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Risk Factors Associated With Surgical Site Infection In Hip Fracture Surgeries Among Geriatric Population In A Teritiary Care Centre

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ABSTRACT
Introduction: Geriatric hip fracture is a common type of osteoporotic fracture with high mortality and disability;Surgical site infection (SSI) can be a devastating complication of this injury. By far, only a few studies identified easily remediable factors to reduce infection rates following hip fracture and less researches have focused on geriatric patients. The objective of this study was to identify risk factors and potentially modifiable factors associated with SSI following geriatric hip fracture surgery.
Objectives:The aim of the study is to identify the risk factors associated with surgical site infection in hip fracture surgeries among geriatric population in a tertiary care centre
Materials and Methods:This is a case control study which was carried out from December 2020 to December 2021 in Government Medical College,Thiruvananthapuram. In this study period 80 cases of surgical site infection and 80 controls without surgical site infections who have underwent hip fracture surgeries aged above 60 years were taken.Demographics information, medications and additional comorbidities, operation-related variables, and laboratory indexes were extracted and analyzed.
Results: 30 variables were studied for any significant association with surgical site infections in hip fracture surgeries.We found Diabetes mellitus (chi square value:53.0326 and p value 0.0001),Obesity(chi square:11.54 and p value 0.008),Type of implant(chi square:21.743 and p value 0.0001),Type of surgery(chi square:38.31 and p value 0.0001),pre op haemoglobin level(chi square:20.05 and p value 0.0001),pre op ESR level(chi square:42.34 and p value 0.0001),pre op albumin level(chi square:51.27 and p value 0.001),Duration of surgery(chi square:34.35 and p value 0.0001),Mini mental score(chi square:28.97 and p value 0.001),Not using of opsite(adhesive polyurethane drape)(chi square:32.385 and p value 0.001),not using intra-op antibiotic powder(chi square:42.004 and p value 0.001)Not giving prophylactic antibiotic dose(chi square:53.199 and p value 0.0001), low socioeconomic status(chi square 10.0118 and p value 0.04) had a significant association with risk of surgical site infection.
Conclusion:In the present study of risk factors associated with surgical site infections in hip fracture surgeries we found diabetes mellitus,obesity,extra medullary implants,open surgeries,decreased pre op haemoglobin level (less than 12), decreased albumin level than the normal level(<3.5),increased preop ESR level than the normal,increased duration of surgery than the mean duration(> 90 mins),increased duration of hospital stay(more than 1 week),low socio economic status are risk factors for developing surgical site infections.Also use of intraop antibiotic powder(Vancomycin powder),Using Opsite(adhesive polyurethane film) at the surgical site,giving prophylactic parental antibiotic within one hour prior to surgical incision were found to reduce the incidence of surgical site infections in hip fracture surgeries.

Keywords: *Surgical site infection; implant related infection; orthopaedic infection; ,hip fracture surgeries; risk factors;, biofilms*

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I. BACKGROUND

Hip fracture is one of the biggest challenges facing patients and healthcare systems. Worldwide there are 1.3 million hip fractures every year. The overwhelming majority of hip fractures are treated with surgery. Given that 60% of hip fracture patients have at least one major medical comorbidity, such as malignancy or

diabetes, these patients are particularly vulnerable to surgical site infection (SSI).[59]

Deep infection has profound consequences for hip fracture patients including five-times higher mortality. Survivors experience prolonged hospital admissions and much higher need for discharge to residential care.[5]Understanding the rate of infection is a critical component of research and disease management for SSI. Various bodies are responsible for SSI surveillance in their respective countries. However, the surveillance process may underestimate the true rate of infection.The underestimation of SSI in hip fracture by public bodies has important implications for the time, energy, and resources being employed to tackle a problem which is a research priority for patients.Published studies may act as an important source of incidence data for this complication for patients and in turn inform future studies.

OBJECTIVES

To study the risk factors associated with surgical site infection in hip fracture surgeries among geriatric population in a tertiary care centre

STUDY DESIGN

Case -Control studySTUDY SETTING

Department of Orthopaedics and department of Microbiology, Medical college Thiruvananthapuram. STUDY PERIOD

One year after getting clearance from Ethics clearancecommitee.STUDY POPULATION

Cases-Patients presenting with surgical site infections of hip fracture surgeries aged above 60 in Orthopaedics department.(both OP and IP)

Inclusion criteria-Patients aged above 60 who underwent hip fracture surgeries, clinically diagnosed to have surgical site infection.

Controls-Patients aged above 60who have undergone hip fracture surgeries with no evidence of surgical site infection for at least 6 months.(Patients aged above 60 presenting to the orthopaedics department with hip fractures who have undergone surgeries will be followed for at least 6 months to make sure that there is no evidence of surgical site infection through phone calls or other personal contact means and they will be considered as controls)

Exclusion criteria-The exclusion criteria were1.Tuberculosis of hip joint.

2. Open fractures.

3. Patients with incomplete data of medical record or follow-ups after discharge 4.Patients not giving consent

SAMPLE SIZE

Cases -80

Controls -80

DATA COLLECTION

For cases

Using a semi structured questionnaire socio economic charecteristics,clinical history and relevant details will be collected for patients presenting with surgical site infection.(cases) Data related to antibiotic susceptibility patterns and the microbiological profile of the samples will be collected and followed up from microbiology department using the IP and OP number of the concernedpatients .

For controls Using a semi structured questionnaire socio economic charecteristics,clinical history and relevant details will be collected for patients presenting with hip fractures in the orthopaedicsdepartment. After undergoing surgeries they will be followed for at least 6 months through phone or other personal contact means and ensures that there is no evidence of surgical site infections

II. Materials and Methods

COLLECTION OF SPECIMEN

Pus or secretion from the infection site will be collected using sterile disposable syringe or wound swab Infected tissue will be collected in sterile container

Removed implant part such as screw, plate,nailetc will be sent in brain heart infusion Samples collected under aseptic precaution will be sent immediately to microbiology lab for culture and sensitivity.

DATA AANALYS

Data will be entered into excel sheet

Categorical variables will be expressed as proportions and quantitative variables will be expressed as mean and standard deviation

Statistic test of significance - Chi square test for categorical variables and student t test for quantitative variables.

Analysis of data will be done using appropriate statistical softwareETHICAL CONSIDERATION

Institutional ethics committee clearance will be obtained Informed consent will be obtained from the

participants Confidentiality will be ensured and maintained through out the study. Subjects who are not compliant to treatment will be counselled.

POLICY IMPLICATION

Once the risk factors and the antibiotic susceptibility patterns associated with surgical site infections are identified, adequate corrective measures and appropriate antibiotic usage can be suggested in the treatment protocol

BUDGET AND FUNDING

No financial burden occur for study subjects. All expenses will be met by principle investigator. RESULTS AND ANALYSIS

We studied 80 cases with surgical site infections who have undergone surgery for hip fracture surgeries and 80 controls. The following are the observations made and available data is analysed as follows.

INFERENTIAL ANALYSIS1.AGE

Age	Cases		Controls		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	1.625	1	0.202	1.503
<80	39	48.75	31	38.75	70	43.75				
>80	41	51.25	49	61.25	90	56.25				
Total	80	100	80	100	160	100				

Table 32:Age group analysis

Association of age with Surgical site infection was found not to be significantwith p value 0.202

GENDER DISTRIBUTION

Gender	Cases		Controls		Total		Chi square	df	p	OR
	N	%	N	%	N	%	1.78	1	.18	0.65
Male	34	42.5	42	52.5	76	47.5				
Female	46	57.5	38	47.5	84	52.5				
Total	80	100	80	100	160	100				

Table 33:Gender distribution analysis

Association of gender with SSI was found not to be significant with p value 0.18

DIABETES MELLITUS

DM	Cases		Controls		Total		Chi square	df	p	OR
	N	%	N	%	N	%	53.0326	1	0.0001	13.91
Yes	61	76.25	15	18.75	76	47.5				
No	19	23.75	65	81.25	84	52.5				
Total	80	100	80	100	160	100				

Table 34:Diabetes mellitus anakysis

Asaociation of Diabetes mellitus with SSI was found to be significant with p value0.0001

HYPERTENSION

HTN	Cases		trols		Total		Chi square	df	p	OR
	N	%	N	%	N	%	0.0984	1	0.753	1.11
Yes	38	47.5	30	37.5	68	42.5				
No	42	52.5	50	62.5	92	57.5				
Total	80	100	80	100	160	100				

Table 35:Hypertension analysis

Association of hypertension with SSI was found not to be significant with p value 0.753

COPD

COPD	Cases		Controls		Total		chi square	df	p	OR
	N	%	N	%	N	%	0.5375	1	0.463	0.697
Yes	8	10	11	13.75	19	11.9				
No	72	90	69	86.25	141	88.1				
Total	80	100	80	100	160	100				

Table 36:COPD analysis

Association of COPD with SSI was found not to be significant with p value 0.463

CKD(CHRONIC KIDNEY DISEASE)

CKD	Cases		Controls		Total		chi square	df	p	OR
	N	%	N	%	N	%	0.5263	1	0.468	1.71
Yes	5	6.25	3	3.75	8	5				
No	75	93.75	77	96.25	152	95				
Total	80	100	80	100	160	100				

Table 37: CKD analysis

Association of CKD with SSI was found not to be significant with p value 0.468

OBESITY

Obesity	Cases		Controls		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	11.54	1	0.0001	3.105
Yes	42	52.5	21	26.25	63	39.4				
No	38	47.5	59	73.75	97	60.6				
Total	80	100	80	100	160					

Table 38: Obesity analysis

Association of obesity with SSI was found to be significant with p vakue 0.00018.MALIGNANCY

Malignancy	Cases		Controls		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	0.20	1	0.649	0.658
Yes	2	2.5	3	3.75	5	3.1				
No	78	97.5	77	96.25	155	96.9				
Total	80	100	80	100	160	100				

Table 39:Malignancy analysis

Association of malignancy with SSI was found not to be significant with p vakue 0.649

ALCOHOLISM

Alcoholism	Cases		ols		Total		Chi square	df	p	OR
	N	%	N	%	N	%	0.5926	1	0.286	0.826
Yes	20	25	23	28.75	43	26.9				
No	70	75	57	71.25	117	73.1				
Total	80	100	80	100	160	100				

Table 40: Alcoholism analysis

Association of alcoholism with SSI was found not to be significant with p value 0.286

SMOKING

Smoking	Cases		Controls		Total		Chi square	df	p	OR
	N	%	N	%	N	%	3.45	1	0.063	2.02
Yes	24	30	14	17.5	38	23.75				
No	56	70	66	82 5	122	76.25				
Total	80	100	80	100	160	100				

Table 41: Smoking analysis

Association of Smoking with SSI was found not to be significant with p value 0.063

PAN CHEWING

Panchewing	Cases		Controls		Total		Chi square	df	p	OR
	N	%	N	%	N	%	1.94	1	0.238	2.11
Yes	8	10	4	5	12	7.5				
No	72	90	76	95	148	92.5				
Total	80	100	80	100	160	100				

Table 42:Pan chewing analysis

Association of pan chewing with SSI was found not to be significant with p value 0.238

TIMING OF SURGERY

Timing of Surgery	Cases		Controls		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	1.258	1	0.262	0.69
Emergency	30	37.5	37	46.25	67	41.9				
Elective	50	62.5	43	53.75	93	58.1				
Total	80	100	80	100	160	100				

Table 43:Timing of surgery analysis

Association of timing of surgery (emergency or elective) with SSI was found not to be significant with p value 0.262

TYPE OF FRACTURE

Type of Fracture	Cases		Controls		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	0.642	1	0.423	1.29
Extracapsular	49	61.25	44	55	93	58.1				
Intracapsular	31	38.75	36	45	67	41.9				
Total	80	100	80	100	160	100				

Table 44:Type of fracture analysis

Association of type of fracture with SSI was found not to be significant with 0.423

TYPE OF IMPLANT

Type ofImplant	Cases		Controls		Total		Chi square	df	p	OR
	N	%	N	%	N	%	27.749	1	0.001	6.057
Extramedullary	51	63.75	18	22.5	69	43.1				
Intramedullary	29	36.25	62	77.5	91	56.9				
Total	80	100	80	100	160	100				

Table 45:Type of implant analysis

Association of type of implant with SSI was found to be significant with p value 0.001

TYPE OF SURGERY

Type of surgery	Cases		Controls		Total		Chi square	df	p	OR
	N	%	N	%	N	%	38.31	1	0.001	8.64
Open	63	78.75	24	30	87	54.3				
Closed	17	21.25	56	70	73	45.7				
Total	80	100	80	100	160	100				

Table 46:Type of surgery analysis

Association of type of surgery with SSI was found to be significant with p value 0.001

Pre-Op Haemoglobin level

Pre-Op Hb level	Cases		Controls		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	20.05	1	0.001	4.5
<12	48	60	20	25	68	42.5				
>12	32	40	60	75	92	57.5				
Total	80	100	80	100	160	100				

Table 47:Preop Hb analysis

Association of preop hb level with SSI was found to be significant with p value 0.001

PRE OP ESR LEVEL

Pre-OpESR	Cases		Controls		Total		Chi square	df	p	OR
	N	%	N	%	N	%	42.34	1	0.001	9.91
Elevated	64	80	23	28.75	87	54.4				
Normal	16	20	57	71.25	73	45.6				
Total	80	100	80	100	160	100				

Table 48: Preop ESR level

Association of Pre op ESR level with SSI was found to be significant with 0.001

PRE-OP ALBUMIN LEVEL

Pre-Op Albumin	Cases		Control		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	51.27	1	0.001	13.5
Low	67	83.75	22	27.5	89	55.6				
Normal	13	16.25	58	72.5	71	44.4				
Total	80	100	80	100	160	100				

Table 49:Pre op albumin level analysis

Association of pre op albumin level with SSI was found to be significant withP value 0.001

USE OF DRAIN

Use ofDrain	Cases		Control		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	1.691	1	0.204	1.497
Not used	47	58.75	39	48.75	86	53.75				
Used	33	41.25	41	51.25	74	46.25				

Total	80	100	80	100	160	100				

Table 50: Use of drain analysis

Association of use of drain with SSI was found not to be significant with p value 0.204

DURATION FROM TRAUMA TO SURGERY

Duration from trauma to surgery	Cases		Controls		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	0.901	1	0.341	0.735
>7 days	33	41.25	39	48.75	72	45				
<7days	47	58.75	41	51.25	88	55				
Total	80	100	80	100	160	100				

Table 51: Duration from trauma to surgery analysis

Association of Duration from trauma to surgery with SSI was found not to be significant withP value 0.341

URINARY CATHETERISATION

Urunary catheterisation	Cases		Control		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	1.261	1	0.261	1.439
Yes	51	63.75	44	55	95	59.6				
No	29	36.25	36	45	65	40.6				
Total	80	100	80	100	160	100				

Table 52: Urinary Catheterisation analysis

Association of Urinary catheterisation with SSI was found not to be significant with p value 0.261

USE OF ANTIBIOTIC POWDER

Use of antibiotic	Cases		Controls		Total		Chi Square	df	p	OR
powder	N	%	N	%	N	%	42.004	1	0.001	9.677
Not used	59	73.75	18	22.5	77	48.1				
Used	21	26.25	62	77.5	83	51.9				
Total	80	100	80	100	160	100				

Table 53: Use of anyibiotic powder analysis

Association of not using antibiotic powder with SSI was found to be significant withp value 0.001

PROPHYLACTIC ANTIBIOTIC USE ONE HOUR PRIOR TO SURGERY

Prophylactic antibiotic	Cases		Control		Total		Chi Square	df	p	OR
use	N	%	N	%	N	%	53.192	1	0.001	14.42
No	47	58.75	39	48.75	86	53.75				
Yes	33	41.25	41	51.25	74	46.25				
Total	80	100	80	100	160	100				

Table 54:Use of prophyactic antibiotic use analysis

Association of not using prophylactic antibiotic one hour prior to surgery with SSI was found to be significant with p value 0.001

DURATION OF HOSPITAL STAY AFTER SURGERY

Duration of hospital	Cases		Control		Total		Chi Square	df	p	OR
stay	N	%	N	%	N	%	25.616	1	0.001	5.45
>1week	55	68.75	23	28.75	78	48.75				
<1 week	35	31.25	57	71.25	82	51.25				

Total	80	100	80	100	80	100				

Table 55:Duration of hospital stay after surgery analysis

Association of duration of hospital stay after surgery with SSI was found to be significant withp value 0.001

DURATION OF SURGERY

Duration of surgery	Cases		Controls		Total		Chi square	df	p	OR
	N	%	N	%	N	%	34.35	1	0.001	7.49
>90 mins	56	70	19	23.75	75	46.9				
<90 mins	24	30	61	76.25	85	53.1				
Total	80	100	80	100	160	100				

Table 56: Duration of surgery analysis

Association of duration of surgery with SSI was found to be significant with p value 0.001

MINIMENTAL SCORE

Mini mental score	Cases		Controls		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	28.97	1	0.001	6.181
<24	55	68.75	21	26.25	76	47.5				
>24	25	31.25	59	73.75	84	52.5				
Total	80	100	80	100	160	100				

Table 57 : Minimental score analysis

Association of low mini mental score with SSI was found to be significant withp value 0.001

USE OF PRE-OPSITE

Use o pre-0psite	Cases		Control		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	24.34	1	0.001	5.762
No	66	82.5	36	45	102	63.75				
Yes	14	17.5	44	55	58	36.25				
Total	80	100	80	100	160	100				

Table 58:Use of preopsite analysis

Association of not using pre-opsite with SSIvwas found to be significant with p value 0.001

EARLY MOBILISATION AFTER SURGERY

Early mobilisation	Cases		Control		Total		Chi Square	df	p	OR
	N	%	N	%	N	%	1.6091	1	0.2054	1.49
No	33	41.25	41	51.25	74	46.25				
Yes	47	58.75	39	48.75	86	53.75				
Total	80	100	80	100	160	100				

Table 59:Early mobilisation after surgery analysis

Association of early mobilisation after surgery with SSI was found not to be associatedWith p value 0.2054

EDUCATIONAL STATUS

Educational Status	Cased		Control		Total		Chi square	df	p
	N	%	N	%	N	%	0.5404	4	0.969
Primary	27	33.75	29	36.25	56	35			
Middle	18	22.5	20	25	38	23.75			

High school	15	18.75	14	17.75	29	18.12
Intermediate	12	15	11	13.75	23	14.4
Graduate	8	10	6	7.5	14	8.7
Total	80	100	80	100	160	100

Table 60:Educational status analysis

Association of educational status with SSI was found not to be significant with p value 0.969 30.SOCIO ECONOMIC STATUS

Socio economic	Cases		Controls		Total		Chi square	df	p
Status	N	%	N	%	N	%	10.012	4	0.0402
Lower	22	27.5	14	17.5	36	22.5			
Upper lower	21	26.25	14	17.5	35	21.9			
Lower middle	17	21.25	13	16.25	30	37.5			
Upper middle	12	15	21	26.25	33	20.1			
Upper	8	10	18	22.5	26	32.5			
Total	80	100	80	100	160	100			

Table 61: Socioeconomic status analysis

Association of socioeconomic status with SSI was found to be significant with p value0.0402.

III. DISCUSSION

In our study mean age of case is found to be 79 years and controls to be 72years. There was no significant association between age and surgical site infection. Similar studies conducted by Mohamed Al-Mayahi et al and Muhammad Thahir et al found that there was no relation between age and risk of surgical associated infection. Study conducted by Dr.Amaradeep G et al found that there was increased risk in old age. There was no significant gender associated risk found in our study. Study conducted by Mohamed Al-Mayahi et al[11]demonstrated similar results. Stephen Apanga et al done a similar study in Ghana and found increased risk in males.

61 cases(76.25%) and 15controls (18%) had diabetes mellitus. Prevalence of diabetes in controls is found to be comparable with the current diabetic status of Kerala. We found a significant relation between diabetes mellitus and risk of surgical site infection(chi square value of 53.0326 ,p value 0.001 and odds ratio 13.91)Similar studies were done by Berkes M et al and Dronge A et al found increased risk of

infection in diabetic patients. Boris Mraovic et al also got similar findings regarding diabetes and periprosthetic infection. Zmistowski et al concluded that perioperative hyperglycaemia after total joint arthroplasty is a risk factor for infection.38 cases (46.67%) and 30 controls(37.5) had hypertension. Few studies were done on this topic. We were not able to demonstrate any significant risk The reason may be less number of cases.8 cases (10%) and 11 controls (13.75%) had copd .Few studies were done in this topic. We were not able to demonstrate any significant risk. The reason may be less number of cases.5 cases (6.25%) and 3controls (3.75%) had CKD .Few studies were done in this topic. We were not able to demonstrate any significant risk. The reason may be less number of cases.

142cases (52.5%) and 21 controls (26.25) had obesity. We found a significant relation between obesity and risk of surgical site infection. Similar studies were done by Michelle M. Dowsey25 and Malinzak

RA26 and found that there were no increased risk of implant associated infection with obesity but morbid obesity (BMI>40) increase the risk of implant associated infection.According to study conduced by Malinzak RA, and Chen ju the risk of PeriprostheticJoint Infection (PJI)has been shown to increase exponentially with body mass index (BMI), as BMI >40 kg/m2 (obese) increased the risk of infection by

3.3 times, while a BMI >50 kg/m2 (morbidly obese) increased the risk of infection by 21 times.

2 cases had malignancy and 3 controls had malignancy Only few studies were done on this topic We

were not able to demonstrate any significant association. The reason may be less number of cases.In our study there were 20 (25%) alcohol users among cases and 23 (28.75%) among controls. We were not

able to demonstrate any significant association between alcohol use and surgical site infections in hip fracture surgeries . Study conducted byChuanlong Wu et al found that Patients with diabetes, older age, BMI of ≥28 kg/m2 and alcohol abuse or living in rural areas, had increased PJI risk.

In our study smoking was not found to have a significant association with risk of surgical site infection

.Studies done by Lindstrom on the same topic demonstrated significant relation between smoking and implant associated infection.

8 cases were pan chewers and 4 controls were pan chewers.Wecouldn‟t find any association between pan chewing and surgical site infection .Ina study conducted by Nicholas Berard et al on Tobacco use and risk of wound complications and periprosthetic joint infection: A systematic review and meta-analysis of primary TJA procedures found that tobacco users had a significantly higher risk of wound complications. In our study smaller sample size of pan chewers may be the reason for different result.

In our study 30 cases (37.5%) and 37 controls(46.25%) were operated as an emergency procedure. We were not able to demonstrate emergency procedure as a risk factor for developing surgical site

infections.Studies done by Hiba K Anis et al found that elective patients had a lower risk of developing organ/space SSI .In our study we could not find any association between type of fracture(extracapsular or intracapsular) and surgical site infection in hip fracture surgeries. Edwards et al2 attempted to identify pre-operative risk factors for deep infection, and found that the rate of infection was higher in patients with an intra-capsular rather than an extra-capsular fracture but this difference was not statistically

significant.51 cases(63.75) and 18 controls were treated with extra medullary implants. We found a

significant association of using extra medullary implants(chi square 27.74,p value 0.001 and odds ratio-6.05) a risk factor for developing surgical site infections in hip fracture surgeries compared to

intramedullary implants. Studies conducted by T. Harrison et al also showed that extra medullary devicesare associated with higher incidence of surgical site infection than intramedullary devices

In our study 63 cases(78.75%) and 24 controls(30%) underwent open surgeries. We found a significant association between open surgeries of hip fracture and surgical site infection. So we concluded that open surgeries are having a higher incidence of surgical site infection than closed procedures. In a study by Pourya Ghayoumi et al found that the incidence of deep wound infection was more in open

procedures than closed reduction procedures.In our study we observed a significant relation between low haemoglobin level and surgical site infection(chi square 20.05,p value 0.001 and odds ratio 4.5)48 cases (60%) and 20 controls(25%) had hb less than 12 mg/dL.In a study by Ji, Chenni MD, Zhu

(retrospective case–control study) a history of anaemia and lower preoperative Hb level (<120 g/L in males or <110 g/L in females) were reported as risk factors for SSI following surgical repair of femoral neck fractures.In our study 67 cases(83.75%) and 22 controls (27.5%) had decreased pre op albumin

level than the normal. We found that decreased albumin level (chi square51.27,p value0.001 and odds ratio 13.5) is a risk factor for developing SSI in hip fracture surgeries. Study conducted by Tianxiao Ma et al. found that lower pre op albumin is risk for SSI.

We had 64 cases (80%) and 23 controls (28.75%) had elevated pre-Op ESR levels than the normal for thecorresponding age and sex.We found that elevated Pre-op ESR levels have a significant association withSSI.

In our study we could not establish any association between usage of drain and SSI.Study conducted by Xiaopo Liu, Zhijie Dong2 et al showed that drainage use could affect the occurrence of SSI by reducing its risk.We could not find any association between duration from trauma to surgery and SSI.Study

conducted by Adrian Cheng Kiang Lau et al found that patients who waited for more than one week for surgery had a statistically significantly higher risk of SSI.

Our study could not find any association between urinary catheterisation and incidence of SSI.David Cumming et al studied the incidence of deep wound infection after hip fracture surgery and its

relationship to urinary catheterisation and found that the difference between the case and control groups was not statistically significant (P=0.38).

In our study 59 cases(73.75%) and 18 controls(22.5%) didn‟t receive antibiotic powder (Vancomycin) in the surgical wound intraoperatively.We found that not using antibiotic powder is associated with risk of developing SSI.(chi square 42.004,p value 0.001 and odds ratio 9.67)and use of vancomycin powder

reduces the incidence of SSI Otte et al. were able to show that intrawound lowers the infection rate after knee and hip arthroplasty from 1.6 to 0.5%, compared with a control group. Patel et al. showed a

reduction in the infection rate through vancomycin of 2.7–0.3%.

66 cases(82.5%) and 20 controls (25%) didn‟t receive intravenous antibiotic dose prophylacticaly one hour prior to surgery. We found that the incidence of SSI is associated with patients who didn‟t receive prophylactic antibiotic dose one hour

prior to surgery(chi square53.192,pvalue 0.001 and odds ratio 14.42) Southwell keley et al conducted a meta analytical study on antibiotic prophylaxis in hip fracture surgeries and concluded that prophylactic antibiotics were effective in reducing the incidence of wound infection (combined superficial and deep) after hip fracture surgery, when compared with placebo.

In our study 55cases (68.75%) and 23 controls(28.75) had stayed in hospital more than 1 week after surgery. We found that increased duration of hospital stay is associated with risk of SSI(chi

square25.616,pvalue 0.001 and odds ratio 5.45). :study conducted by Adrian Cheng Kiang Lau et al foundthat presence of SSI is significantly associated with increased length of hospital stay ($p < 0.001$.

In our study 56 cases(70%) and 24 controls(30%) had duration of surgery time more than 90 mins.We

found that there is significant association of increased duration of surgical time (>90 mins)and risk of SSI.Study by Xiaopoliu et al found that operating time > 107 min is significant in the occurrence of SSI in geriatric hip fracture surgeries. An association between a longer duration of surgery and SSI has been shown before in several other studies (Harrison et al. 2012, Daley et al. 2015, Cheng et al. 2017, de Jong

et al. 2017). On this basis, some authors have advocated measures to reduce duration of surgery (Cheng et al. 2017),

In our study 55 cases(68.75%) and 23 controls (28.75%) had mini mental state score less than 24.We found that decreased mini mental score of patients (<24) is a risk factor for the occurrence of SSI.(chi square 28.97,pvalue 0.001 and odds ratio 6.180.) In the invariable analysis by Christian T Pollman et al cognitive impairment is statistically significantly associated with an increased risk of early and delayed deep SSI.In our study pre op site(poly urethane adhesive film or drape) was not used in 66 cases(82.5%) and 36 controls (32.5%).We found that there is a significant risk of developing SSI in patients were pre op site is not used(chi square 24.3408,pvalue 0.001 and ods ratio 5.76) .In patients were pre opsite was

used the incidence of SSI is found to be less. Study done by K.Y Chiu et al showed that there is no

significant difference in the post operative infection rates in patients who underwent surgery for hip fractures. IN a prospective randomised trial ,study by Maryam et al found that incisional draping reduces the rate of contamination of the surgical site during hip surgeries.

In our study we could not demonstrate any association between lack of early mobilisation and risk of

SSI.We could not find any papers which studied the lack of early mobilisation as a risk factor for SSI in hip fracture surgeries.In our study educational status of the patients was studied to find any association with SSI.But we could not demonstrate any association between them.

Socio economic status of the patients according to Kuppuswamy scale was categorised as

lower,upperlower,lowermiddle,upper middle and upper classes. We found that low socioeconomic status have association with incidence of SSI in hip fracture surgeries(chi square10.0118 and pvalue 0.04).Only few studies were done on this topic But a study by Graham.J et al concluded that

socioeconomic status may not be a risk factor for periprosthetic joint infections.CONCLUSION

In the present study of risk factors associated with surgical site infections in hip fracture surgeries amonggeriatric population we have studied 30 variables for any significant association with risk of surgical site

infection. We found diabetes mellitus,obesity,type of implant(extramedullary implant),type of

surgery(open surgery),low pre op haemoglobin level(<12),elevated preop ESR level,lowpreop albumin level, increased duration of hospital stay (>7 days) after surgery, increased duration of surgery

time(>90mins),low mini mental state score(<24) ,lower socio economic status had an association with surgical site infections. We also found that use of intra wound antibiotic powder during surgery and prophylactic intravenous dose of antibiotic one hour prior to surgery and use of pre -opsite(poly

urethane adhesive film) during surgery has association with decreasing the incidence of surgical site infections in hip fracture surgeries.

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