hospital (tertiary care hospital), Karachi. It collected retrospective data from 2010 to 2025 as sample. Purposive sampling technique was used and women who underwent total laparoscopic hysterectomy at the

institution within the defined study period were enrolled.

Ethical consideration: The study was approved by the ethical review board (Reference No. PH/IRB/2025/036, Dated: 21/08/2025). Informed written consent was obtained from the participants, and the confidentiality of their data was clearly explained.

Inclusion criteria: It included women aged 25–65 years who provided consent for elective total laparoscopic hysterectomy and had complete surgical and follow-up records available.

Exclusion criteria: Patients with prior history of pre-existing infection, immune-compromised status, incomplete medical record, follow-up loss and those undergoing emergency procedure were excluded.⁸

All participants were divided into two groups as Group-A (TLH using disposable plastic ports) and Group-B (TLH using reusable metallic ports). Data was extracted from hospital records, operative notes, and post-operative follow-up logs using a pre-designed data collection form. Variables recorded were demographic parameters (age, BMI, parity), type of port used, PSI and its post-operative management and outcomes. Port-site infection was defined according to standard surgical site infection criteria, including the presence of local signs of inflammation such as erythema, induration, tenderness, and/or purulent discharge at the port site.⁹

Statistical Analysis:

All the data was processed by Statistical Package for Social Sciences (SPSS) v28.0. Normality was checked by Shapiro Wilk test. Quantitative variables like age, BMI and parity were presented as mean \pm SD. Frequency (n) and percentages (%) were calculated for qualitative variables. Descriptive statistics summarized baseline characteristics. Evaluation among groups was performed using Fisher's exact test to compare infection rates. A p-value of ≤ 0.05 was considered statistically significant.

Results

A total of 24 patients were included in the study. The mean age of patients was 50.4 ± 4.1 years in Group A (disposable plastic ports) and 48.9 ± 6.5 years in Group B (reusable metallic ports). The mean body mass index (BMI) of the study population was 28.4 ± 12.5 kg/m². Demographic characteristics of the patients are presented in Table I. No statistically significant differences were observed between the two groups with respect to marital status (p-value = 0.53) or presence of comor-

Table I: Demographic Parameters of involved Patients (n=24)

Parameters	Categories	Group-A (Disposable plastic ports)	Group-B (Reusable Metallic ports)	p-value
		Frequency (%)	Frequency (%)	
Marital Status	Yes	7(77.80)	14(93.30)	0.53
	No	2(22.20)	1(6.70)	
Comorbidities	Yes	5(55.60)	9(60.00)	0.26
	No	4(44.40)	6(40.00)	
Type of comorbidity	DM	2(40.00)	2(22.20)	0.83
	HTN	3(60.00)	5(55.60)	
	Hypothyroidism	0(0.00)	2(22.20)	
	Others	0(00.00)	0(0.00)	
	No	7(77.80)	15(100.00)	

p-value 0.05 considered statistically significant; p-value calculated by Fisher Exact Test; n: number of participants Diabetes Mellitus: DM, Hypertension: HTN

bidities (p-value = 0.26). Similarly, the distribution of types of comorbidities, including diabetes mellitus, hypertension, and hypothyroidism, was comparable between the groups (p-value = 0.83).

Clinical parameters are summarized in Table II. All patients in both groups had positive PSI (100%), and therefore no statistical comparison was applicable for this variable. No significant differences were observed

Table II: Clinical Parameters of involved Patients (n=24)

Parameters	Categories	Group-A (disposable plastic ports)	Group-B (Reusable Metallic ports)	P-value
		Frequency (%)	Frequency (%)	
PSI	Yes	9(100.00)	15(100.00)	**
	No	0(0.00)	0(0.00)	
Antibiotics Prophylaxis	Yes	8(88.90)	12(80.00)	0.57
	No	1(11.10)	3(20.00)	
Local Infiltration	Yes	2(22.20)	2(13.30)	0.57
	No	7(77.80)	13(86.70)	
Wound debridement	Yes	2(22.20)	0(0.00)	0.05*
	No	7(77.80)	15(100.00)	

*p-value calculated by Fisher Exact Test, *p-value 0.05 considered significant, n=number of participants; ** No statistical test was applied as all participants in both groups had identical outcomes (100% PSI positive); hence, p-value is not applicable, Port Site Infection: PSI*

between the groups in terms of antibiotic prophylaxis (p-value = 0.57) and local infiltration (p-value = 0.57). However, a statistically significant difference was observed in wound debridement, which was more frequent in Group A compared to Group B (22.2% vs 0.0%, p-value = 0.05).

Discussion

The present study evaluated the comparison of port site infection (PSI) between disposable plastic and metallic ports in total laparoscopic hysterectomy. The results demonstrated that the frequency of co-morbid conditions was comparable between Group A (55.6%) and Group B (60%), with no statistically significant difference (p-value = 0.83), thus indicating that baseline patient characteristics were similar across both groups. Comorbidities such as diabetes mellitus (DM) and hypertension (HTN) are well-established risk factors for impaired wound healing and increased susceptibility to surgical site infections (SSI), as highlighted in previous studies. In the current study, HTN was the most common co-morbidity observed in both groups, followed by DM, while hypothyroidism was only reported in Group B. Previous studies have consistently reported that patients with DM have a significantly higher risk of SSI and poorer outcomes due to immune dysfunction and microvascular impairment.^{10,11} Specifically, predictive models for SSI frequently include DM as a key risk factor.¹² Hypertension often coexists with DM; although its independent effect on SSI is less clear, it has been associated with poorer recovery, particularly when combined with other comorbidities.^{13,14} Although hypothyroidism was less well studied in the context of acute SSI but it has been associated with longer-term complications such as impaired overall healing and increased infection risk in surgical populations.¹⁵ Overall, the similar distribution of comorbidities between groups in this study aligns with existing literature, suggesting that while these factors influence infection risk, they did not contribute to differences between groups in the present analysis.

Notably, all participants in both groups were PSI positive (100%), resulting in a lack of variability in the outcome measure. Consequently, no statistical test (Chi-square or Fisher’s exact test) could be applied, and the p-value was not applicable. This uniform distribution limited the ability to establish any comparative association between the type of port used and the occurrence of PSI. However, it also highlighted the need to carefully interpret these findings in the context of study design and

sample characteristics. Variability in the definitions of postoperative surgical infections across studies may influence reported infection rates and limit direct comparison of findings.¹⁶ Some studies have not comprehensively defined SSI thus led to variability in reported incidence rates. Recent evidence emphasized that standardized definitions and consistent diagnostic criteria were essential for accurately comparing postoperative outcomes and ensuring reproducibility of results.¹⁶

Although antibiotic prophylaxis remained a cornerstone in preventing SSIs according to previous studies, but recent evidence highlighted the importance of appropriate timing and stewardship rather than prolonged use. A previous study has reported that the timing of antibiotic administration (preoperative vs extended perioperative regimens) did not significantly change SSI rates in general surgery patients, aligning with our finding of non-significant group differences.¹⁷ Other studies on antibiotic prophylaxis also emphasized tailored use based on local microbial profile and resistance patterns rather than prolonged postoperative antibiotics.^{18,19}

In the present study, the use of local infiltration was observed in a small proportion of patients, with 22.2% in Group A and 13.3% in Group B, while most patients in both groups did not receive local infiltration. This indicates a relatively limited and comparable utilization of this technique across the study groups. Existing literature predominantly focused on the role of local infiltration in postoperative pain control rather than infection prevention. For instance, studies in orthopedic surgery have demonstrated that local infiltration techniques are effective in reducing postoperative pain; however, they do not significantly influence wound infection rates or length of hospital stay.²⁰ These findings were consistent with the observations of the present study, where no clear association could be established between local infiltration and port site infection (PSI). The lack of significant variation in its use between groups, combined with evidence from previous studies, suggests that local infiltration may have minimal direct impact on infection-related outcomes. Therefore, while local infiltration remains a valuable modality for postoperative analgesia, its role in influencing infection-related outcomes appears limited. In the present study, no significant association was observed between local

infiltration and port-site infection, suggesting that it may not be a major contributing factor in the development of PSI following total laparoscopic hysterectomy.

A significantly higher proportion of patients in Group A required wound debridement compared to Group B (22.2% vs. 0%, $p = 0.05$). This may reflect differences in local tissue response, surgical handling, or port characteristics influencing wound healing. Previous studies have shown that tissue trauma, contamination, and impaired healing are key factors necessitating debridement.²¹ However, the small sample size warrants cautious interpretation. Another study on port-site infections in laparoscopic surgery reported that wound complications such as infection, necrosis, and delayed healing may require interventions like drainage and debridement to promote proper healing. The study emphasized that inadequate sterilization, tissue trauma, and microbial contamination are key contributors to such complications.²²

Conclusion

Port-site infections were observed with both disposable plastic and metallic ports, suggesting that port material alone may not be the primary determinant of infection risk. No significant difference in infection occurrence was observed between the groups. These findings highlight the importance of adhering to strict aseptic techniques, including operating theatre sterility, proper instrument reprocessing and sterilization, and meticulous skin preparation and draping, to minimize infection risk in laparoscopic procedures.

Limitations and Recommendations

This was a single center study with limited number of patients and financial constraints. Further prospective studies with larger sample sizes and multicenter involvement are warranted to validate these findings and explore port site infection during total laparoscopic hysterectomy.

Conflict of Interest: None

Funding Disclosure: None

Acknowledgement: None

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Authors Contribution

All authors have approved the final version and are responsible for the integrity of the study.

ZA: Literature search, data collection and review

SS: Conceptualization, literature search, review and revision

AB & TL: Data collection and analysis, writeup and revision