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Original Article

Surgery Section

Preoperative Single Dose Intraincisional vs Intravenous Ceftriaxone in Preventing Surgical Site Infection Post-Hernioplasty Conducted at a Tertiary Care Centre at Chengalpattu, Tamil Nadu, India

A PRAVINDHAS[1], K NAVANEETHA[2], A AJAY RAJA[3], R LAKSHMANA[4], NEETHISH K PAUL[5]

ABSTRACT

Introduction: Among the hospital acquired infections, Surgical Site Infection (SSI) still remains as the major problem for surgeons. Inguinal hernia surgeries are considered as clean surgeries, incidence of SSI in posthernioplasty is found to be 3.1%-4.5%. However, in tertiary care centres in developing countries like India, the incidence is found to be high at 11-14%.

Aim: The aim of the present study was to compare the efficacy of preoperative single dose ceftriaxone infiltration at the incision site and preoperative Intravenous ceftriaxone only in preventing SSI in hernioplasty.

Materials and Methods: A prospective interventional study was conducted at SRM Medical College and Research Institute, Chengalpattu, Tamil Nadu, from May 2021 to October 2022 for a duration of 18 months in 100 Patients, who attended the surgical outpatient block or other known cases of inguinal hernia who were referred to the surgery department from other departments. They were divided into group A or group B randomly. Hernioplasty was done on these groups, preoperative, intraoperative and postoperative wound swab was sent for these patients. Postoperatively patients were followed-up on 3rd, 7th and 14th day and assessed for development of SSI. The continuous variables were presented as mean and SD. The categorical variables were expressed in percentages. The significance of continuous scale data between two groups were determined using student t-test. The Chi-square/Fischer's-exact test was used to evaluate the significance of the categorical data analysed. Data analysis was computed using Statistical Package for Social Sciences (SPSS) version 27 and Microsoft excel office 2019.

Results: Male preponderance was seen 91% in inguinal hernias. Most of the patients belonged to the age group of 41-60 (54%) years of age. Ten patients (20%) developed SSI who got i.v. antibiotic injection but only three patients (6%) developed SSI who got intraincisional antibiotic injection with a p-value of 0.037 (<0.05) showing significance. One patient developed haematoma for with re-exploration was done on Postoperative Day (POD) #3. Two patients developed wound gapping for which secondary suturing was done on POD #7 and suture removal was done on POD #21. For rest of the all the patient's suture removal was done on POD #14. Intraopertive and postoperative and organism growth was seen only in the 13 patients who developed SSI. Most common organism isolated was staph, Aureus (38.5%, 5 cases). All 13 patients who developed SSI had some co-morbidity. Out of the 13 patients who developed SSI 11 patients (84%) had surgery for more than 30 minutes. Mean hospital stay was 3-5 days (87%).

Conclusion: In the present study, there was significant reduction in incidence of SSI in the group, that received preoperative single dose Intraincisional ceftriaxone than the other group that received only preoperative intravenous ceftriaxone. Preoperative intraincisional antibiotics significantly reduces the rate of SSI because of the higher concentration achieved at the incision site.

Keywords: Antibiotics, Complication, Efficacy, Hernia, Infection, Inguinal, Mesh, Postoperative, Surgical wound

INTRODUCTION

Among the hospital acquired infections 33% are due to Surgical Site Infection. SSI still continues to be a major problem for surgeons as it not only increases the hospital stay but also affects the postoperative outcome of the patients. It not only affects the surgeon and patients but also adds on to the economic burden for patient and for the country [1]. Ninety percent of the SSI occurs within 30 days of surgery, most commonly 5 to 6 days of postoperative period. The organisms get introduced through the wound during the decisive period. In order to prevent surgical site contamination surgical prophylaxis is must, as its main goal is to ensure ideal tissue concentration of drug have a reasonable broad-spectrum activity against expected organisms is maintained during the decisive period [2]. Failure to maintain this leads to increased chances of SSI. Polk HC Jr et al., has emphasised that efficacy of the antibiotic agent for prophylaxis of SSI is based on wounds levels and not blood or serum levels [3].

After a breach in the tissue either due to trauma or surgery, it takes 4 hours interval before bacterial growth gets established to cause an infection this is called decisive period [4]. Preoperative intraincisional injection helps to achieve this high tissue levels. So, the need of the hour is to achieve high target tissue concentrations of desired antibiotic based on microbiological prevalence of organisms in clean, contaminated, and dirty surgical incisions [4]. It is not advisable to use the antibiotic for a prolonged period, because of the emergence of multidrug resistant strains [5]. Hernioplasty surgeries are considered as clean surgeries and the incidence of SSI in open hernia surgeries are found to be 3.1% to 4.5% [6], but in tertiary care centres in developing countries like India SSI for clean surgeries are found to be high 10-14% [7,8], due to various factors like preoperative care, theatre environment, postoperative care, lesser concentration of antibiotic at the incision site, use of synthetic (prolene) mesh, fibrin matrix formed at the incision site, and improper timing of administration of the antibiotics. Hence,

antibiotic prophylaxis has become a must in inguinal hernia surgeries [9]. Antibiotic prophylaxis in open hernioplasty has proved to reduce the incidence of SSI by 50%, in this study, a novel technique has been used which is single dose intraincisional infiltration of antibiotic, there are studies over the past decade that has showed positive outcome for intraincisional infiltration of ceftriaxone, but all those studies had a postoperative antibiotic coverage [8-10].

Thus, the aim of the present study was to compare the "efficacy of preoperative single dose ceftriaxone infiltration at the incision site and preoperative Intravenous ceftriaxone only in preventing SSI in hernioplasty".

MATERIALS AND METHODS

A prospective interventional study was conducted at SRM Medical College and Research Institute, Chengalpattu, Tamil Nadu, India, from May 2021 to October 2022. 100 patients were included, with 50 in each group, who attended the surgical outpatient block or referred to the department who were known case of Inguinal hernia. Prior clearance was obtained from the Institutional Ethical Committee vide letter no 2827/IEC/2021.

Sample size calculation:

Formula: $n=\frac{(Z\alpha+Z1-\beta)2\ (P1Q1+P2Q2)}{(P1-P2)2}$

P1=25% in patients who received intra-venous injection; P2=5% in patients who received intraincisional infiltration; Q=(100-P); Zα+Z1-β=3.92

Prevalence was calculated based a study by Singh A et al., [8].

Where,

P1=developed SSI in group A

P2=developed SSI in group B

Q1=not developed SSI in group A

Q2=not developed SSI in group B

=7.84 (1875+475)

400

=46.1≈50 in each group

Patients were randomly allocated with odd numbers in group A and even numbers in group B in the order of admission to each group (single dose of intravenous ceftriaxone (1 gm) vs intraincisional ceftriaxone before starting procedure) following which patients were followed-up on outpatient basis for a period of four weeks.

Inclusion criteria: The inclusion criteria were patients more than 18 years of age (male/female) undergoing open hernioplasty at our tertiary care centre who showed nil allergy to test dose (ceftriaxone) and who are ready to take part in the study and accepting the informed consent were included and those who belonged to ASA I/II category [11].

Exclusion criteria: Patients who were excluded from this study where those who did not consent for the study and those who had incisional hernias, recurrent hernias, inguinal hernias with complications like irreducibility, obstruction, strangulation, incarceration and laparoscopic hernia repair and those who are allergic to ceftriaxone test dose and those had a prior incidence of SSI and patients who are suffering from liver failure, immunocompromised or prolonged steroid therapy and those who belonged to ASA III/IV.

A proper clinical history with examination and informed consent, Injection ceftriaxone, 10 mL distilled water supplied in the hospital and Microbiology lab requisition form for pus culture and sensitivity. All patients with inguinal hernia in an elective setting were included after obtaining written informed consent. Patients were randomised into two groups by allotting random numbers.

Group A: Prophylaxis by intraincisional Infiltration of the Antibiotic (1 gram of Ceftriaxone diluted with 10 mL of distilled water was infiltrated along the site of proposed incision 20 minutes before incision after induction by the anaesthetist).

Group B: A single dose of one gram of Ceftriaxone was administered intravenously 20 minutes before the surgical incision at the time of induction of anaesthesia.

Study Procedure

The dose of antibiotic used for infiltration was one gram of Ceftriaxone (Injection XONE 1 gm) dissolved in 10 mL of distilled water (whose concentration of ceftriaxone equals to 100 mg/mL) was infiltrated 20 minutes prior to incision, uniformly around all the margins of the planned incision with a disposable syringe and 16 Gauge (G) needle in subcutaneous tissue plane, after giving Inj. Ceftriaxone intra dermal test dose, to check for allergic reaction. Preoperative, intraoperative and postoperative local tissue samples were sent for culture and sensitivity, operation site was covered by sterile occlusive dressings for 72 hours for elective cases, then first inspection of the suture site was carried out. The suture site was left open thereafter to inspect daily except in patients who developed infection. SSI is assessed by complication like wound discharge, infection and wound dehiscence and classified as serous, seropurulent and purulent discharge. Cases where SSI was suspected, occlusive dressing was resorted to twice daily wound wash with normal saline and betadine. Wound complications were documented as per Centres for Disease Control and Prevention (CDC) guidelines 2017 [12]. Postoperative wound infection was categorised into superficial, deep and organ space based on CDC guidelines [13]. Patients developing any discharges from the surgical wound were investigated by pus swabs for culture and appropriate antibiotics were administered intravenously as per culture and sensitivity report. Alternate sutures were removed on 10th postoperative day. Complete suture removal on 14th postoperative day. Subsequently, all cases were followed-up in the general surgery Outpatient Department (OPD) at weekly intervals for one month.

Intraoperative blood loss was estimated using Gauze Visual Analogue (GVA), less than 50 mL was considered as minimal blood loss, 50-100 mL was considered as moderate blood loss and more than 100ml was considered as severe blood loss for open hernioplasty [14]. Postoperative pain was assessed using Visual Analogue Scale (VAS), as no pain (score 0), mild pain (1-3), moderate pain (4-6), severe pain (7-9), very severe pain (10) [15]. Parameters studied were age distribution, gender distribution, development of SSI in intraincisional infiltration vs intravenous infiltration, type of SSI and complications and how were they managed, duration of surgery, organisms isolated, intraoperative blood loss, postoperative pain, mean hospital stay and influence of co-morbid in preventing SSI.

STATISTICAL ANALYSIS

The continuous variables were presented as mean and SD. The categorical variables were expressed in percentages. The significance of continuous scale data between two groups were determined using student t-test. The Chi-square/Fischer's-exact test were used to evaluate the significance of the categorical data analysed, p-value of less than 0.05 was taken significant. Null hypothesis stated that there was no relation between intraincisional infiltration and prevention of SSI, null hypothesis was accepted as true if p-value is >0.05 and rejected if p-value is <0.05. SPSS version 27 and Microsoft excel version office 2019 was used to compute the data.

RESULTS

Majority of the patients belonged to the age group of 41-60 years of age comprising 54% of total number of cases [Table/Fig-1].

There was a male preponderance of 91% and female patients of 9%. Showing that inguinal hernias are more common in males [Table/Fig-2]. Among the patients who had single intraincisional infiltration only three patients that is 6% (3/50) developed SSI. But

in patients who have single dose intravenous injection 10 patients that is 20% (10/50) developed SSI [Table/Fig-3].

Age distribution (years)	Group A	Group B
≤20	2 (4%)	1 (2%)
21-30	4 (8%)	4 (8%)
31-40	7 (14%)	9 (18%)
41-50	14 (28%)	12 (24%)
51-60	13 (26%)	15 (7%)
61-70	9 (18%)	7 (8%)
≥70	1 (2%)	2 (4%)
Total	**50 (100%)**	**50 (100%)**

[Table/Fig-1]: Age distribution.

Sex distribution	Group A	Group B
Male	44 (88%)	47 (94%)
Female	6 (12%)	3 (6%)
Total	**50**	**50**

[Table/Fig-2]: Gender distribution.

Parameters		Infection		Total
		No	Yes	
Group B	Count	40	10	50
	% within infiltration	80.0%	20.0%	100.0%
Group A	Count	47	3	50
	% within infiltration	94.0%	6.0%	100.0%
Total	Count	87	13	100
	% within infiltration	87.0%	13.0%	100.0%

[Table/Fig-3]: Comparison of intraincisional infiltration (group A) vs intravenous infiltration (group B) wrt. development of Surgical Site Infection (SSI).

On tabulating the findings in a Chi-square test, there was an association between group A and group B in preventing SSI. The p-value 0.037 which is <0.05 so, the null hypothesis was rejected [Table/Fig-4].

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-square	4.332a	1	0.037	0.071	0.036
Continuity correction[b]	3.183	1	0.074		
Likelihood ratio	4.540	1	0.033	0.071	0.036
Fisher's-exact test				0.071	0.036

[Table/Fig-4]: Chi-square test for of intraincisional infiltration (group A) vs intravenous infiltration (group B) with ceftriaxone in preventing SSI.

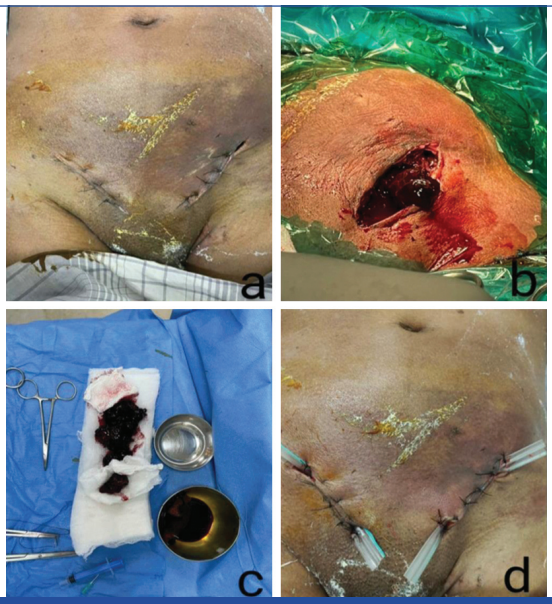
Based on the type of infection [Table/Fig-5], 87 patients had no SSI among which 47 patients that is 54% belonged to patients who had intraincisional infiltration and 40 patients that is 46% belonged to patients who had intravenous injection. Ten patients had superficial infection (discharge from wound site) out of which three patients (30%) belonged to group A and seven patients (70%) belonged to group B. Three patients had deep infection (two patients had wound gapping and one patient had haematoma collection) out of which all three patients belonged to all three patients belonged to group B and none of the patients of group A had moderate infection.

Infections		Complication		Total
		Group A	Group B	
Superficial	Count	3	7	10
	% within infections	30.0%	70.0%	100.0%
Deep	Count	0	3	3
	% within infections	0.0%	100.0%	100.0%
No infection	Count	47	40	87
	% within infections	54.0%	46.0%	100.0%
Total	Count	50	50	100
	% within infections	50.0%	50.0%	100.0%

[Table/Fig-5]: Type of Surgical Site Infection (SSI).

Among the 3 patients who had deep infection, one patient developed haematoma for with re-exploration was done on POD #3 [Table/Fig-6]. Two patients developed wound gapping for which secondary suturing was done on POD #7 [Table/Fig-7] and suture removal was done on POD #21. For rest of the all the patient's suture removal was done on POD #14.

[Table/Fig-6]: Wound gapping in postherniоplasty.



[Table/Fig-7]: Haematoma collection in postherniplasty: a) Skin discoloration was noted over the operated site on POD#3; b) Intraoperative finding of haematoma collection, a small bleed was noted which was arrested; c) Evacuated haematoma from surgical site; d) Corrugated rubber drain was placed insitu and wound closed in layers.

Comparing the duration of surgery, 81 patients had surgery in less than 30 minutes, in which 44 patients (54%) belonged to group A and 37 patients (58%) belonged to group B, in which two patients of group B (4%) developed SSI.

Nineteen patients had surgery between 30 minutes to two hours, in which six patients (31%) belonged to group A and 13 patients (68%) belonged to group B. Three patients belonging to group A (50%) developed SSI and 8 patients belonging to group B (61%) developed SSI. None of the patients had surgery for more than two hours. Out of the 13 patients who developed SSI 11 patients (84%) had surgery for more than 30 minutes [Table/Fig-8]. This study found that duration of surgery was statistically significantly in group A (23.40±8.41) compared with group B (36.80±28.95), p=0.003*. Hence, the average duration of surgery of group A is better than group B. There is an association between the duration of surgery and development of SSI [Table/Fig-9].

Group A		Infection		Total
		Absent	Present	
Duration of Surgery	<30 min	44	0	44
	30 min-2 h	3	3	6
	>2 h	0	0	
Total		47	3	50
Group B		Infection		Total
		Absent	Present	
Duration of surgery	<30 min	35	2	37
	30 min- 2 h	5	8	13
	>2 h	0	0	
Total		40	10	50

[Table/Fig-8]: Duration of surgery with respect to infection.

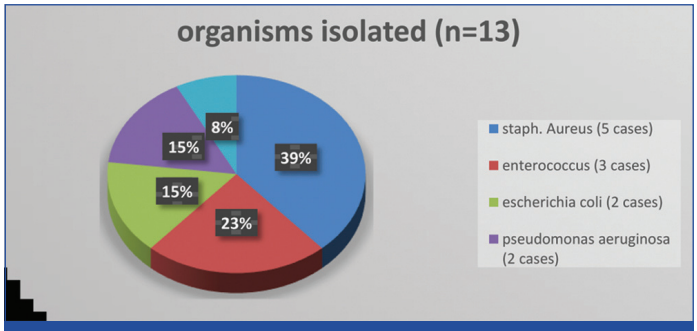
Duration of surgery (In mins)	Infections	N	Mean	Std. Deviation	Std. Error mean	Sig. (2-tailed) p-value
	Group A	50	23.4000	8.41767	1.19044	0.003
	Group B	50	36.8000	28.95739	4.09591	

[Table/Fig-9]: Group statistics for duration of surgery.

Wound culture sensitivity was sent preoperative, intraoperative and postoperative and organism growth was seen only in the 13 patients who developed SSI. Most common organisms isolated were staph. Aureus (38.5%), enterococcus (23%) and E.coli (15%). Most common antibiotics sensitive to the organisms were: (1) Ceftriaxone; (2) Amikacin; and (3) Piperacillin [Table/Fig-10,11].

Organisms isolated	Preoperative		Intraoperative		Postoperative	
	+	-	+	-	+	-
Group A	Nil	Nil	Nil	Nil	3	47
Group B	Nil	Nil	Nil	Nil	10	40

[Table/Fig-10]: Wound culture sensitivity preoperative vs intraoperative vs postoperative.



[Table/Fig-11]: Organisms isolated by culture sensitivity in preoperative, intraoperative and postoperative in 13 cases.

In estimating the blood loss based on GVA [Table/Fig-12], 72 patients had nil blood loss out of which 38 patients (52%) belonged to group A and 34 patients (47%) belonged to group B. Twenty seven patients had minimal blood loss (<50 mL), of which 12 patients (44%) belonged to group A and 15 patients (56%) belonged to group B. One patient had moderate blood loss (50-100 mL) belonging to group B. The p-value was found to be 0.459, hence, there here was no association found between type of infiltration and control of intraoperative blood loss.

Chi-square test upon comparing the postoperative pain [Table/Fig-13], 84 patients had mild pain out of which 43 patients (51%) belonged to group A and 41 patients (49%) belonged to group B. Sixteen patients had moderate pain out of which seven patients (44%) belonged to group A and nine patients (56%) belonged to group B. There was no significant difference between two groups in controlling postoperative pain (p>0.05).

Parameters			Infiltration 1		Total
			Group A	Group B	
Bloodloss	Minimal (<50 mL)	Count	12	15	27
		% within bloodloss	44.4%	55.6%	100.0%
	Moderate (50-100 mL)	Count	0	1	1
		% within bloodloss	0.0%	100.0%	100.0%
	NIL	Count	38	34	72
		% within bloodloss	52.8%	47.2%	100.0%
Total		Count	50	50	100
		% within bloodloss	50.0%	50.0%	100.0%

[Table/Fig-12]: Intraoperative bloodloss.
Chi-square value 1.556, p-value 0.459

Parameters			Infiltration-1		Total
			Group A	Group B	
Pain	Mild	Count	43	41	84
		% within pain	51.2%	48.8%	100.0%
	Moderate	Count	7	9	16
		% within pain	43.8%	56.3%	100.0%
Total		Count	50	50	100
		% within pain	50.0%	50.0%	100.0%

[Table/Fig-13]: Postoperative pain scale.
Chi-square value 0.298, and p-value 0.585

In this study, out of the 100 patients, 87 patients had a mean hospital stay of 3-5 days including 47 patients of group A and 40 patients of group B. Ten patients were found to have a hospital stay of 1-2 weeks including three patients of group A who developed SSI and seven patients of group B who developed SSI for daily dressing. Three patients of group B had a hospital stay of more than two weeks, among which two patients had to undergo secondary suturing for wound gapping and one patient had to undergo re-exploration and haematoma evacuation followed by secondary suturing [Table/Fig-14].

This study found that hospital stay was statistically significantly in group B (3.48±3.79) compared with group A (2.28±1.76), t(98)=2.029, p=0.046*. Hence, the average hospital stay of group A is better than group B [Table/Fig-15].

Mean hospital stay	Group A	Group B
≤5 days	47	40
6-13 days	3	7
≥2 weeks	0	3

[Table/Fig-14]: Mean hospital stay.

	N	Mean	Std. Deviation	Std. Error mean	p-value
Group A	50	3.4800	3.79172	0.53623	0.046*
Group B	50	2.2800	1.76172	0.24915	

[Table/Fig-15]: Group statistics for mean hospital stay (in days).

Among 100 patients, 52 patients had co-morbidities out of which 27 patients (52%) belonged to group A and 25 patients (48%) belonged to group B. All 13 patients who developed SSI had co-morbidities in both group A and group B p-value is 0.047. Three patients in group A developed SSI among the 27 patients that is 11%. Ten patients in group B developed SSI among the 25 patients that are 40%.

The SSI was found to be more prevalent in patients who had more than one co-morbidity (T2DM/SHTN & T2DM/SHTN/Obesity) that is 82.5% [Table/Fig-16]. There was an association between presence of multiple co-morbidities and development of SSI.

		Group A (27)		Group B (25)		Total
		SSI		SSI		
		+	-	+	-	
Co-morbiditites	SHTN*	0	0	0	2	2
	T2DM**	0	2	0	0	2
	T2DM/SHTN	1	12	3	11	27
	T2DM/SHTN/Obesity	1	9	5	1	16
	Obesity	0	0	1	1	2
	COPD***	1	1	1	0	3
Total		3	24	10	15	52

[Table/Fig-16]: Influence of co-morbidities on Surgical Site Infection (SSI).
*SHTN: Systemic hypertension
**T2DM: Type 2 diabetes mellitus
***COPD: Chronic obstructive pulmonary disease
Chi-square value is 9.623 and p-value is 0.047*

Intraincisional infiltration has a protective effect in developing SSI compared to intravenous injection.

DISCUSSION

The surgical site infection is the most common complication following any surgical procedure. Based on the study done by Sikora A and Zahra F on nosocomial infections, SSI is the third most common cause of nosocomial infection [16]. This study has been carried out in the tertiary care centre for 18 months from the month of May 2021 to October 2022. Risk of SSI is 23% to 38% in India [17] which is higher in compared to global estimate of 0.5% to 15% due to various factors like preoperative care, the theatre environment, postoperative care, and the type of surgery. In the present study, 100 patients were included who were divided into two groups with n=50 in each group, group A patients received preoperative single dose intraincisional infiltration of ceftriaxone and group B included the patients who received preoperative single dose intravenous infiltration of ceftriaxone and outcomes were studied preoperative, intraoperative and postoperative.

Among the 100 patients studied, majority of the patients belonged to the age group of 41-60 years of age comprising of about 54 that is 54% based on cross tabulation which was in concordance with the study done by Sayanna S on prevalence of inguinal hernias in Indian population which showed higher incidence in age group of 41-60 years of age accounting to about 53.5% [18]. On comparing the gender distribution, male preponderance of 91% and female patients of 9%. With a male: female ratio of 10.1:1. A study conducted by Berndsen MR et al., on Inguinal hernias showed that male to female ratio of 9:1 showing that inguinal hernias are more common in males than females [19]. Inguinal hernia surgeries are considered as clean surgeries, incidence of SSI in posthernioplasty patients was found to be 3.1%-4.5% [6]. But, in tertiary care centres in developing countries like India incidence is found to be high. In a study conducted by Alagarsamy GS and Ramasamy R on efficacy of antibiotic prophylaxis in preventing SSI in patients undergoing Lichtenstein's hernioplasty in a tertiary care centre SSI incidence was found to be 14% [7]. In another study done by Singh A et al., on comparative study of preoperative intraincisional infiltration of ceftriaxone vs. intravenous ceftriaxone for prevention of SSI clean cases had a SSI rate of 11%, these findings are consistent with the present study, this may be due to various factors like preoperative care, the theatre environment, postoperative care, lesser concentration of antibiotic at the incision site, fibrin matrix formed at the incision site, and improper timing of administration of the antibiotics [8]. Hence, antibiotic prophylaxis has become a must in inguinal hernia surgeries. In this study, among the patients who had preoperative single dose intraincisional infiltration of ceftriaxone 6% (3 patients) developed SSI. Among the patients who had preoperative single dose intravenous injection of ceftriaxone 20% (10 patients) developed surgical site injection. On statistically analysing the above findings, it is found that, there was a significant association between group A and group B in preventing SSI. The p-value 0.037 (<0.05, hence this proves that intraincisional infiltration was better than intravenous injection in preventing SSI. Based on the type of post-op complication it was observed that intraincisional infiltration is better in preventing postoperative complication than intravenous group.

In comparing the duration of surgery, Cheng H et al., in his study on prolonged operative duration increases risk of SSI proves that increase in operative time increases the risk of SSI like 13%, 17%, and 37% increased likelihood for every 15 minutes, 30 minutes, and 60 minutes of surgery, respectively [20]. These findings are consistent with the present study out of the 13 patients who developed SSI, 11 patients (84%) had surgery for more than 30 minutes. Association was found between development of SSI and prolonged duration of surgery as p-value (0.003*) was found to be significant. In this study, based on the culture sensitivity, most common organism isolated was staphylococcus aureus 38.5% (five patients), next was enterococcus 23% (three patients) and Escherichia coli 15% (two patients). And most common antibiotic sensitive was ceftriaxone followed by amikacin and piperacillin. In similar studies done by Singh A et al., showed that Escherichia coli were found to be common 72%; in another study done by Kamat US et al., noticed that pseudomonas (40%) is most identified organism from surgical site [8,21].

In estimating the blood loss based on GVA scale, 72 patients had nil blood loss in both case (52%) and control (47%) groups. Twenty seven patients had minimal blood loss of which 44% (12 patients) belong to case and 56% (15 patients) belonged to control group. One patient in control group had a moderate blood loss. In a study done by Aeschbacher P et al., showed that blood loss >100 mL and open surgery are independent risk factors for SSI [22]. In this study on statistical analysis there was no significance found in control of intraoperative blood loss as most of the patients had nil to minimal blood loss. Postoperative pain was assessed using VAS, 84 patients had mild pain in both case (51%) and control groups (49%). Sixteen patients had moderate pain out of which seven patients (44%) belonged to group A and nine patients (56%) belonged to group B. There is no significant difference between two groups in controlling postoperative pain.

In the present study, on statistical analysis of mean hospital stay, average hospital stay of case was better than control group which denotes that postoperative recovery was better and faster in patients who had infiltration in compared with patients who had intravenous which was in concordance with the study done by Singh A et al., and the study done by Totty JP et al., [8,23]. On assessing influence of co-morbidities, it was found that SSI was found to be more prevalent in patients who had more than one co-morbidity (T2DM/SHTN & T2DM/SHTN/OBESITY) that is 82.5 % of those who had multiple co-morbidities. There is an association found between multiple co-morbidities and development of SSI. Intraincisional infiltration has a protective effect in developing SSI compared to intravenous injection. This is found to be in accordance with many studies that prove the influence of co-morbidities in development of SSI [24,25]. Among the prompted newer modes of administering prophylactic antibiotics, one of which is the intraincisional infiltration of the antibiotic to ensure a higher concentration of the antibiotic at the incision site.

Limitation(s)

Incision time was delayed as surgeon has to wait for 20 minutes after local infiltration. Factors like concentration of the antibiotic in the blood and at incisional site at various intervals, affinity of the antibiotic to adipose tissue were not studied in this study. This can be established in a larger study where these factors are considered.

CONCLUSION(S)

In this study, the group that received single dose intraincisional ceftriaxone preoperatively had significant reduction in the incidence of SSI than the group which received single dose intravenous ceftriaxone preoperatively in hernioplasty surgeries. This can be adapted in surgical procedures as it is an easier mode of administration.

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PARTICULARS OF CONTRIBUTORS:

1. Junior Resident, Department of General Surgery, SRM Institute of Science and Technology, Chengalpattu, Tamil Nadu, India.
2. Associate Professor, Department of General Surgery, Trichy SRM Medical College Hospital and Research Centre, Trichirapalli, Tamil Nadu, India.
3. Associate Professor, Department of General Surgery, SRM Institute of Science and Technology, Chengalpattu, Tamil Nadu, India.
4. Professor, Department of General Surgery, SRM Institute of Science and Technology, Chengalpattu, Tamil Nadu, India.
5. Assistant Professor, Department of General Surgery, SRM Institute of Science and Technology, Chengalpattu, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
R Lakshmana,
SRM Nagar, Potheri, Kattankulathur, Chengalpattu, Tamil Nadu, India.
E-mail: drlaksh31@gmail.com

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