ABSTRACT

OBJECTIVE: To compare the results in terms of superficial and/or deep surgical site infection, in primary and delayed primary closure, in cases of contaminated abdominal surgery.

STUDY DESIGN: A case control comparative study.

PLACE AND DURATION: Department of Surgery District Headquarters Hospital Rawalpindi from 14th June 2012 to 14th December 2012.

METHODOLOGY: The study includes 258 patients admitted from emergency with perforated appendix, ileal and duodenal perforations who underwent laparotomy through midline incision. All patients were divided randomly in two groups by non-probability consecutive sampling. In Group A with primary closure (PC) of wound done whereas in Group B delayed primary closure (DPC) of wound done. Each group received antibiotic cover. Patients were followed up for one month post operatively to see any surgical site infection.

RESULTS: Among the 258 patients, Surgical Site Infection (SSI) was significantly high in primary closure (PC) group with 63.4% patients and more infection was seen after 3rd post-operative day with about 54.2% patients having infection but only 9.7% had SSI on 4th post-operative week. However patients with delayed primary closure (DPC) had a frequency of SSI to about 26.2% with 16.6% patients having SSI on 3rd post-operative day while 10.0% at 4th post-operative week.

CONCLUSION: Delayed primary closure in laparotomy wound is effective method of wound closure in contaminated abdominal Surgery.

KEYWORDS: Contaminated Abdominal Surgery, Delayed Primary Closure, Primary Closure, Surgical Site Infection.

INTRODUCTION

Surgical site infection (SSI) is a common and potentially life threatening postoperative complication. The incidence of SSI is approximately 15% of all nosocomial infections and occurs in 10-30% of all patients undergoing gastrointestinal tract (GI) surgery. Incidence rises up to 40% depending on level of contamination. There is considerable morbidity and over one third of postoperative mortality is related to SSI. Surgical site infection is classified as superficial surgical site infection and deep surgical site infection. Superficial surgical site infection occurs somewhere in the operative field following a surgical intervention as skin and subcutaneous tissue involvement. Deep surgical site infection occurs in deeper tissues such as fascial and muscular layers of the body wall. Surgical site infection can occur due to multiple risk factors including nature of operative procedure and patient clinical comorbid conditions. So while forming a protocol to prevent surgical site infection we have to consider multiple risk factors like body mass index, type of surgery i.e emergency or elective operations, comorbid conditions of patients, classification of wounds, blood loss during surgery, suture material used in surgery, use of electro cautery and aseptic measures i.e frequency of glove changes, usage of face masks etc. Risk factor for SSI like smoking status, gender, operating time, suture material and technique of abdominal wound closure are important in lower gastrointestinal surgeries. The management of contaminated and dirty abdominal wounds has been controversial and main focus has been on the measures to minimize SSI thus leading to reduced hospital stay and morbidity. The type of skin closure is one of the factors that can reduce the SSI thus reducing hospital stay of patients and in turn decreasing costs on health resources. The present study was done to highlight this technique for reducing SSI. The analysis helped in making standard protocols for reducing SSI in managing contaminated abdominal wounds reporting in emergency including focus on proper sterile instruments and aseptic measures in emergency. Our study aims to provide a better choice of procedure in handling contaminated wounds with less complication rate. This will decrease the morbidity and hospital stay of patients caused by wound infection leading to wound dehiscence.

METHODOLOGY

Two fifty eight patients who fulfilled the inclusion criteria were admitted via emergency. All cases between twelve and sixty five year of age belonging to either sex group, presenting in the
emergency department of District Headquarters Hospital from 14th June 2012 to 14th December 2012, diagnosed with acute peritonitis were included in the study. This was a case control comparative study. Common causes of peritonitis in patients were duodenal perforation, ileal perforations and perforated appendix. All the patients having risk factors influencing wound healing including tuberculosis, diabetes, malnutrition, human immunodeficiency virus infection, malignancy and steroid use were excluded from study based on history. Patients with history of penetrating/blunt abdominal injuries and patients not completing the 30 day follow up were also excluded. Diagnosis was made on the presence of signs of peritonitis such as tachycardia with generalized tenderness, rigidity and guarding of the abdomen. On laboratory and radiological assessment of patients findings like raised white blood cell count, free air under diaphragm and free fluid in peritoneal cavity were noted. Age, sex, socioeconomic status, history and clinical finding were documented on proforma. Patients were thoroughly counselled about the risks and benefits of procedure. Informed consent was taken.

Patients were divided into two groups by non-probability consecutive sampling randomly. 129 patients had primary closure done and allocated Group A. Rest of the 129 patients underwent delayed primary closure and allotted Group B. Metronidazole 500mg and Ceftriaxone 1gm were given intravenously before induction in both of the groups. In each group, linea alba was closed with Polypropylene 1 suture and same technique applied for both the groups. Skin closure in Group A was done primarily while in Group B delayed skin closure was done on the 4th post-operative day. Patients in each group evaluated for superficial and deep surgical site infection during their hospital stay. Investigations and wound infection was recorded on a proforma. Follow up was done on the 3rd postoperative day and subsequently in the 4th post-operative week which coincided with culmination of the study. Data was analyzed on SPSS version 11.

TABLE – I: AGE DISTRIBUTION IN PC AND DPC GROUPS (n=258)

<table>
<thead>
<tr>
<th>Group</th>
<th>Range</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in PC Group</td>
<td>12-65</td>
<td>28.3</td>
<td>11.5</td>
</tr>
<tr>
<td>Age in DPC Group</td>
<td>12-65</td>
<td>28.7</td>
<td>14.1</td>
</tr>
</tbody>
</table>

PC : Primary Closure  
DPC: Delayed Primary Closure

TABLE – II: SURGICAL SITE INFECTION IN PC AND DPC GROUPS ON 4TH POST OP WEEK (n= 258)

<table>
<thead>
<tr>
<th>Closure Type</th>
<th>SSI 4th post op week</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>PC</td>
<td>12 (9.7%)</td>
<td>117(90.6%)</td>
</tr>
<tr>
<td>DPC</td>
<td>13 (10.0%)</td>
<td>116(89.9%)</td>
</tr>
<tr>
<td>Total</td>
<td>25 (19.7%)</td>
<td>233(90.3%)</td>
</tr>
</tbody>
</table>

PC: Primary Closure  
DPC: Delayed Primary Closure  
SSI: Surgical Site Infection

Surgical site infection is a common and potentially life threatening postoperative complication. The surgical techniques used for wound closure are varied in patients. Various surgeons's advocated primary closure of wounds and some advocated to close wounds after three to four days of surgery. Since primary closure resulted in higher wound infection and postoperative complications such as wound dehiscence. Patients have increased length of hospital stay and cost on hospital for managing such patients is more. However, ideal method of wound closure is still debatable issue to minimize morbidity of patients. Our study was done to see the optimum closure method of contaminated surgical wounds in patients having visceral perforations. SSI was diagnosed in 19.8% patients. 30.2% in the PC group and 9.3% in the DPC group developed SSI. Hence significantly greater proportion of PC group patients developed SSI as compared to DPC patients; p=0.015. The better method was delayed primary closure in contaminated cases.

The age of our patients in both PC and DPC groups were within twelve to sixty five years with mean and standard deviation of...
28.5±12.8. Age has no effect on risk of wound infection rate which is illustrated in our study irrespective of the technique chosen for abdominal closure. Similar results were portrayed in Ahmed M et al study.

The contaminated wound management has been a controversial issue since long and studies conducted to prove one technique superior to the other. However in our country we have to focus on basic reasons that aggravate risk factors for SSI. There is a lot of room for making future strategies at all levels with training of staff and health personnel for minimizing these risk factors. After education need for making sterility in theatre per suites is important. Progression of SSI can lead to wound dehiscence and burst abdomen with abscess formation within abdominal cavity. Wound dehiscence has an incidence of 2% and associated mortality of 25%.

Many causes of wound infection are avoidable and good surgical outcome can be achieved by proper initial management of patients in emergency setting. Then after resuscitation there is need for standard theatre conditions and prevention of complication by applying appropriate surgical technique. Lack of experience on part of surgeon especially seen in emergency is also associated with increased chance of complication. However, co-morbidities, surgical technique and post-operative care are also significant factors in patients uneventful recovery. Emergency laparotomy undertaken for acute abdomen demands highly professional skills from a surgeon. For an effective outcome, postoperative care is as important as preoperative preparation of the patient. Any negligence in care, in either case, can produce unacceptable consequences regardless of the standard of surgical procedure. Postoperative complications associated with wound have a major influence on the postoperative morbidity of the patients. Wound healing is complicated by multiple factors and it is rare that a single factor exist. It is very difficult to ascertain that which factor is of utmost importance in a clinical study. In our study SSI was observed in 63.4% patients of PC group and 26.2% in DPC group. In a study by Bahdragoudra J in which primary group had a higher rate of wound infection 54% and delayed primary closure was 12% (P<0.001). Further study and research is needed to exactly show the differences regarding closure techniques. This is why emphasis has been given in literature for many decades as health care authorities are trying to cope with it precisely. Our study may help to improve handling the contaminated wounds regarding choice of a better procedure with less complication rate.

CONCLUSION

Delayed primary closure of abdominal wound is better in cases of contaminated abdominal wounds, as it can avoid major infection and hence wound dehiscence as proved by our study. There is need for surveillance and further research to set standard protocols and decrease SSI to reduce burden on health care resources.

Contribution of authors:
Asma Bibi: Provoked the idea of manuscript and made the inclusion exclusion criteria. Also wrote the methodology.