

# Surgical Wound Site Infection – Our experience

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Surgical wound site infections increase patient morbidity with physical disability, prolonged hospital stay and poses heavy economic burden. In this study of eight hundred patients, pattern of wound site infection, its etiology and correlations are studied. An infection rate of 22.7% is seen in emergency and 8.89% in elective surgical procedures. Among elective procedures, 5.05% clean, 8.39% clean contaminated, 45.45% contaminated and 66.6% dirty cases developed wound site infection. Infection rates increased with duration of operation and in surgery done in hands of junior residents. Meticulous surgical technique, proper sterilization and judicious use of antibiotics help control the morbidity of wound site infection.

**Key words:** Wound, infection, management

One of the main aims in surgical practice is prompt rehabilitation and back to work as early as possible. Surgical wound site infection in a common and major obstacle that hinders this goal.

Wound infection is one of oldest known ailments afflicted after trauma and amputation<sup>1</sup>. Even today it leads to increased morbidity and even mortality, and poses much burden on economics of person and state<sup>2</sup>.

Infection is caused by invasion of body tissues by microorganisms that overgrow and overpower the host defence mechanisms to produce local and systemic manifestations<sup>3</sup>. Sources of microbial contamination include direct inoculation, airborne contamination, haematogenous and lymphatic seeding etc. Presentation and severity of wound site infection depend on different factors; patient factors like host immunity, nutritional status, extremes of age, diabetes mellitus, anemia, malignancy, uremia etc.; surgical factors include degree of tissue trauma with devitalised tissue, and presence of dead space, foreign body or haematoma etc., microbial factors include microbial load, pathogenicity, sensitivity and resistance of organisms<sup>4</sup>.

Wounds are classified as clean, clean-contaminated, contaminated and dirty, according to degree of contamination of wound<sup>5</sup>. Surgical site infection is classified as superficial and deep<sup>6</sup>. It manifest locally as cellulitis, suppuration, dehiscence etc., and systemic effects like bacteremia, septicaemia and multiple organ failures<sup>7</sup>. Great advances, over past few decades, in antibiotics, improved surgical techniques, better methods of sterilization and general hygiene have helped prevent and treat a lot number of complicated infected cases.

## Material and methods

It is a prospective study of eight hundred patients admitted in North Surgical Ward, Mayo Hospital, Lahore in first half of year 2000, for different emergency and elective operations. All patients were thoroughly evaluated for their primary presentation and accordingly treated. Record was maintained included biodata, history, physical findings, investigations, operative findings etc. Special note was

made of any associated illness, previous treatment, duration from onset of disease or primary insult to presentation at hospital, period of resuscitation and evaluation, duration of surgery, time of surgery, level of experience of surgeon, whether emergency or elective surgery, use of antibiotics either prophylactic or therapeutic, duration of hospital stay, and type of wound like clean, contaminated etc., and whether wound left open or closed. Vigilant wound examination was done for any complication, and managed accordingly.

## Results

Out of eight hundred patients in this study, 475(59.25%) admissions were from emergency and 326(40.75%) through outpatient department. These included 502 males and 298 female patients. Their ages ranged from 12 to 76 years. Of the emergency operation 108(22.7%) patients developed wound infection, while 29(8.89%) of elective cases did so, making total infected wounds 137(17.12%).

Table 1

		Clean	Clean Contaminated	Contaminated	Dirty
Emergency	No. of operation	0	169	204	101
	No. of infected wound	0	19 (11.24%)	43 (21.07%)	46 (45.45%)
Elective	No. of operation	178	131	11	6
	No. of infected wound	9(5.05%)	11(8.3%)	5(45.4%)	4(66.6%)

Wound types according to degree of wound contamination, in emergency and elective operations, showed varying rates of infection as in table 1.

Patients with associated medical illness and some other important predisposing factors to wound infection showed following rates of wound infection (Table.2)

Duration of operation reflected a direct correlation with frequency of wound infection, as in Table 3

Table 2

	n=	Infected cases
Diabetes mellitus	74	31(41.89%)
Malnutrition	27	9(33.3%)
Steroid	5	3(60%)
Jaundice	38	12(31.57%)
Smoking	108	18(16.66%)
Renal failure	8	3(37.5%)
Bleeding disorders	4	2(50%)

Table 3

	Duration of operation			
	<1 hr	1-2 hrs	2-3 hrs	>3 hrs
No. of cases	249	306	173	72
Infected cases	17 (6.8%)	31 (10.13%)	55 (31.79%)	34 (47.22%)

Level of experience of surgeon also reflected in number of cases infected, as in table 4.

Table 4

	Consultant		Resident	
	Emergenc y	Elective	Emergenc y	Elective
No. of cases	46	204	428	122
Infected cases	12 (26.08%)	8 (3.9%)	96 (22.42%)	21 (17.2%)

Anticipating wound infection, a number of clean contaminated and contaminated wounds were not closed and skin was left open. Comparative results of wound site infection is given in Table 5.

Table 5

	Clean Contaminated		Contaminated	
	Skin closed	Skin open	Skin closed	Skin open
No. of cases	272	27	78	137
Infected cases	28 (10.25%)	2 (7.4%)	36 (46.15%)	12 (8.75%)

Wound site infection presented in a varied spectrum as in table 6.

Table 6

Complications	n=108	%age
Cellulitis	56	51.8
Suppuration/abscess	32	29.6
Wound dehiscence	14	12.9
Spreading synergistic gangrene	6	5.55

## Discussion

Wound site infection presents one of commonest postoperative complication in our set up. This study highlights the prevalence of wound infection in hospital setting and signifies importance of correlation with type of surgery, degree of wound contamination duration of

operation, experience of surgeon, and associated medical problems.

Wound infection rate is higher in emergency cases 108(22.7%) out of 474, as compared to 29(8.89%) out of 326 elective cases, because emergency patients present with trauma like penetrating injuries, crush wounds, road traffic accidents and peritonitis etc.

Degree of wound contamination is a major risk factor. In our study, wound site infection occurred in 19(11.24%) of 169 clean contaminated, 43(21.07%) of 204 contaminated and 46(45.54%) out of 101 dirty cases in those operated in emergency. The higher rates in our study is believed to be due to poor operation theatre sterilisation and hospital acquired infection.

Diabetes mellitus (41.8%), malnutrition (33.3%) and steroid use (60%) showed markedly increased susceptibility, probably due to disturbed local and systemic host defences.

Increase in duration of operation proportionately increase rate of wound infection from 6.8% in <1hour to 47.2% in >3 hours. This reflects increased tissue trauma, desiccation, increased bacterial load and need for additional antibiotics. Operations done by experienced surgeons with meticulous technique and tissue respect show an infection rate of 3.9% in elective cases as compared to 17.2% by residents.

Wounds anticipated to become infected in contaminated cases when left open complicated in 8.75% cases as compared to 46.15% when primarily closed with skin sutures. It signifies importance of leaving susceptible wounds open and letting it heal by secondary intention, thereby decreasing morbidity of patient.

Wounds once complicated were treated by antibiotics, opening the stitches, wound toilet, re-exploration, higher level amputation, wide excision and debridement etc.

Prevention of wound infection is the best modality. Meticulous surgical technique, tissue respect, thorough wound levage and judicious use of antibiotics help prevent and control wound infections and decrease suffering of patient.

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