



Anaemia as a Risk Factor for Port Site Infection in a Tertiary Care Hospital in Jammu and Kashmir

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Abstract

Surgical site infection is one of the common problems encountered in surgical patients despite advances in antisepsis and asepsis. The aim of the study is to determine the association of pre-operative or post-operative anaemia with port site infection in a tertiary hospital in Jammu and Kashmir, India. The study was carried over 2 years in the Post-Graduate Department of Surgery, Acharya Shri Chander College of Medical Sciences (ASCOMS), Jammu. Data was collected from the patient admitted in Department of Surgery, ASCOMS for undergoing Laparoscopic cholecystectomy. All patients were followed up for 30 days for development of surgical site infection. Infected cases were identified based on CDC SSI criteria 2015. Out of 700 patients, 122 (17.42%) patients were found to be clinically infected (17.42%). Among 122 patients who got infected, 46 patients (37.7%) had anaemia. 12 (26.08%) patients had preoperative anaemia and were build up before surgery and 34 (73.91%) patients had post-operative anaemia. 2 cases (4.34%) had severe anaemia. 27 (59%) cases had moderate anaemia, 17 (36.66%) cases had mild anaemia

Keywords: surgical site infection, port site infection, pre and post-operative anaemia

Introduction

Surgical site infections (SSIs) are considered to be the most common nosocomial infections among surgical patients and constitute a heavy and potentially preventable economic burden on healthcare providers. Preoperative anaemia has also been associated with increased morbidity and mortality. In surgical patients, pre-operative haemoglobin levels were shown to be inversely related to operative mortality. Surgical site infections (SSI) frequently cause morbidity and mortality among inpatients of hospitals. Several studies have demonstrated an increased length of hospitalisation and the associated financial implications for patients

with SSI compared with non-infected patients having similar surgical procedures. The prevalence varies from hospital to hospital and across different countries. SSI rate in India also varies along length and breadth of country and varies from 1.6% to 38%.

Port Site Infections Are a Subset Of SSI Limited To Laparoscopic Surgeries.

Total quality management in hospitals is gaining emphasis these days. Control of postoperative complications is an essential component of total quality management. In this context it becomes important to determine the prevalence of port site

infections (PSI), assess the magnitude of the problem and provide a rationale to set priorities in infection control in the hospitals. Not many studies are done in India in this direction. In India, SSIs are one of the leading causes of morbidity and mortality. This variability can be due to differences in the characteristics of the hospital population, differences in clinical procedures, infection control measures, and hospital environment. As anaemia is quiet prevalent in the Himalayan foothills we have undertaken a study to assess preoperative and post-operative anaemia association with surgical site infection

Aim And Objectives

To study association of anaemia in port-site infection

Material And Methods:

The PROSPECTIVE study was conducted from October 2018 to October 2020 over a period of 2 year on patients admitted in Department of General Surgery, ASCOMS, Jammu for undergoing LAPAROSCOPIC CHOLECYSTECTOMY.

The total number of 700 patients were initially evaluated in the OPD. A detailed **history** was asked from the patients followed by **examination** which included GPE and Systemic examination.

Investigations included complete Haemogram, Coagulogram, RFT's, LFT's, Urine examination, ECG, CXR, Abdominal X-ray, USG-abdomen and pelvis.

Those patients with Haemoglobin levels below 11gm/dl were labelled as anaemic.

The patients were categorized into mild, moderate and severe anaemia according to World Health Organization -Mild Anaemia 9.0 - 10.9gm/dl

Moderate Anaemia 7.0 - 8.9gm/dl

Severe Anaemia <7.0gm/dl.

After careful evaluation and preparation, all the patients were taken for elective **Laparoscopic Cholecystectomy**.

All the operative findings were noted and blood loss during surgery was recorded.

After the operation, patients were put on iv fluids, antibiotics, and analgesics.

Drainage was recorded after twenty four hours in patients in whom drainage tubes were put. All the port side dressings were done after 24 hours, and condition of the wounds was noted. Most of the patients were discharged after 24 hours.

All the patients attended the OPD after 7 days for removal of stitches. Simultaneously the condition of the wounds was also noted and recorded.

Then the patients were seen in the OPD every weekly for the condition of the wound for next 8 weeks. Any changes in the wound site like redness, induration, edema of the margins, discharge etc were noted and managed accordingly. The patients with PSI were treated whereby proper cleaning of the wound sites was done, culture-sensitivity of the wound discharge taken and then treated with appropriate antibiotics. Complete Haemogram of the patients was also done and evaluated. All the patients were followed for next eight weeks.

Wound was classified as **per NNIS methodology and CDC classification**.

Grade 1- early case that reported within 4 weeks.

Grade 2- delayed cases reported within 4-8 weeks of the surgery.

Delayed cases were classified as the following

A. Tender nodules at port sites.

B. Sinus discharging white pus at site of nodule.

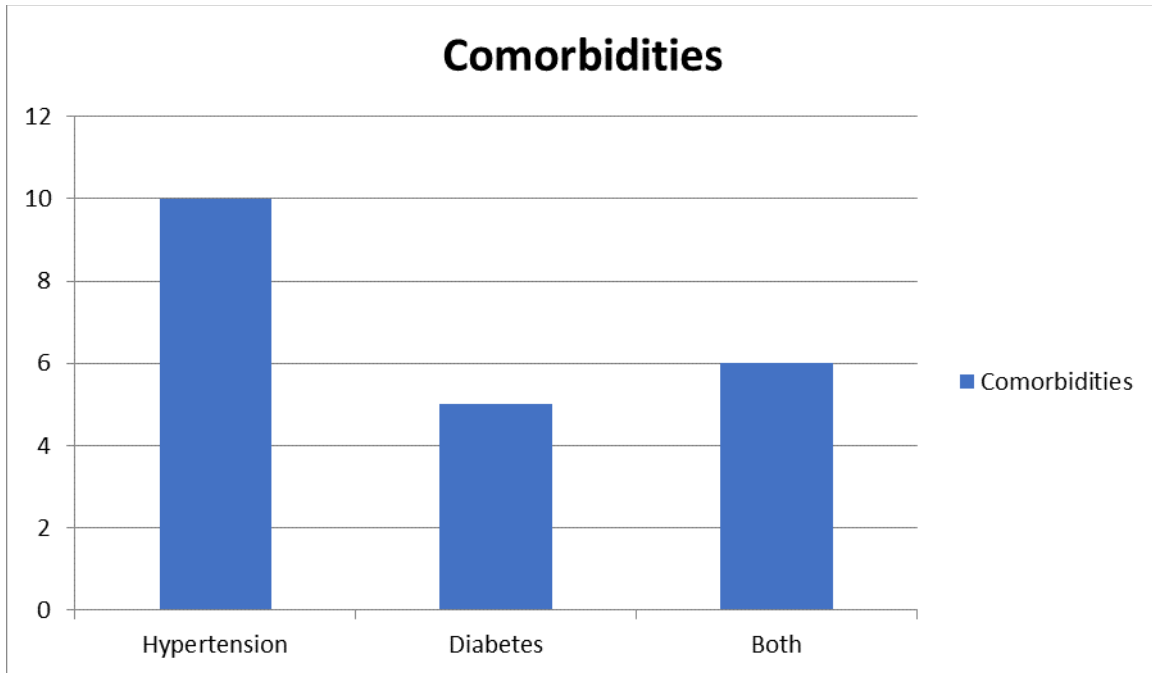
Statistical Analysis was done using Microsoft Excel, SPSS 13 software. Those risk factors that were univariately significant using chi-square analysis at $p < 0.05$ were entered into binary logistic regression equation to evaluate the risk of each factor when adjusted for other factors.

Observations And Results

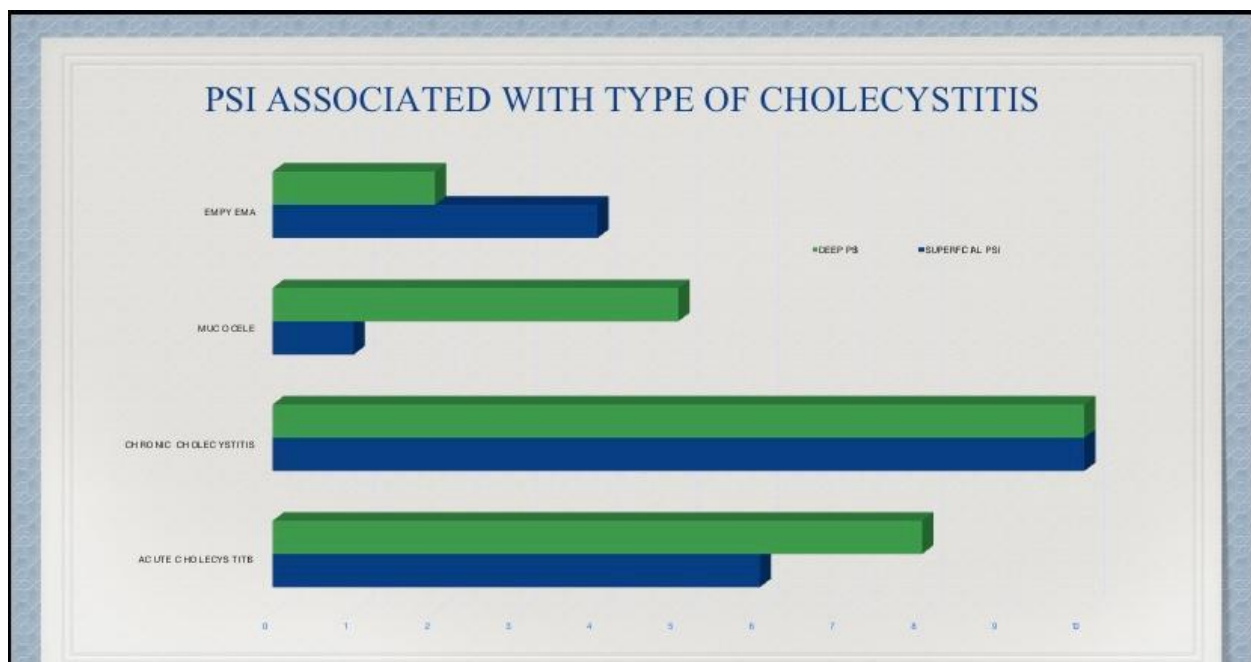
Out of 700 patients enrolled in our study ,122 (17.42%) patients were found to be clinically infected. Among 122 patients who got infected, 46 patients (37.7%) had anaemia. 12(26.08%) patients had preoperative anaemia and were build up before surgery and 34 (73.91%) patients had post-operative anaemia. 2 cases (4.34%) had severe anaemia. 27 (59%) cases had moderate anaemia, 17 (36.66%) cases had mild anaemia. In our study out of 46 patients having PSI with Anaemia - 36 patients were females and 10 patients were male. It was also found

that 12 patients who were given blood transfusion had longer hospital stay thus pointing out towards the more risk of infections in blood transfused patients' post-surgery. Out of these 46 anaemic patients, 10

patients had hypertension and 5 patients had diabetes. 6 patients had both diabetes and hypertension. 5 patients who had both anaemia and diabetes had a hospital stay of 15 ± 3 days.



In our study, Mucocele, and acute cholecystitis pathology had deep port site infections. Empyematous gall bladder had superficial port site infection. Chronic cholecystitis had equivocal deep and superficial port site infection



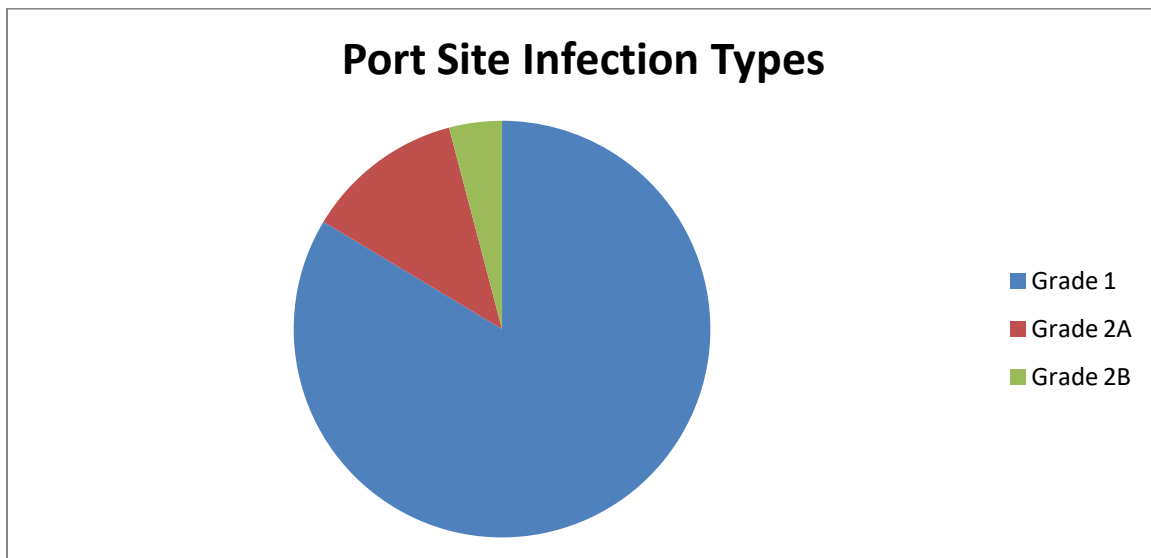
Out of various types of anaemias detected in patients with port site infection, 2 patients had beta thalassemia minor, 15 had megaloblastic anaemia, 8 patients had copper and zinc deficiency anaemia, 20 had iron deficiency anaemia, 1 had vit A and E deficiency anaemia

NO. OF PATIENTS	TYPE OF ANAEMIA	GRADE 1	GRADE 2A	GRADE 2B
2	BETA THALLESEMIA MINOR	1	1	
15	MEGALOBLASTIC ANAEMIA	7	5	3
8	COPPER AND ZINC DEFICIENCY ANAEMIA	6	2	
20	IRON DEFICIENCY ANAEMIA	15	3	2
1	VIT A AND E DEFICIENCY	1		

Maximum port site infections were found in umbilicus i.e.85 patients had umbilicus involved, 20 patients had epigastric site infection and 17 patients had infection in both umbilicus and epigastric port. There were no patients with lateral port infection.

The mean duration of surgery in 39 cases was more than 75% of operative time and hence had higher chances of port site infections.

Maximum port site infections were grade 1. Out of 122 port site infections, 102 infections were grade 1, 15 were grade 2A and 5 were Grade 2B, as per NNIS METHODOLOGY AND CDC CLASSIFICATION.



The PSI patients who had anaemia did not show any culture positivity for mycobacterium and Atypical mycobacteriae.

Biopsy in only 1 case out of 46 showed granulomatous disease.

30 out of 46 patients responded on treating the underlying cause of anaemia, with routine antibiotics and regular dressings. 16 cases due to prevalence of tuberculosis and dubious biopsy reports were put on clarithromycin and ciprofloxacin.

Discussion

Anaemia is known to be a predictor of adverse outcome in surgical patients. In the present study both preoperative and postoperative anaemia has significantly influenced the occurrence of surgical site infections. Naveen, *et al* found that out of 37 anaemic patients in their study, 23 (62.16%) developed Surgical site infections.

Liu liu, *et al.* suggested that patients with preoperative anaemia had significantly higher risk of incisional SSI than non-preoperative anaemia patients.

In our study patients who had preoperative anaemia had severe surgical site infection and longer hospital stay as compared to post-operative anaemia patients. Baron *et al.* analysed 39,309 non-cardiac surgery patients, and they found that preoperative anaemia significantly increased risk of postoperative mortality and resulted in prolonged hospitalisation. Although increasing evidence suggested that Preoperative anaemia was associated with poor outcomes after surgery, the mechanisms remain unclear. Experimental studies have confirmed that anaemia induced decreased oxygen delivery, elicited multiple organ hypoxia, like the brain and kidney, and finally caused organ dysfunction. Consistent to the findings of experimental studies, clinical trials have proved that anaemia caused acute kidney injury and increased post-operative infection, which were closely associated with anoxia-induced hypoxia. Similarly, increased risk of incisional SSI was observed in preoperative patients in the present study. Besides, preoperative anaemia increased risk of allogeneic blood transfusion which suppresses cellular immunity and causes SSI. Janssen *et al.* analysed 3721 patients who underwent laminectomy and/or arthrodesis of the lumbar spine. This study showed that blood transfusion increased 3-fold risk of SSI. In our study we found that 13.04% who had perioperative anaemia developed surgical site infections. Dunne *et al* determined that preoperative

anaemia was an independent risk factor for major morbidity and mortality, in a very large sample size of 6301 non-cardiac surgical patients. Malone and co-workers investigated several potential predictors of SSI and demonstrated a significant independent association between postoperative, but not preoperative anaemia and SSI in non-cardiac surgical patients. When comparing such studies, however, differences in definition and severity of anaemia must be recognized.

Both preoperative and postoperative anaemia had significantly influenced the occurrence of surgical site infections. Several studies determined that preoperative anaemia was an independent risk factor for PSI.

In non- cardiac surgical patients, post operative anaemia is an independent risk factor for PSI.

Anaemia induces decreased oxygen delivery, elicits multiple organ hypoxia. (Pittman, et.al.2011)

Anaemia increases risk of allogenic blood transfusion which suppress cellular immunity and causes SSI. (psui, etal.2014)

Conclusions

This study suggests that anaemia (Hb< 11 mg/dl) was associated with increased risk of PSI after surgery

Thus, correction of preoperative anaemia should be considered and future studies on PSI should target early preoperative optimization of modifiable factors like Anaemia, Diabetes, Malnutrition.

Consideration should also be given to preoperative diagnosis and correction of anaemia with iron, vit B12, folic acid, Vit E, Vit A

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