Original Article

Postoperative Surgical Site Infection after Incisional Hernia Repair: Link to Previous Surgical Site Infection?

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ABSTRACT

Objective: Aim of the study was to determine the affects of different factors in general and previous surgical site infection (SSI) in particular, on postoperative SSI in patients undergoing open ventral Incisional hernia repair in a clean setting as there is still a lot of controversy on this issue. **Patients & Methods:** This is a Prospective study conducted at Madina Teaching Hospital, University Medical & Dental College, Faisalabad from January 2006 to September 2010. All patients undergoing open ventral Incisional hernia repair in a clean setting were evaluated for a postoperative surgical site infection (SSI). The development of a postoperative surgical site infection was taken as the primary endpoint. Patients were divided into two groups, without history of postoperative SSI and with history of postoperative SSI. Both groups were compared regarding demographic factors, Perioperative data and development of postoperative SSI. **Results**: 167 patients met the predefined criteria and were analyzed. Of these, 25patients were having prior wound infection after their previous surgery. Univariate analysis was done. It showed that patients with prior wound infection and those without prior wound infection had similar characteristics (Table 1). American Society of Anesthesiology (ASA) score (3.1 vs. 3.7; P .003) and percentage of smokers (3.1 vs. 3.7; P .003) was found to be significantly lower in the group with no history of wound infection as compared to other group with history of wound infection. There was no significant difference between two groups regarding use of permanent synthetic mesh (78% vs. 76%; P .571), requirement for an anterior component separation (18% vs. 07%; P .138), surgical site infection within 30 days after surgery (11% vs. 16%; P .487). The patients requiring surgical debridement after a postoperative SSI were similar in the two groups (31% vs. 25%; P .793) (Table 2). History of previous wound infection was not a significant factor, when we evaluated for predictors of surgical site infection after ventral hernia repair (odds ratio [OR], 1.47; P .436). However, a history of chronic obstructive airway disease (COAD) (OR, 4.09; P .018) and a history of smoking (OR, 6.01; P .004) were found to be significant predictors for an increased risk of developing a surgical site infection after ventral hernia repair in this group of patients (Table 3). **Conclusions**: We were unable to demonstrate any link between a previous SSI and a higher rate of SSI after open ventral hernia repair. Chronic obstructive airway disease & Smoking were identified as primary risk factors predictive of a postoperative surgical site infection. **Key Words**: Ventral Incisional hernia; postoperative surgical site infection; previous surgical site infection.

INTRODUCTION

Abdominal hernia repair is one of the most common procedures in general surgery. Surgical site infection after hernia repair is a devastating complication. Despite advances in surgical technique and prosthetic technologies, the risks for recurrence and infection are high following the repair of Incisional ventral hernias. The current standard for reinforced hernia repair is synthetic mesh, which can reduce the risk for recurrence in many patients. However, permanent synthetic mesh can pose a serious clinical problem in the setting of infection. Assessing patients' risk for wound infection is an outstanding need.

Obesity, smoking, poor surgical technique and post operative surgical site infections contribute to

Incisional hernias [1, 2, 3, 4]. Some reports suggested that viable bacteria may be present since Previous SSI and may lead to subsequent surgical site infection after ventral hernia repair [5, 6] One group of surgeons with expertise in ventral hernia repair, a prior wound infection should be considered a high risk for postoperative surgical site infection[7]. They take the risk of surgical site infection similar to active gastrointestinal contamination during ventral hernia repair[7]. Because this recommendation has significant implications to prosthetic mesh selection, it is important to validate these findings. We started this study to see any link between previous surgical site infection to postoperative surgical site infection in patients undergoing ventral Incisional hernia repair in a clean setting using a prospectively maintained database of patients.

AIMS OF THE STUDY

Aim of the study was to determine the affects of different factors in general and previous surgical site infection (SSI) in particular, on postoperative SSI in patients undergoing open ventral Incisional hernia repair in a clean setting as there is still a lot of controversy on this issue.

MATERIALS AND METHODS

After approval from the hospital ethical committee, the study was conducted at Madina Teaching Hospital, University Medical & Dental College, Faisalabad from January 2006 to September 2010. It is a prospective study.

Inclusion criteria: All patients undergoing clean open ventral hernia repair with completely healed wounds, no sinus tracts, and no clinical signs of infection were included for analysis.

Exclusion criteria: Patients with contamination, concomitant procedures on the gastrointestinal tract, an inadvertent enterotomy or simultaneous panniculectomy were excluded from the study. Patients with active abdominal infection at the time of presentation (enterocutaneous fistula, open wound, or active mesh infection) or who had a laparoscopic repair were also excluded from the study.

Antibiotic prophylaxis was given and continued in postoperative period till drains were out. Drains were removed when discharge was less than 50 ml/24 hr. Open ventral hernia repair was typically performed in a similar fashion as described by Rives and Stoppa. Midline incision is followed by adhenolysis of the anterior abdominal wall. The retro-rectus plane is dissected, and re-approximated. It separates the prosthetic from the viscera. The midline fascia is reapproximated over the prosthetic. To achieve midline fascial closure, additional fascia was released, as required. All the patients were followed up for a period of one year. Medical records were analyzed for patient's demographics including age, sex, smoking, history of wound infection, co morbidities, chronic obstructive pulmonary disease, body mass index, number of prior abdominal surgeries, and number of prior ventral hernia repairs. Perioperative data included ASA (American Society of Anesthesiology) classification, defect size, surgical repair, technique, the type of prosthetic material used, the location where the prosthetic material was placed, and operating room time. Smoking was defined as patients with history of smoking within 3 months prior to surgery. Prior wound infection was defined as those patients requiring opening or drainage of their incision, documented erythema, requiring antibiotic therapy, or septic dehiscence.

Postoperative surgical site infection was the primary end point for analysis. It was defined as any documented erythema of the wound, need to remove sutures, or the initiation of systemic antibiotics within 30 days of surgery. The secondary end point was a major surgical site infection. It was defined as those patients who require readmission to the hospital, or surgical debridement after hernia repair.

Statistical analysis was performed using R-Statistics. Univariate analysis was performed with the 2-sample t test for continuous variables and logistic regression analysis for categoric variables. All tests were 2-sided, and a P value less than 0.05 were considered significant.

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RESULTS

167 patients met the predefined criteria and were analyzed. Of these, 25patients were having prior wound infection after their previous surgery.

Table-1

Patient characteristics divided by history of wound infection

Variable	No history of wound infection (n=142)	History of wound infection (n=25)	P- value
Age (years)	51.1	49	.61
%Male	56%	64%	.91
Body Mass Index, Kg/m2	31.2	30.4	.203
Smoking	17	38	.021
ASA	3.1	3.7	.003
COPD	22	8	.132
Number of co morbidities	1.3	.9	.107
No of prior hernia repairs	1.53	.99	.069
No of prior abdominal surgeries	3.53	3.58	.805
Defect size, cm2	397	349	.497
Operating room time, h	2.7	2.3	.968
Synthetic mesh repair	78%	76%	.571
Open anterior component Separation	18%	7%	.138
Surgical site infection	10%	15%	.484

Table-2

Summary of postoperative surgical site infections

Treatment of surgical site infection	No history of wound infection	History of wound infection	P value
Any postoperative surgical site infection	16 (11%)	4 (16%)	.487
Surgical debridement	05 (31%)	1 (25%)	.793
Wound debridement in dressing room	03 (19%)	2 (50%)	.198
Intravenous antibiotics before discharge	08 (50%)	1 (25%)	.187

Univariate analysis was done. It showed that patients with prior wound infection and those without prior wound infection had the following similar characteristics: age, sex, body mass index, number of co morbidities, number of prior hernia repairs, number of prior abdominal surgeries, defect size, surgical time and synthetic mesh repair (Table 1).

Table-3

Univariate analysis of predictors for surgical site infection after ventral hernia repair

Variable	Odds Ratio	P value
Age, y	1.21	.812
%Male	1.02	.912
BMI, kg/m2	1.13	.892
ASA	3.13	.337
Number of co morbidities	1.73	.62
COAD	4.09	.018
Diabetes mellitus	1.83	.298
Smoking	6.01	.004
Immunosuppression	.21	.222
Number of prior abdominal surgeries	1.18	.619
Number of prior hernia repairs	1.19	.802
Defect size, cm2	1.00	.021
Operating room time, h	1.03	.006
Open anterior component separation	1.96	.197
History of wound infection	1.47	.436

American Society of Anesthesiology (ASA) score was found to be significantly lower in the group with no history of wound infection as compared to the other group with wound infection (3.1 vs. 3.7; P .003). Similarly, group with no history of wound infection as compared to 2nd group with history of wound infection was having a lower percentage of smokers (17% vs. 38%; P .021).

There was no significant difference between those patients without or with a history of previous wound infection with regard to the use of permanent synthetic mesh (78% vs. 76%; P .571). The requirement for an anterior component separation was similar between the 2 groups (18% vs. 07%; P .138).

Surgical site infection within 30 days after surgery was documented in 20 (12%) patients. Rate of surgical site infection between the two groups ie with no history of wound infection and with history of wound infection was not significant statistically (11% vs. 16%; P .487). surgical debridement was carried out in 6 (30%) patients who developed a surgical site infection. No patient required mesh removal. (Table-2). The patients

requiring surgical debridement after a postoperative SSI were similar in the two groups (31% vs. 25%; P .793) (Table 2). History of previous wound infection was not a significant factor, when we evaluated for predictors of surgical site infection after ventral hernia repair (odds ratio [OR], 1.47; P .436). However, a history of chronic obstructive airway disease (COAD) (OR, 4.09; P .018) and a history of smoking (OR, 6.01; P .004) were found to be significant predictors for an increased risk of developing a surgical site infection after ventral hernia repair in this group of patients (Table 3).

DISCUSSION

Our study evaluated the effect of a previous surgical site infection on the outcome of a ventral hernia repair regarding postoperative SSI in patients undergoing surgery in a clean setting. We were unable to find any link between previous SSI and postoperative SSI in patients undergoing a clean ventral hernia repair. However, COAD and a history of smoking in patients undergoing ventral hernia repair were found to be at a higher risk for SSI and therefore, deserve a special consideration during abdominal wall reconstruction. In 2012, Jeffrey A. Blatnik, David M. Krpata, Yuri W. Novitsky, et al in their study found no correlation between a prior wound infection and a higher rate of SSI after open ventral hernia repair[3]. They further concluded that smoking and COPD were the primary risk factors predictive of a postoperative surgical site infection[3]. In 1989, Houck et al evaluated the consequences of a prior wound infection on the outcome of open ventral hernia repair. However, the series of patients was small. They reported that patients undergoing an open ventral hernia repair had a significantly higher rate of postoperative SSI when compared with other clean abdominal procedures[7]. They also evaluated the subset of patients undergoing a ventral hernia repair that had a previous SSI. They found a 4 times higher rate of SSI than those patients without a previous wound infection. It was postulated that viable bacteria might be harboring in the wound and a source of contamination for the prosthetic at the time of ventral hernia repair. Their study had several limitations that might preclude generalizations to current surgical practice. Routine Perioperative prophylactic antibiotics were not widely used in this study. However, when preoperative antibiotics were given, they noted a 50% reduction in SSI rates after ventral hernia repair. Currently, our practice involves preoperative administration of intravenous antibiotics and discontinuation on removal of drains. This may explain why our patients with a history of wound infection have a much lower rate of surgical site infection (12%) when compared with the study by Houck et al[7] (41%). When Houck et al [7] used preoperative antibiotics their infection rate decreased to a similar rate as we found at 12%.

In our study, overall infection rate of 12% is consistent with several other similar modern studies in patients undergoing open ventral hernia repair[9]. However, other studies have shown even lower infection rates [10].Majority of the patients who developed a postoperative SSI were treated conservatively. In our series only 6 patients required surgical debridement (5patients without & 1 with 'history of previous SSI'), and none required complete removal of the mesh. In this study, our patients had no long-term infections.

Recently, ventral hernia working group has placed patients with a history of SSI in grade 3. Risk for postoperative SSI in these patients was similar to patients with a stoma or violation of the gastrointestinal tract[8]. In this study, a history of COAD and smoking were found as independent risk factors for the development of a postoperative SSI after open ventral hernia repair. They have been documented by others as risk factors for postoperative SSI after ventral hernia repair[1, 3, 4]. Advanced age, diabetes and immunosuppression as predictors of postoperative wound infection have been reported by many National Surgical Quality Improvement Programs [8]. From a clinical perspective, it is important to note that smoking is the only immediately modifiable risk factor, and therefore we mandate smoking cessation before open abdominal wall reconstruction.

In conclusion, 12% of our patients had SSI after open ventral incisional hernia repair in a clean setting. Among those, who developed postoperative SSI,

majority was managed conservatively and none required mesh removal. We were unable to demonstrate any link between a previous SSI and a higher rate of SSI after open ventral hernia repair. Chronic obstructive airway disease & Smoking were identified as primary risk factors predictive of a postoperative surgical site infection.

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