

Prospective Comparative Study of Complications of Laparotomy Wound in Elective and Emergency SurgeryPankaj Kumar¹, Kumar Ashish²¹Assistant Professor, Department of General Surgery, NMCH, Jamuhar, Sasaram²Associate Professor, Department of General Surgery, NMCH, Jamuhar, Sasaram

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Conflict of interest: Nil

Abstract

Background and Objectives: Postoperative wound complications are of common occurrence. The incidence of postoperative wound infections ranging from <2% to 38%. Based on NNIS (National Nosocomial Infections Surveillance) system reports, surgical site infections are the third most frequently reported nosocomial infections among hospitalized patient. Comparison of complications of laparotomy wound in elective and emergency surgery and various determinants affecting it.

Materials and Methods: It is a prospective randomized study of 72 patients undergoing emergency and elective laparotomy. Postoperative wound complications and various factors affecting it are compared between emergency and elective surgery.

Conclusion: In conclusion, laparotomy wound complications are multifactorial, this study demonstrated the increase in incidence of postoperative tissue and wound complications in emergency surgery (25%) than elective surgery (14%). It mainly depends on higher ASA score, anemia and higher wound class who are more likely to be associated with development of wound complications.

Keywords: Wound Complications, SSI, Risk factors.

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Introduction

Postoperative wound complications are of common occurrence. The incidence of postoperative wound infections ranging from <2% to 38%. Based on NNIS (National Nosocomial Infections Surveillance) system reports, surgical site infections are the third most frequently reported nosocomial infections among hospitalized patient [1] Surgical complications remain a frustrating and difficult aspect of operative treatment of patient regardless of how technically gifted and capable surgeon, will deal with postoperative wound complications [2,3]. Despite significant improvement in technology, postoperative vigilance, wound infections continue to occur. In addition to increased morbidity, mortality, loss of work productivity, disruption of family life, stress to employer, society and increased financial burden to health care system in general Postoperative wound infections range in severity from the most minimal stitch abscess to the extremely virulent infection leading to postoperative wound infections generalized septicaemia, wound dehiscence or death in some cases [4,5]. So the study of this aspect of laparotomy wound complications and surgical site infections with a view to identify the factors causing wound infections, microorganisms affecting and its antibiotic sensitivity will not only reduce the

post operative morbidity in these patients but also will result in an immense cost benefit, hospital stay to the patient and to the institution [6,7]

Objectives

Comparison of complications of laparotomy wound in elective and emergency surgery and various determinants affecting it.

The following determinants will be taken into consideration in formulating the risk index in our patients:

- Age
- ASA score
- Systemic diseases eg: diabetes mellitus, severe anemia etc.

Material and Methods

Patients admitted in Narayan Medical College and Hospital Jamuhar Sasaram Rohtas Bihar. Study duration of two years. for elective and emergency laparotomy.

All potential candidates for surgery will be investigated and evaluated as per the required norms which will include; hemoglobin %, blood sugar, blood urea, serum creatinine, urine albumin, urine

sugar and microscopy.

Investigations of other organ system involvement and nutritional status, any other biochemical investigations necessary apart from those investigations necessary to diagnose these cases which necessitates the surgical intervention are also included post-operative observed complications like, seroma, haematoma and wound infection, time of ambulation and duration of hospital stay. Surgical site infections will be classified according to the Center for disease control and prevention (CDC) classification: superficial incisional, deep incisional and organ/space infection. Patient will be followed up for a minimum period of one month following surgery. Final analysis regarding incidence and risk factors will be arrived at from the collected data.

Inclusion Criteria

- All emergency and elective laparotomy patients.
- Age more than 12yrs.

Exclusion Criteria

- Patients with parietal wall hernia.

- Patients with organ space infection.
- Gynaecological conditions.

Sample Size: Incidence rate of 38% in surgical site infection and 95% level of significance with 30% allowable error the calculated sample size is 72.

Statistical Analysis

Following statistical tests will be used to compare the results.

- Diagrammatic presentation.
- Mean S D
- Regression analysis (if necessary)

Results

The study was conducted on 72 patients, aged between 13-80 years, who underwent major elective or emergency laparotomy surgery in NMCH Jamuhar Sasaram.

Among the 72 patients, 5 (36) in elective and 9 (36) in emergency laparotomy patients developed complications

Table 1: Distribution of complications in Age

Age Groups	Emergency						Elective					
	Seroma		Superficial SSI		Deep SSI		Seroma		Superficial SSI		Deep SSI	
	F	%	F	%	F	%	F	%	F	%	F	%
10'-20'	0	0	1	14	0	0	0	0	0	0	0	0
21-30	2	40	2	30	2	40	0	0	0	0	0	0
31-40	1	20	1	14	1	20	0	0	0	0	0	0
41-50	1	20	1	14	2	40	0	0	0	0	0	0
51-60	0	0	1	14	0	0	1	100	1	33	1	50
>60	1	20	1	14	0	0	0	0	2	67	1	50
Total	5	100	7	100	5	100	1	100	3	100	2	100

Table 2: Distribution of Complications in Sex

	Emergency						Elective					
	Seroma		Superficial SSI		Deep SSI		Seroma		Superficial SSI		Deep SSI	
	F	%	F	%	F	%	F	%	F	%	F	%
Male	3	60	5	71	3	60	1	100	3	100	2	100
Female	2	40	2	29	2	40	0	0	0	0	0	0
Total	5	100	7	100	6	100	3	100	3	100	2	100

Table 3: Association of Complications with DM

DM	Emergency						Elective					
	Seroma		Superficial SSI		Deep SSI		Seroma		Superficial SSI		Deep SSI	
	F	%	F	%	F	%	F	%	F	%	F	%
Absent	4	80	6	86	4	80	1	100	3	100	2	100
Present	1	20	1	14	1	20	0	0	0	0	0	0
Total	5	100	7	100	5	100	1	100	3	100	2	100

Table 4: Association of Complications with Anemia

	Emergency						Elective					
	Seroma		Superficial SSI		Deep SSI		Seroma		Superficial SSI		Deep SSI	
	F	%	F	%	F	%	F	%	F	%	F	%
Absent	1	20	2	29	1	20	1	100	3	100	1	67
Present	4	80	5	71	4	80	0	0	0	0	1	33
Total	5	100	7	100	5	100	1	100	3	100	2	100

Table 5: Association of Complications with POS

	Emergency						Elective					
	Seroma		Superficial SSI		Deep SSI		Seroma		Superficial SSI		Deep SSI	
	F	%	F	%	F	%	F	%	F	%	F	%
1'-15	1	0	0	0	0	0	0	0	0	0	0	0
16-30	3	60	5	72	2	40	1	100	3	100	2	100
31-45	1	20	1	14	2	40	0	0	0	0	0	0
>45	1	20	1	14	1	20	0	0	0	0	0	0
Total	5	100	7	100	5	100	1	100	3	100	2	100

Table 6: Comparison of Complications of laparotomy wound in emergency and elective.

	Emergency		Elective		p value	T
	F	%	F	%		
No Complication	27	75	31	86	0.083	1.76
One Complication	04	11	04	11		
Two Complication	02	06	01	03		
Three Complication	03	08	00	00		
Total	36	100	36	100		



Figure 1: Normal wound healing



Figure 2: Superficial surgical site infection

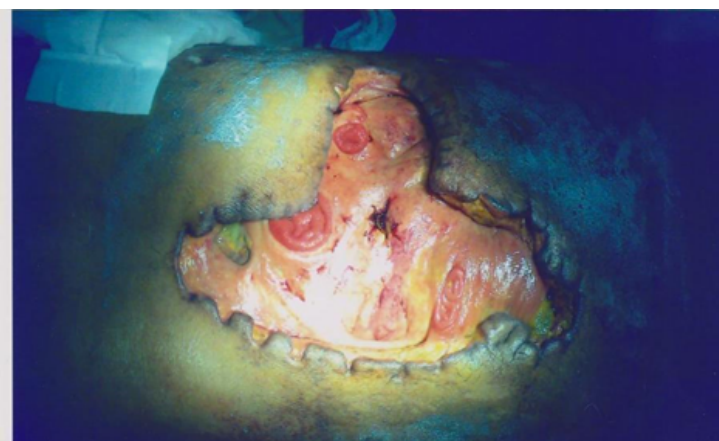


Figure 3: Deep incisional surgical site infection

Discussion

According to Lars Tue Sorensen MD et al. and Milorad Paunovic in their study demonstrated a significant increase in incidence of postoperative tissue and wound complications in emergency than elective surgery ($p < 0.05$) [8] demonstrate no much difference in postoperative tissue and wound complications in emergency and elective surgery ($p > 0.05$)

[9] contrast to that, in this study there was significant increase in incidence of postoperative tissue and wound complications in emergency surgery than elective surgery, ($p = 0.08$). Common for all tissues subject to surgery is a disruption of the local vascular supply, thrombosis of the vessels, and tissue hypoxia. Once the blood supply is restored, several factors may complicate healing. The most important seems to be the proliferation of bacteria in the wound and tissue, which affects each process involved in healing and increases the risk of wound infection, delayed healing, and dehiscence [8,10] a decrease in TS (tissue strength) and fibroblast

concentration, so that tissue destruction occurs [9]. Whereas factor affecting SSI, according to CDC are extremes of age, poor nutritional status, presence of diabetes, obesity, nicotine or steroid use, a coincident infection or colonization and a dysfunctional immune system. In this study patients with age > 50 years had more complications, but overall it is not significantly associated with wound complications in emergency and elective surgery. ($p > 0.05$) According to Lars Tue Sorensen MD et al. following emergency surgery males were associated with increased risk [7]. Similar finding was found by Milorad Paunovic in his 2832 study. According to Suchitra Joyce B et al females are significantly associated with SSI. In this study there was no significant association between male or female. Traditional wound classifications are a reasonably effective method to predict the inherent risk of developing an SSI from a specific procedure. For example, although the risk of developing an infection from a

clean, Class I surgical procedure is low, the risk

[11] progressively increases from a Class I surgery to a Class IV surgery. The risk for developing an SSI was heightened for patients undergoing Class III or Class IV surgical procedures, as well as for patients with > 3 diagnoses at the time of surgery. Abdominal procedures and surgical procedures that last > 2 hrs were additional risk factors for microbial

contamination and resultant surgical site [11]. Generally, the wound classification method does not take into account the varying intrinsic patient risk factors within any wound class. Patients undergoing surgical procedures may exhibit a number of risk factors that make them more susceptible to infection by an exogenous pathogen than the wound classification might indicate [1,11] most of the patients were in class III or class IV category, compared to elective surgery in which all patients were class II category. Thus this is one of the risk factor which is associated with development of more complications in emergency surgery. As incorporated in national nosocomial infections surveillance system (NNIS), the most recognized factors are the wound classification, American Society of Anesthesiology, class III or higher, and prolonged operative time, where time is longer than the 75th 14 percentile for each such procedure. In this study as ASA score was high, more chances of associated complications of laparotomy wound was noted. In emergency surgery significant association for seroma ($p = 0.004$) superficial ($p = 0.025$) and deep incisional SSI (0.004) were found compared to elective surgery where only deep incisional SSI had significant association of development of complications ($p = 0.028$) Lars Tue Sorensen MD et al. and Milorad Paunovic in their study found that overall incidence of tissue and wound complications was 6% following elective operation and 16% In this study incidence of postoperative tissue and wound complications in elective surgery was 14% and in emergency surgery was 25%. These values are higher compare to other studies, In elective surgery most of patients having malignancy, which itself is a risk

factor might be associated with higher value of complications. The limitation of this study is small sample size, as well as wound complications which are multifactorial and depends on other factors also like obesity, nutritional status mainly hypoproteinemia, immunocompromised state like tuberculosis HIV etc. Still this study found that ASA score, anemia are significantly associated with wound complications and as wound class is higher there are more chances of development of complications according to NNIS there are the most recognized factors.

Conclusion

Laparotomy wound complications are multifactorial, it depends on many factors. This study demonstrated that there is significant increase in incidence of postoperative tissue and wound complications in emergency (25%) than elective (14%) surgery ($p=0.08$). Higher ASA score, anemia and higher wound class are more likely to be associated with development of wound complications. Patients with a larger number of predictors are under highest risk. This study provided data for preoperative identification of patients with a high risk of postoperative tissue and wound complications. Further, development of clinical pathways would prove valuable if the absolute risk of each patient could be estimated when planning surgery to specifically optimize the patient's preoperative condition to reduce the risk of complications.

References

1. Alicia J, Mangram MD, Teresa C, Horan, MPH, CIC et al. Guidelines for prevention of surgical site infection. 1999; 20(4): 247 – 270.
2. Merrill T, Dafton, MD. In Surgical complications Sabiston textbook of Surgery. 20th edn. Saunders; Elsevier; 2016; 1(15): 311 – 335
3. Dunn L David, “History repeats itself Connections and Casualty in the study of surgical Infections”. Arch surg 1994; 129 : 21 – 22
4. Ananthanarayanan R and C. K. Jayaram Panikar, Textbook of Microbiology”. Madras, Onent Longmen – Hydrebad. 2005;1-6.
5. Peter J.E Cruse In: History of Surgical Infection Fry Surgical Infections. 1995; 3 – 9.
6. David J. Leaper, In: Surgical infection Bailey and Loves short practice of surgery 27th edn 4: 32-47.
7. Maria B, Wittle MD, Adrian Barbul. General Principles of wound Healing; Surgical Clinics of North America. June 1997; 77: 509 – 526.
8. Finn kallehave MD, Peer wille – Jorgensen Lars Tue Sorensen et al. Risk factor for tissue and wound complication in Gastrointestinal surgery Ann Surgery. 2005; 241(4):654 – 658.
9. Cavit COL, Atilla SORAN and Meltem COL. “Can Postoperative Abdominal wound Dehiscence be Predicted” Tokia J Exp clin Med. 1998; 23 (3):123-127.
10. Milorad Paunovic. Predictors of postoperative complications in gastrointestinal surgery Acta Medica Medianae. 2008; 47:15-19.
11. Sander Florman, Ronald Lee Nichols et al. Current Approaches for the Prevention of Surgical Site Infections Am. J. Infect. 2007 Dec; 3(1): 51-61