ORIGINAL ARTICLE
AUDIT

Surgical site infection following hernia repair in the day care setting of a developing country: a retrospective review

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Abstract

Objective: To determine the incidence proportion of surgical site infection following hernia repair in a daycare setting at a tertiary care hospital of a low-income country.

Methods: The retrospective audit was done at the Aga Khan University Hospital, Karachi, from June 1, 2008 to May 30, 2009. Patients with age >15 years who underwent Lichenstein's open mesh repair in daycare were included. Surgical Site Infection was labelled if the records revealed any of the following: opening of the wound by the primary surgeon; pain, tenderness and raised temperature of skin; purulent discharge from the wound; if the surgeon had documented it as a surgical site infection. SPSS 16 was used for data analysis.

Results: After reviewing the retrieved files, 104 patients were found eligible. Of them, 102 (98%) were males. Overall wound-related complications were found in 13 (12.5%), whereas surgical site infection was found in 8 (7.7%) patients. The mean age of those with infections was 38.7±18 year, while that of those with no surgical site infection was 47.8±18 years. Smoking was found significantly associated with surgical site infection with 5.8 times higher incidence as compared to the non-smokers [OR with 95% CI: 5.6 (1.2, 25.3)].

Conclusions: The incidence of surgical site infection after hernia repair with mesh in a daycare setting at a tertiary care hospital of a low-income country was higher than internationally reported incidence. Smoking was found to be a significant risk factor.

Keywords: Inguinal hernia, Surgical site infection, Smoking, Day care surgery. (JPMA 63: 760; 2013)

Introduction

Hernia is a common medical problem and repair of hernias is one of the commonest surgical procedures worldwide.[1] Today inguinal hernias account for 75% of abdominal wall hernias and are 25 times more common in men;[2] becoming one of the leading causes of workloss and disability. As the procedure can be performed within one hour, daycare hernia repair surgery has begun to gain a lot of attention.

Mesh repair has rapidly become one of the most popular techniques of hernia repair. Of the open mesh repair techniques, the Lichtenstein hernia repair is most frequently used[3] which is a tension-free repair of the weakened inguinal floor using a polypropylene mesh. One of the most important objectives of any surgical procedure remains to be the prevention of surgical site infections (SSIS). Literature reports overall 0-9% SSI after inguinal hernia repair and 1-3% with antibiotic cover.[3-5] Since to date there are only a few publications analysing mesh infections, there continue to be difficulties in selecting optimal treatment of SSIs following mesh repair of hernias. This difficulty is even more in low-income countries, where use of mesh for the treatment of hernias is a recent development.

The aim of the current study was to determine the frequency of SSI following hernia repair in a daycare setting from a tertiary care hospital of a low-income country.

Patients and Methods

The retrospective study was conducted at the Aga Khan University Hospital, Karachi form June 1, 2008 to May 30, 2009. Patients with age >15 years who underwent Lichtenstein's open mesh repair in daycare were included. The study was exempted from Ethical Review as per institutional guidelines. Exclusion criteria included those lost to followup, recurrent hernia, emergency procedures and incomplete records. The files of the patients were retrieved through international classification of diseases (ICD) codes and reviewed for eligibility by a resident of General Surgery on a proforma. SSI was labelled if the records revealed any of the following; opening of the wound; pain, tenderness and raised temperature of skin; purulent discharge from the wound; if the surgeon had documented it as an SSI.

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Data analysis was done using SPSS version 16. Continuous variables were analysed as means ± standard deviations and categorical variables were analysed as frequencies and percentages. Univariate logistic regression was done to determine the association between SSI (dependent variable) and risk factors (age, comorbids and perioperative factors) and the association was represented as odd's ratios (OR) with 95% confidence interval (CI).

Results

After reviewing the retrieved files, 104 patients were found eligible. Of them 102 (98%) were males. Overall wound-related complications were found in 13 (12.5%), whereas SSI was found in 8 (7.7%) patients.

Patients with SSI had a mean age of 38.75±18.06 with a body mass index (BMI) of 25.4±2.93 with no predilection for the side of hernia (Table-1). Patients with irreducible hernia had more wound infections compared to those who had reducible hernia. Residents performed 24/104 (23%) operations and 2/24 (8.3%) patients had SSIs, whereas 80 (77%) operations were performed by consultants and 6/80 (7.5%) patients had wound infections. The operation was completed within 60 minutes in 28 (26.9%) patients and 1/28 (3.5%) had SSI (Table-2). Higher proportion of patients with SSI was found if surgery time was >60 minutes or if the procedure was done under regional/general anaesthesia. However, none of the above results were statistically significant.

Smoking was found to be statistically significant in patients who had wound infections and on univariate logistic regression, smokers had 5 times greater odds of SSI compared to the non-smokers [OR with 95% CI: 5.6 (1.2, 25.3)] (Table-3). Pre-operative antibiotics were given in 84 (80.7%) patients and 5/84 (5.95%) developed SSIs, whereas 20 (19.23%) patients did not get antibiotics and 3/20 (15%) developed SSIs. These results, however, were also not statistically significant.

Table-1: Comparison of baseline variables between patients with SSI and without SSI.

Variable	SSI (n=8)	No SSI (n=96)	p-value
Age	38.7±18	47.8±18	<0.207
Body Mass Index	25.4±2.9	24.8±4	<0.647
Haemoglobin	13.6±2.7	13.8±1.2	<0.887
Irreducibility	5 (63%)	21 (22%)	<0.022
Comorbids:			
Hypertension	0	27 (28.1%)	-
Diabetes	1 (12.5%)	9 (9.3%)	<0.568
IHD	0	15 (15.6%)	-
COPD/Asthma	1(12.5%)	6 (6.2%)	<0.439
CLD	1(12.5%)	3 (3.1%)	<0.278
BPH/LUTS	0	4 (4.1%)	-
Distant infection	0	6 (6.2%)	-
Any malignancy	1(12.5%)	5 (5.2%)	<0.389
Smoking	5 (62%)	22 (22.9%)	<0.027

SSI: Surgical site infection. IHD: Ischaemic heart disease. COPD: Chronic obstructive pulmonary disease. CLD: Chronic lung disease. BPH/LUTS: Benign prostatic hyperplasia/Lower urinary tract symptoms.

Table-2: Comparison of surgery-related characteristics between patients with and without SSI.

Variable	SSI (n=8)	No SSI (n=96)	p-value
Operative Time (in minutes)			
30-60	1 (12.5%)	27 (28.1%)	
61-90	5 (62%)	53 (55.2%)	<0.215
≥91	2 (25%)	16 (16.6%)	
Level of surgeon			
Resident	2 (25%)	22 (22.9%)	≤0.001
Consultant	6 (75%)	74 (77%)	
Anaesthesia			
Local	1 (12.5%)	36 (37.5%)	<0.089
Regional	2 (25%)	10 (10.4%)	
General	5 (62%)	50 (52%)	
Mesh fixation			
Staples	3 (37.5%)	33 (34.3%)	≤0.001
Suture	5 (62.5%)	63 (65.6%)	
Pre-operative antibiotics			
Yes	5 (62.5%)	79 (82.2%)	
No	3 (37.5%)	17 (17.5%)	<0.179

SSI: Surgical site infection.

Table-3: Univariate logistic regression for the risk factors.

Variable	Odd's Ratio	95% CI of Odd's Ratio	
		Lower	Upper
DM	1.381	0.152	12.523
COPD/Asthma	2.143	0.225	20.379
Malignancy	2.6	0.266	25.432
Cryptochorchidism	6.714	0.540	83.473
Smoking	5.606	1.240	25.337
Technique of mesh repair	1.145	0.258	5.093
Pre-operative antibiotics	0.359	0.078	1.647

DM: Diabetes mellitus. COPD: Chronic obstructive pulmonary disease. CI: Confidence interval.

Discussion

Both in the United States and Europe upto 1 million inguinal hernia repairs are performed annually. The majority of these repairs are performed using mesh techniques of which Lichtenstein open mesh repair is the most common.[3] Repair of inguinal hernia falls in the category of 'clean' surgery, hence post operative wound infection rates should be low. Benefit of antibiotic prophylaxis in inguinal hernia repair still remains uncertain.[3,4,6] The low rate of wound infections and the straightforward treatment, if they occur at all, are the

main arguments against routine antibiotic coverage during inguinal hernia surgery.[6] However, there continues to be a flip side regarding this argument. Infection in a hernia wound has been reported to be associated with a fourfold increase in the recurrence rate and therefore may indeed cause serious complications.[6]

A study conducted from 1991 to 1993 to evaluate wound infections after hernia surgery at the Aga Khan University reported the rate of wound infections to be 7%.[7] A subsequent study done at the same institution between 1997-1999[8] identified that increased operative time resulted in increasing wound infections and the wound infection rate decreased during the surveillance period. The wound infection rate was 3.8% in that study.

Malik et al[9] conducted retrospective review and reported a wound infection rate of 18% in elderly patients undergoing hernia repair at Liaquat University of Medical and Health sciences. Jawaid et al[10] conducted a study at Civil Hospital Karachi reported a wound infection rate of 11.4% in patients undergoing elective surgery including inguinal hernia repair. Two other local studies from Pakistan reported 0% infection rate in patients undergoing hernia repair,[11,12] however, they did not report how they diagnosed wound infection. In the current study the wound infection rate was 7%. The possible reasons behind this wide range of reported incidence of SSI are the criteria, set up, patients' selection (elective/emergency/day care) and type of study. The criteria for declaring wound infection in our study was opening of wound in clinic or if the consultant considered SSI and started patients on antibiotics.

There were only two statistically significant factors responsible for surgical site infections in the current study i.e. irreducibility and smoking. The question that arises is whether there could be system related errors in the current study which are responsible for the infection rate? The fault could be anywhere from scrubbing techniques, to preparing and draping the patients or operative techniques to errors in aseptic techniques on part of the doctors, nurses and operating room staff.

This is a retrospective study. This study is unable to determine health system related risk factors. Also the wound analysis has been carried out by the operating surgeon. We need to have a prospective study to evaluate wound infections with a more stringent criterion to define wound infections and identify system related risk factors. More over it has to be a long term project to evaluate reason for wound infection, control them and then re-evaluate the infection rate. Meanwhile surgeries should be performed in as low an operative time as possible and patients should be encouraged to quit smoking at least 4 weeks prior to surgery.[13]

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