Role of Prophylactic Retention Sutures for contaminated (and dirty) abdominal wounds in the prevention and management of wound dehiscence

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Abstract- Wound Dehiscence (Acute Wound Failure or Burst Abdomen) is one of the dreaded complications of abdominal surgery. The incidence of wound dehiscence is higher in contaminated and dirty abdominal wounds. Retention sutures have often been employed in the treatment of acute burst abdomen, but their role as a prophylaxis of acute wound failure is controversial. The main aim of the study was to explore the prophylactic role of retention sutures in contaminated and dirty abdominal wounds in patients without additional risk factors. Of the 97 patients selected, 31 patients had prophylactic retention sutures. While 5 in the intervention group had dehiscence, 9 patients in the control group had wound dehiscence. The results, when analysed, did not show any significant decrease in the rates of dehiscence, but showed improved recovery time in the subset of patients having wound dehiscence in the intervention arm. Hence we do not recommend the routine use of prophylactic retention sutures in all patients with contaminated abdominal wounds without additional risk factors. However, in the event of wound dehiscence, presence of retention sutures is associated with faster recovery time. Further studies should concentrate in identifying this subset of 'at risk' patients who would benefit from the same

Index Terms- Prophylactic Retention Sutures, Contaminated abdominal wounds, Dirty laparotomy wounds, Abdominal Closure.

I. INTRODUCTION

Wound Dehiscence (Acute Wound Failure or Burst Abdomen), defined as postoperative separation of the abdominal musculoaponeurotic layers[1], is one of the dreaded complications of abdominal surgery often leading to evisceration and possibly necessitating intervention. Acute wound failure may be partial or complete depending on the extent of suture dehiscence[2]. Wound dehiscence is associated with higher morbidity and mortality[3] and cost of treatment.

The two classes of surgical wounds[4] which possess highest rate of infection are contaminated and dirty wounds.

Class III/Contaminated: These are open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique (e.g., open cardiac massage) or gross spillage from the gastrointestinal tract, and incisions in which acute, nonpurulent inflammation is encountered are included in this category.

Class IV/Dirty-Infected: They include old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation.

Predisposition to infection raises the risk of wound dehiscence because of multitude of factors including abscess formation and necrosis at the surgical site, postoperative increase in intra abdominal pressure from ileus and ongoing intra abdominal inflammation and sepsis and multiorgan failure leading to poor wound healing[3,5].

Retention sutures have often been employed in the treatment of acute burst abdomen[6] and in the prophylaxis of acute wound failure in patients with multiple risk factors[7, 8] but their role in the context of contaminated and dirty abdominal wounds without other risk factors is less studied.

II. STUDY DESIGN

AIM OF THE STUDY

1. To determine the effectiveness of prophylactic retention sutures in the prevention of wound dehiscence in contaminated (and dirty) abdominal wounds.
2. To explore the role of prophylactic retention sutures in reducing the time to recovery in the event of wound dehiscence.

MATERIALS AND METHODS

This was a single-centre prospective case control study done in the Department of General Surgery, Gandhi Hospital, Secunderabad. All patients undergoing laparotomy with midline incisions which are likely to be contaminated or dirty wounds were selected for the study. Patients with pre existing conditions which are likely to affect wound healing like severe anaemia or hypoproteinemia, patients with chronic illnesses such as chronic liver disease, chronic kidney disease, diabetes, chronic lung disease, immunosuppressed patients and patients with previous midline laparotomies were excluded from the study. Patients lost to follow up and those who expired within the study period were also excluded.

A total of 97 patients qualified for the study. Of these, 31 patients underwent prophylactic retention suturing (the Intervention arm) and the rest 66 patients formed the control group (i.e., simple abdominal closure without additional retention sutures).

All patients underwent surgery under general anaesthesia. Both groups received pre operative antibiotic at the time of induction. After laparotomy and procedure, closure of abdomen was done in layers- rectus sheath with prolene and skin and subcutaneous tissue with nonabsorbable sutures. Drains were kept as required. In addition patients in the test group had retention sutures- 2 or 3 loops of sutupack (ethilon) encompassing all layers were passed across the incision, secured on the skin side by threading them through rubber tubings (to prevent cut through) and then tied as horizontal mattress sutures (**Figure 1**).

Figure 1: Retention sutures in a contaminated case. Skin is closed primarily with drain

Wounds were examined after 48 hours and then every second day till suture removal or discharge. Wound dehiscence (**Figure 2**), if any, and/or any other complications were noted. Depending on the severity they were either managed conservatively or by secondary suturing. Patients were discharged home once the wounds healed. The total length of hospital stay was noted.

Figure 2: Complete Wound Dehiscence 11th POD

III. RESULTS AND ANALYSIS

Of the 97 patients, the Intervention group comprised 31 patients while there were 66 patients in the control group. There was no significant difference in the age or sex between the two groups as shown in **Table 1** and **Table 2**.

Table 1: Age Distribution

	MEAN AGE	Standard Deviation	t-value	p value
Intervention Group	37.16	14.16	t(95)=0.342	**.366** *Not significant for p<.05*
Control Group	38.32	16.11		

Table 2: Sex Distribution

	Intervention Group	Control Group	

Males	27	52	79
Females	4	14	18
	31	66	97
X^2 (1,N=97)=0.96, p=.33; Not significant for p<.05			

Aetiologies for which surgery was done included gastric, duodenal, jejunal, ileal, gall bladder and appendicular perforations, ruptured liver abscess or Pyoperitoneum (**Table 3**).

Table 3: Aetiological Distribution

AETIOLOGY	No. of Pts
DUODENAL PERFORATION	56
JEJUNAL PERFORATION	2
ILEAL PERFORATION	18
GASTRIC PERFORATION	4
GALL BLADDER PERFORATION	1
COLONIC PERFORATION	0
APPENDICULAR PERFORATION	13
RUPTURED LIVER ABSCESS	2
PYOPERITONEUM	1

5 patients (4 partial, 1 complete) in the intervention group, and 9 patients (5 partial, 4 complete) in the control group developed wound dehiscence. The rate of wound dehiscence (both partial and complete combined) was marginally lower in control group (13.63% Vs 16.13%). This, however, was not statistically significant [X2 (1, N=97) = 0.106, p=.745]. The rate of complete wound dehiscence in the test arm was almost half that in the control group (3.23% Vs 6.06%), possibly suggesting an aetiological role of retention sutures in preventing progression of partial wound dehiscence into complete dehiscence. However, again, this correlation was not significant statistically [X2 (1, N=97) =0.347, p= .556].

Table 4: Wound Dehiscence Rates

	Wound Dehiscence (Partial+ Complete)	Complete Wound Dehiscence
Intervention Group	5 (13.63%)	1 (6.06%)
Control Group	9 (16.13%)	4 (3.23%)
	$X^2(1,N=97)=0.106$, $p=.745$	$X^2(1,N=97)=0.347$, $p=.556$

There is not much difference in the mean length of hospital stay between the control and intervention groups (12.55 Vs 11.23) as a whole. But as summarized in **Figure 3**, on comparing the length of hospital stay between the subset of patients with wound dehiscence in control group versus the subset in test populations, the Mean Length of Hospital Stay in the intervention group with dehiscence (M=18.8, SD=11.69) was lesser than the control group with dehiscence(M=30.56, SD=15.53). This was statistically significant at p<.10 [t (12) =1.47, p=.084].

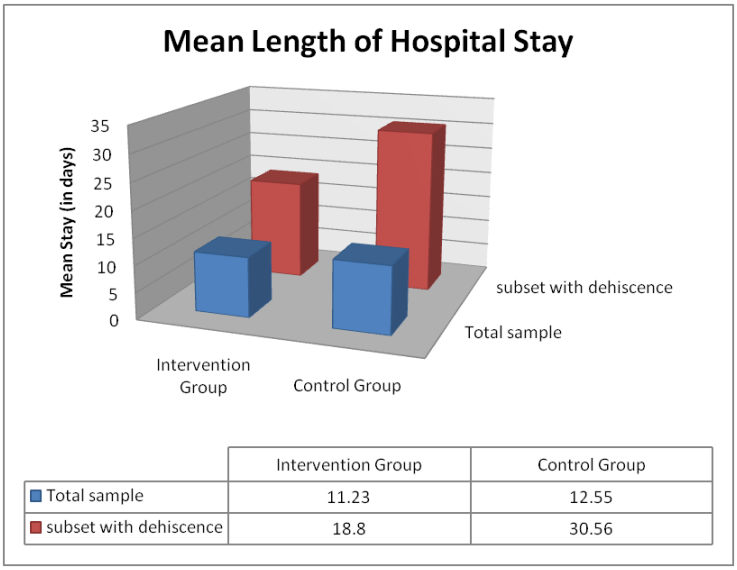

Figure 3: Mean Length of Hospital Stay

IV. CONCLUSION AND RECOMMENDATIONS

The following conclusions and recommendations can be drawn from the study:

1. In patients of contaminated (and dirty) abdominal wounds without additional risk factors prophylactic retention sutures do not decrease the rate of wound dehiscence.
2. The decrease in the rate of complete dehiscence inspite of an apparent increase in (all types) wound dehiscence following

retention sutures is probably an indicator that retention sutures prevent the progression of partial wound dehiscence to complete ones. However, a recommendation cannot be based since the result was not statistically significant. Further studies with larger sample sizes are needed to ascertain its value in this context.

3. Retention sutures decrease the length of hospital stay and hence the time to recovery in patients who have wound dehiscence.

Thus, while retention sutures are useful in decreasing the time to recovery and probably the rate of progression to complete wound dehiscence (i.e., therapeutic role), they do not have a role in prevention or prophylaxis of wound dehiscence in patients with contaminated (or dirty) abdominal wounds but without additional risk factors (i.e., no prophylactic role).

We do not recommend the routine use of prophylactic retention sutures in contaminated laparotomy wounds except for individuals with additional risk factors for wound dehiscence. In the latter group, it not only helps in decreasing the length of hospital stay and hence morbidity, should a dehiscence occur, but also probably prevents progression to complete dehiscence in at risk individuals.

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