TENSION SUTURES IN CLOSURE OF MIDLINE LAPAROTOMY-AVOIDANCE OF WOUND DEHISCENCE

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ABSTRACT

Objective: To compare closure of abdominal wall in midline laparotomy with tension sutures closure (TSC) along with single layer en mass closure (SLC) versus single layer closure (SLC) alone in terms of frequency of wound dehiscence.

Study Design: Randomized control trial.

Place and Duration of Study: Department of Surgery Combined Military Hospital Peshawar, from 12 Nov 2013 to 21 Sep 2015.

Material and Methods: Group A and group B had 150 patients each. Group A was subjected to tension suture closure in addition to single layer en mass closure while group B was subjected to single layer en mass closure alone. Postoperative wound dehiscence (WD) was evaluated on 10th post-operative day (POD). A *p*-value ≤0.05 was considered statistically significant.

Results: Postoperative wound dehiscence was comparatively less in Group A (6%) as compared to Group B (12.6%) which was statistically significant (*p*-value 0.047).

Conclusion: Tension suture closure with single layer closure is superior to single layer en mass closure alone in terms of frequency of post-operative wound dehiscence.

Keywords: Abdominal wall, Single layer closure (SLC), Tension suture closure (TSC), Wound dehiscence (WD).

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INTRODUCTION

Closure of abdomen is a common operative procedure in all abdominal surgeries. It is among the few basic techniques. Single layer en mass closure of abdominal wall is most frequently used technique in current practice of abdominal closure[1]. Post-operative wound dehiscence, burst abdomen, wound infection, suture sinus formation, chronic wound pain and incisional hernia are well known and frequent complications followed by abdominal closure[2,3]. Frequency of post-operative complications also depends on amount of spillage of gut contents into the peritoneal cavity during abdominal surgery[3]. Dehiscence is the disruption or breakdown of a wound. It may range in magnitude from a failure of the deeper portions of the abdominal incision to unite, unrecognized in the postoperative course but resulting later in an incisional hernia, to the dramatic "burst abdomen" or evisceration in which dehiscence of the wound occurs suddenly and is accompanied by protrusion of abdominal contents, usually bowel, through the disrupted wound. Significant wound dehiscence occurs in approximately from 0.4 to 3.5% of all laparotomies[3,4]. Major independent risk factors for wound dehiscence which have been established including age, male gender, chronic pulmonary disease, ascites, anemia, jaundice, emergency surgery, postoperative coughing and wound infection[4]. Operative management options included temporary closure options (open abdomen treatment), primary closure with various suture techniques, closure with application of relaxing incisions, use of synthetic (nonabsorbable and absorbable) and biological meshes and the use of tissue flaps[5]. The treatment of burst abdomen is

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associated with unsatisfactory surgical outcome[5]. Randomized controlled clinical trials are needed to provide the surgical community with a greater level of evidence for the optimal treatment strategy for burst abdomen and the various subtypes[5].

Randomized controlled trials were carried out in Iran for prophylactic application of tension sutures to avoid wound dehiscence[6]. Incidence of wound dehiscence was found significantly reduced (4%) among the individuals in whom tension sutures were applied as compared to the control group in whom single layer en mass closure was done (13.3%)[6].

In this study we intended to compare TSC and SLC for closure of midline laparotomy wounds in terms of wound dehiscence. Thus finding out the preferable method which results in lesser incidence of wound dehiscence in patients undergoing closure of abdominal wall after midline laparotomy has been undertaken.

MATERIAL AND METHODS

This randomized control trial was carried out in the inpatient's surgical department of Combined Military Hospital Peshawar from 12 November 2013 to 21 September 2015. Clearance from institutional ethical committee was obtained and informed written consent was taken from every individual. A total of 300 patients undergoing midline laparotomy were selected and subjected to the two different methods of abdominal closure i.e. TSC with SLC and SLC alone. Patients with diabetes, abdominal malignancy, asities and patients with previous history of laparotomy were excluded. Sampling was non-probability consecutive sampling. Patients were divided into two equal groups of 150 each by lottery method. In group A, full thickness tension sutures were applied for closure of abdominal wall in addition to single layer en mass closure. In group B, single layer en mass closure was done alone. In both groups subcutaneous fat was approximated with interrupted Vicryl 2/0 sutures and skin was closed with staples. Skin sutures were to be removed after 14 days of surgery while tension sutures were to be retained upto 28 days post-operatively. All the surgeries were performed by same surgical team and patients were followed up within 10 days of surgery to look for development of wound dehiscence. Contact numbers of patients were taken and all data were entered in the data collection proforma and analysed using statistical package for social sciences (SPSS) version 14. Mean and standard deviation were calculated for quantitative

Table-I: Comparison of male vs female (frequency).

Wound dehiscence	Gender		Total	*p*-value
	Male	Female		
Yes	14	14	28	0.008
No	201	71	272	
Total	215	85	300	

Table-II: Comparison of TSC + SLC VS SLC.

Wound dehiscence		Study Group		Total	*p*-value
		Tension suture closure + Single layer closure	Single layer closure		
Yes	n	9	19	28	0.047
	%	6%	12.7%	9.3%	
No	n	141	131	272	
	%	94%	87.3%	90.7%	
Total	n	150	150	300	
	%	100.0%	100.0%	100.0%	

variables like age. The categorical or qualitative variables like gender and wound dehiscence were presented in terms of percentages and frequencies. Independents sample t-test was applied to compare mean age between groups. Both groups were compared for wound dehiscence (categorical value) applying chi-square test. A *p*-value <0.05 was considered statistically significant.

RESULTS

A total of 300 patients undergoing midline laparotomy were recruited and were randomly divided into two equal groups of 150 each. The age distribution ranged from 26-75 years in the study. Minimum age was 26 years (n=2) and maximum age was 75 years (n=1) with Mean age of 50.27 ± 14.62. Mean age in group A was 50.15 ± 14.75. Mean age in group B was 50.39 ± 14.54 (*p*-value 0.002). Out of total 300 patients, 71.6% (n=215) were males and 28.4% (n=85) were females. Among total 215 males, 14 developed wound dehiscence; while among 85 females, 14 developed wound dehiscence with a significant *p*-value of 0.008 (results summarized in table-I). Wound dehiscence was checked on 10th post op day. When examined on day 10, group A revealed 6% (n=10) wound dehiscence as compared to group B which showed 12.7% (n=19) wound dehiscence. The groups had a statistically significant difference in the frequency of wound dehiscence with a chi-square *p*-value 0.047. Comparison between frequencies is given in table-II.

DISCUSSION

Dehiscence of the wound after abdominal surgery is a serious complication that continues to bedevil the surgeon and threatens the patient[7]. It has significant impact on health care cost, both for the patients and hospitals[8]. It results from a failure deeper portions of abdominal incisions to unite together. The results of which may remain unrecognized in the postoperative course resulting later in an incisional hernia, to the dramatic "burst abdomen" or evisceration which consists of protrusion of the abdominal viscera due to dehiscence of all the planes of the abdominal wall after laparotomy[9]. A number of factors influence the healing of wounds. The factors that are significantly associated with wound dehiscence include hypoalbuminemia, anemia, malnutrition, chronic lung disease and emergency procedure[10,11]. The additional post-operative factors that are found to be significant include vomiting, prolonged intestinal paralysis, repeated urinary retention and increased coughing[10]. Disruption can take place at any time in the postoperative period but most often occurs between sixth and eighth day after operation[12]. The cause of this complication is an increase in horizontal tensile forces on the site of the insertion of sutures which cuts the rectus sheath[1]. This type of disruption has long been associated with a substantial mortality rate, but most often, death is a result not of the disruption but due to the underlying conditions that caused it. Appropriate treatment at the bedside includes protecting the intestines with sterile towels, promptly administering a narcotic, intravenously if possible, and immediately taking the patient to the operating room for re-suturing of wound and application of tension sutures. In this technique of reinforced tension line suture, peak tensile forces are distributed from the suture base to the surrounding tissue through a horizontal suture, thereby preventing the suture from cutting through the tissue[1]. In the absence of infection a re-sutured wound heals more rapidly than the primary wound, presumably because some metabolic preparation of the tissues has already taken place. Pre-operatively, the presence of local and systemic factors leading to wound dehiscence gives the surgeon an anticipation of wound dehiscence in post-operative period. The medical literature includes two risk scores predicting the occurrence of abdominal wound dehiscence including the VAMC and Rotterdam scoring system[13]. Both the VAMC and Rotterdam scores can be used for the prediction of abdominal wound dehiscence[13]. In cases with high pre-operative risk scores, prophylactic application of tension sutures may result in a

decreased incidence of wound dehiscence post-operatively[6].

Randomized controlled trials in Iran by Khorgami and colleagues[6] in 2012 had compared Tension suture closure and Single Layer closure in high risk cases for wound dehiscence. Trials revealed the frequency of wound dehiscence of 4% in TSC but the frequency increased to 13.3% when abdomen was closed by conventional SLC. When compared to our results, the frequency of wound dehiscence in TSC in our trials was greater (6%) while it was lesser (12.7%) in SLC group.

Our study has certain limitations. Individual risk factors for wound dehiscence were not included in our study, long term complications were not recorded and it had limited sample size. We recommend that the effects of individual risk factors over wound dehiscence should be calculated and method of closure should be tailored individually. Long term complications like complete healing time, incisional hernia and cosmesis should be evaluated and compared to get better evidence based results. The role of tension suture closure should be analysed in diabetes mellitus and other immuno-compromised states where there is risk of delayed wound healing. It is necessary to perform additional larger studies for standardization of the technique of closure of abdominal wound after midline laparotomy has been undertaken.

CONCLUSION

TSC with SLC is superior to SLC alone in reducing incidence of wound dehiscence after closure of midline laparotomy incision.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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