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Original Article

Effectiveness of Prophylactic Antibiotics in Inguinal Hernia Repair Surgery: Experience from a Surgical Unit at National Hospital Galle - an audit

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Abstract

Inguinal hernia mesh repair is a common surgical procedure where the use of Antibiotic Prophylaxis (AP) remains controversial. This audit evaluated AP practices and Surgical Site Infection (SSI) rates at a tertiary care center in Sri Lanka, benchmarking against international and local guidelines.

A retrospective study was conducted at the University Surgical Unit, National Hospital Galle, involving 90 adult patients who underwent elective open (Lichtenstein) or laparoscopic Transabdominal Preperitoneal (TAPP) mesh repair between November 2023 and November 2025. Data on demographics, comorbidities, antibiotic regimens, and postoperative outcomes were analyzed.

The majority of patients were male (96.7%) with a mean age of 57.3 years. Open repair surgery was performed in 70% of cases. Despite guidelines recommending single-dose or no prophylaxis, 83.3% (n=75) of patients received multi-dose antibiotic regimens. Only 10% received a single dose, and 6.7% received no antibiotics. The overall SSI rate was 3.3% (n=3), all of which were superficial incisional infections. Notably, all SSIs occurred in the multi-dose group, while no infections were recorded in the single-dose or no-antibiotic groups. Statistical analysis showed no significant association between the AP regimen and SSI incidence.

This audit indicates that multi-dose antibiotic regimens offer no additional benefit over single-dose or no prophylaxis in preventing SSIs following inguinal hernia repair. Adherence to current evidence-based, single-dose protocols is recommended to maintain surgical safety, reduce healthcare costs, and improve antimicrobial stewardship.

Introduction

Inguinal hernia mesh repair is one of the most frequently performed surgical procedures worldwide (1). The traditional tissue herniorrhaphy has largely been replaced with open Lichtenstein tension-free repair as the gold standard, while Laparoscopic Transabdominal Preperitoneal (TAPP) repair is also widely practiced.

Surgical Site Infection (SSI) is the most common postoperative complication following inguinal hernia repair (2). Although classified as a clean surgery, the implantation of a prosthetic mesh, which is a permanent foreign body, has the potential for infection. SSIs may significantly increase patient morbidity and lead to mesh infection requiring surgical removal. Such complications not only diminish the patient's quality of life but also increase the healthcare burden.

The necessity of Antibiotic Prophylaxis (AP) to prevent SSIs in elective inguinal hernia mesh repair is a controversial topic in surgical practice. In a tertiary care setting such as the National Hospital Galle, it is important to administer AP only when necessary, balancing the prevention of infections with the principles of antibiotic stewardship. Effective stewardship involves selecting the appropriate drug and ensuring the correct dose, timing, and duration of therapy. Adherence to these evidence-based principles enables surgical units to preserve antibiotic efficacy for the future while reducing the emergence and spread of antimicrobial-resistant bacteria. (3)

This clinical audit was conducted to evaluate the current practices of antibiotic prophylaxis in the University Surgical Unit at the National Hospital, Galle. By benchmarking local practices and clinical outcomes

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against international standards, this study aimed to identify areas for improvement in surgical care and prophylactic protocols.

Methods

This retrospective study was conducted as a clinical audit as part of the ongoing quality improvement process of at the University Surgical Unit, National Hospital Galle. The study population comprised all adult patients (>18 years) who underwent elective Lichtenstein or laparoscopic (TAPP) inguinal hernia mesh repair between 1st of November 2023 and 1st of November 2025 under the supervision of the same surgeon. Patients with recurrent hernias, emergency surgeries, or incomplete medical records were excluded.

Data were extracted from medical records, including Bed Head Tickets (BHTs), focusing on antibiotic prophylaxis (agent, dosing, duration), surgical factors (procedure type, duration, anesthesia), and patient demographics (age, sex, ASA score, comorbidities). Details regarding postoperative infections after discharge were gathered via telephone contact with the patients.

Statistical analysis was performed using the IBM™ Statistical Package for Social Sciences (SPSS™) version 25. Descriptive statistics were used to summarize patient characteristics and complication rates, while comparative tests using Fisher's Exact Test were used to evaluate the associations between prophylaxis practices and SSI. Statistical significance was set at $p < 0.05$.

Permission for the study was obtained from the Director of the National Hospital, Galle. Clearance was obtained from the Clinical Audit Committee (Reference No - NHG CAP 020).

Results

The total study population was 105, out of which 90 participants (85.7%) were included in the study after applying exclusion criteria. Reasons for exclusion included recurrent hernias (n = 4) and inaccurate contact details in the medical records, which made patient contact impossible(n = 11). There was a male predominance of 96.7%(n=87). The mean age was 57.34, with the majority aged between 50 and 70 years (42.2%, n=38). Normal BMI was recorded in 46.7% (n=42), while 22.2% (n=20) were classified as obese. Hypertension was the most prevalent comorbidity (30%, n=27), with smoking and heavy weightlifting each reported by 10%(n=9) of the study population. No patients in the sample were diagnosed with immunocompromised conditions such as HIV or primary immunodeficiencies.

Table 1: Socio-demographic data of sample

	Category	Frequency (n)	Percentage (%)
Age	**18 – 29**	8	8.9
	30 to 49	19	21.1
	50 to 70	38	42.2
	> 70	25	27.8
Gender	**Male**	87	96.7
	Female	3	3.3
BMI	**< 18.5 (Underweight)**	11	12.2
	18.5 to 22.99 (Normal)	42	46.7
	23.0 to 24.99 (Overweight)	17	18.9
	≥ 25 (Obese)	20	22.2
ASA	**I**	46	51.1
	II	44	48.9
Comorbidities and Risk factors	**Diabetes Mellitus**	6	6.7
	Smoking	9	10
	Heavy Weight lifting	9	10
	Hypertension	27	30
	Chronic cough	8	8.9
	Asthma	4	4.4
	Immunocompromised status	0	0.0

Two types of surgical techniques were performed; Open Lichtenstein tension-free repair (70%, n=63) and Laparoscopic Transabdominal Preperitoneal (TAPP) repair(30%, n=27). Most surgeries were performed by a Surgical Registrar (55.6%, n=50). The mean preoperative and postoperative hospital stays were 1.88 days and 1.14 days, respectively.

Table 2- Details of surgery

		Frequency (n)	Percentage (%)
Type of surgery	**Open**	63	70.0
	Laparoscopic	27	30.0
Surgeon grade	**Consultant**	32	35.6
	Senior Registrar	8	8.9
	Registrar	50	55.6
Preop hospital admission	**1 day**	21	23.3
	2 days	60	66.7
	More than 2 days	9	10.0
Post op hospital admission	**1 day**	82	91.1
	2 days	5	5.6
	More than 2 days	3	3.3

Four prophylactic antibiotic regimens were identified: single-dose cefuroxime, multi-dose cefuroxime regimen, single-dose co-amoxiclav, and multi-dose co-amoxiclav regimen. Single-dose regimens consisted of 1.5 g IV cefuroxime or 1.2 g IV Co-amoxiclav administered in the operating theater. In multi-dose cefuroxime regimens, the initial dose was followed by either three doses of 750 mg IV every 8 hours (5.6%, n=5) or two doses of 500 mg orally every 12 hours (13.3%, n=12). Multi-dose co-amoxiclav regimens were continued with either three doses of 1.2 g IV every 8 hours (54.4%, n=49) or three doses of 625 mg orally every 8 hours (10%, n=9).

Three cases of SSIs (3.3%) were reported within 30 days postoperatively. Following the Centers for Disease Control and Prevention (CDC) criteria, all cases were classified as superficial incisional SSIs (4). One patient (1.1%) required readmission, while the others were managed as outpatients. All infections resolved within two weeks of treatment with oral antibiotics. All patients who developed SSIs had received multi-dose prophylactic antibiotic regimens, and no significant association was observed between the antibiotic prophylaxis regimen and SSI incidence ($p = 0.737$, >0.05). Among the three patients who developed SSI, one was obese, one was overweight, and one had normal body weight. None of these patients had diabetes mellitus or were immunocompromised.

Table 3 – Association between antibiotic prophylaxis regimen and Surgical site infection

	Surgical Site Infection	
	Yes	**No**
Single-dose Cefuroxime	0	2 (100%)
Cefuroxime-based Multi-dose	1(5.9%)	16 (94.1%)
Single-dose Co-amoxiclav	0	7 (100%)
Co-amoxiclav-based Multi-dose	2(3.4%)	56(96.6%)
No antibiotics	0	6 (100%)

Discussion

The use of AP in elective inguinal hernia repair remains a topic of significant debate. According to international guidelines from HerniaSurge Group and European Hernia Society, AP is not recommended for open mesh repairs in low-risk environments. However, this suggests the selective administration of AP in high-risk environments or high-risk patients. Patients with comorbidities such as diabetes were considered as high-risk patients, while regions with high local infection rates were considered as high-risk environments. For laparoscopic repair in any environment or any patient, AP is not recommended (5).

When considering local guidelines issued by the Sri Lanka College of Microbiologists, a single intravenous dose of AP is recommended, either IV cefuroxime or IV co-amoxiclav (6). This approach may be justified by the high-risk nature of our resource-limited setting, where the potential for contamination is elevated. Specifically, the use of a shared operating theater for diverse procedures, including casualty surgeries, significantly increases the risk of cross-contamination.

Our findings reveal a significant lack of uniformity in AP regimens. Six patients (6.7%) received no antibiotics, adhering to international guidelines that recommend against routine use. A single dose of IV AP was administered to 9 (10%) patients, in accordance with local guidelines. The choice of

antibiotic was appropriate, which was either cefuroxime or co-amoxiclav. The majority of patients (n=75, 83.3%) received multi-dose AP regimens, contradicting the recommended local and international guidelines. Out of laparoscopic surgeries, only five (16.7%) patients were not administered antibiotics, despite this being the recommended practice.

The clinical efficacy of antibiotic prophylaxis depends on the timing and the duration of administration. International standards, including those from the World Health Organization (WHO), recommend administration of AP through a single intravenous dose within 60 minutes prior to the skin incision. This ensures that peak bactericidal concentrations are achieved in the tissues at the exact moment of incision and mesh implantation, when the risk of contamination is highest. (7) However, the timing of administration could not be assessed in this study, because the exact administration times for antibiotic prophylaxis were missing from the medical records. Established practices in operating theater in National Hospital Galle is that AP is commenced within 60 min prior to skin incision.

The SSI rates in inguinal hernia repair as shown in literature, ranges from 0.06% to 5.3%, with a mean value of approximately 3% (8). According to a meta-analysis of Randomized Controlled Trials by Herniasurge group, the wound infection rate in the high-risk environment groups that received AP was 4.2% (5). The SSI rate in our study was 3.3% (n=3), which aligns with other published international literature. All these infections were superficial incisional infections, which were well controlled with oral antibiotics and debridement. No deep incisional or mesh infections were reported in our study population.

All reported SSIs occurred in patients who received multi-dose regimens, and no infections were noted in the "no antibiotic" or "single-dose" groups. No significant association could be elicited between the regimen type and SSI incidence, which may be due to the small sample size of the SSI group. However, it emphasizes that multi-dose regimens offer no superior protection over single-dose prophylaxis.

The widespread use of multi-dose antibiotic regimens in 83.3% of the study population in our setting poses a significant threat to antimicrobial stewardship. Over-prescription of broad-spectrum agents like co-amoxiclav and cefuroxime, creates a burden on natural selection, eliminating susceptible bacteria while allowing resistant strains to survive and proliferate. This practice facilitates the emergence of multidrug-resistant organisms, resulting in increased patient morbidity, prolonged hospitalizations, and escalated healthcare costs. (9)

Conclusion

Given that all SSIs identified in this study occurred in patients receiving multi-dose regimens, it is evident that prolonged administration offers no additional clinical benefit. Therefore, according to current evidence, inguinal hernia mesh repair can be safely performed in high-risk environments using a single-dose prophylactic antibiotic regimen. Adhering to evidence-based, single-dose protocols is important to preserve the efficacy of antibiotics and ensure the continued safety of modern surgical procedures. Firm adherence to national AP guidelines followed by an audit study of a similar nature will shed more light on the validity of the findings.

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