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ORIGINAL ARTICLE

BURST ABDOMEN: IS IT A PREVENTABLE COMPLICATION?

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Aim: *to evaluate the effectiveness of supporting plastic tubes technique (new technique) in prophylaxis against burst abdomen.*
Methods: *a total of 140 patients, 76 patients underwent emergency laparotomy and 64 underwent elective laparotomy through midline laparotomy through a midline vertical incision. They were randomized to either mass closure alone or mass closure plus supporting plastic tube technique. All patients were consented.*
Results: *There were 3 bursts out of 70 patients in the mass closure alone group (4.28% risk). while none of the patients in the supporting tubes group underwent burst (0% risk).However, there were two cases in the later group developed incisional hernia in the late post-operative period.*
Conclusion: *supporting plastic tubes method is a good prophylactic method against burst abdomen, not for incisional hernia, and it is advised to be used in all risky patients.*

Keywords: *Wound dehiscence, supporting plastic tubes, laparotomy.*

INTRODUCTION

Wound dehiscence / burst abdomen is a very serious postoperative complication associated with high morbidity and mortality. It has a significant impact on health care cost both for the patient and the hospital.[1]

The incidence of wound dehiscence /burst abdomen varies from center to another worldwide. While it is recorded to be 1-3 % in most centers,[1-4] some centers in India recorded incidence of burst abdomen as high as 10-30%.[5-7]

Many risk factors were incriminated in causation of burst abdomen including malnutrition, anaemia, hypo-proteinaemia, pre and post operative prolonged steroid therapy, peritonitis, malignancy, jaundice, uraemia prolonged post operative abdominal distension or cough.[2]

Wound dehiscence is related to the technique of closure of abdomen and the sutures used. Numerous studies have been conducted evaluating a bewildering variety of closure techniques and suture materials.[8-10]

The current opinion in the west centers for closure a midline incision is toward running mass closure with non absorbable or slowly absorbable suture using a suture length: wound length ratio of 4:1. Continuous running sutures ensure that tension is distributed evenly along the length of the wound.[11-13]

Many trials and new techniques were developed to prevent or at least reduce the risk of wound dehiscence[8,9,14,15] but burst abdomen remains a formidable morbidity.

Supporting plastic tubes is a new technique developed by the author to circumvent the problem of burst abdomen. Its practical usefulness was tested in randomized control trial of wound closure of midline laparatomy.

PATIENTS AND METHODS

A total of 140 patients presented to our department of general surgery Zagazig University hospitals from Mars 2005 to Mars 2009 were enrolled in this study. 76 patients were admitted to the causality unit for emergency laparotomy and 64 patients were admitted to the in-patient surgical wards for elective laparotomy.

Inclusion criteria: All patients prepared to a midline laparotomy and have more than one risk factor for wound dehiscence (mentioned in Table 1).

Exclusion criteria:

1. Patients under 18 years of age.
2. Patients who had incisional hernia or burst abdomen at presentation.
3. Patients who died shortly (within 2 weeks) after surgery.

All patients were explored through a midline laparotomy and each patient was serially numbered in the study and the patients were randomized into two equal groups. Group I (patients with odd numbers) were closed using the classic mass closure running sutures. Group Π (patients with even numbers) were closed using the classic mass closure as above plus supporting plastic tubes (see below).

Patients in group Π were given explanation of the new technique and signed a written consent form. All patients in this study were operated and closed by the author.

Group I: Running continuous mass closure was performed using No 2 vicryl (polyglycolic acid Ethicon) sutures. Sutures bites were placed 1.5-2 cm from the edge of linea alba and spaced about 1 cm from each other. The edges were gently approximated without strangulation keeping the suture length: wound length ratio of about 4:1

Group Π: Supporting plastic tubes technique using nasogasteric tubes No 10 Fr. which were mounted on the metal trocars of the suction drains of No 12 Fr. simulating a needle and thread, the trocar is introduced into the abdominal wall at one side just lateral to the linea semilunaris outside-in through all layers, then the trocar is introduced into the contra-lateral side from inside-out to be extruded just lateral to linea semilunaris in a point opposite the introduction one. So, we actually take a through and through suture using plastic tube instead of the thread. The tubes are then cut with suitable lengths sufficient for closure and initially left untied. Then the process is repeated every 10 cm of the wound (Fig. 1).

All tubes are cut with suitable lengths and left untied until the wound is classically closed with mass closure running continuous sutures up to skin closure (Fig. 2).

Care should be taken to stretch the greater omentum under the plastic tubes crossing the wound not to entangle viscera during tying of the plastic tubes. Also before suturing the tube, the two ends of the tube are grasped, pulled up and moved from side to side to ensure that it is free from catching viscera in-between.

Then they are tied by crossing their ends gently enough to approximate both sides of the wound without strangulation and sutured side by side using silk suture No 2/0 silk suture to hold them in place (Figs. 3,4).

The tubes are left for 15 days which is maximum risky period of burst abdomen. They are removed like the traditional sutures by cutting the tube on one side and pulling it from the other side.

All patients were followed up for 4 weeks. Burst abdomen is diagnosed when intestine, omentum or other viscera are seen through the wound.

Statistical analysis: The risk (cumulative incidence) of burst was calculated as number of burst in the group/total number of patient in that group.

Also, Statistical analysis of the distribution of the risk factors between the two groups was performed to ensure adequate randomization.

RESULTS

This study included a total 140 patients who underwent midline laparotomy 76 patients for emergency laparotomy and 64 patients for elective laparotomy. they were 103 males (73.64%) and 37 female (26.4%) the age of patients range from 27 to 82 years with average age 43.12 years and a median age of 42 and a standard deviation of 15.02. two patients died in the early postoperative period and were excluded from the study Table 2.

The patients were equally randomized into two groups (group I) 70 patients were subjected to continuous mass closure alone method and (group II) 70 patients were subjected to supporting plastic tube method plus mass closure. The average age of patients in group I was 42.68 years. The average age of patients in group II was 43.56 years Table 2.

Statistical analysis of the risk factors revealed no significant difference between the two groups that confirms adequate randomization of the patients into two groups Table 3.

There were 3 bursts out of 70 patients 4.28%) in the mass closure alone group while none of the patients in the mass closure plus supporting tubes underwent burst (0% risk).

Out of the 76 emergency cases, two developed burst abdomen (2.63 % risk) while only one burst is recorded among the 64 elective cases (1.56 % risk).

Complications recorded with the technique

1. Bad cosmoses of the wound due to scaring of the puncture sites and pressure of the tubes on skin
2. Localized haematoma or ecchymosis at the trocar site occurred in three cases
3. Trocar site malignant recurrence occurred in one case with intra-abdominal disseminated colonic carcinoma
4. Leak of postoperative ascites from the trocar site after removal of the tubes occurred in two cases and treated by control of ascites together with simple suturing of the hole and the leak stopped
5. Incisional hernia at the laparotomy wound occurred in two cases about two months postoperatively.

Table 1. Definition of risk factors for burst abdomen.

Risk factor	Definition of its presence
1- Elderly	Age over 60 years
2-Diabetes	Fasting blood sugar >140 mg/dl or random blood sugar >200 mg/dl.
3-Malnutrition	Weight <70 % of expected weight for height.
4-Obesity	Body mass index >30
5-Anaemia	Haemoglobin less than 10 gm %
6- Uraemia	Blood urea > 50 mg /dl
7-Jaundice	Serum bilirubin > 2 mg %
8-Hypoalbuminaemia	Serum albumin < 3 mg %
9-Intra-abdominal malignancy	detected during operative exploration
10- Intra-abdominal sepsis	Presence of pus in the peritoneal cavity

Table 2. The results between the two groups.

	Group 1 Mass closure alone	Group II Mass closure + supporting plastic tubes	Total
No of patient	70	70	140
Sex:			
Male	46	57	103
Female	24	13	37
Average age (in years)	42.68	43.56	43.12
Indication of laparotomy:			
Emergency	33	43	76
Elective	37	27	64
No of bursts	3 (Risk 4.28%)	0 (Risk is 0 %)	

Table 3. Incidence of risk factors among the patients.

Risk factor (RF)	No of patients with RF			No of patients without RF			X^2	P
	Group I	Group II	Total	Group I	Group II	Total		
1- Elderly	41	37	78	29	33	62	0.46	0.49
2-Diabetes	32	31	63	38	39	77	0.03	0.86
3-Malnutrition	16	8	24	54	62	116	3.22	0.07
4-Morbid obesity	25	23	48	45	47	92	0.13	0.72
5-Anaemia	46	47	93	24	23	47	0.03	0.85
6- Uraemia	1	5	6	69	65	134	2.79	0.09
7- Jaundice	11	7	18	59	63	122	1.02	0.31
8- Hypoalbuminaemia	15	20	35	55	50	105	0.95	0.32
9-Intra-abdominal malignancy	24	19	43	47	51	97	0.74	0.39
10- Intra-abdominal sepsis	20	13	33	50	57	107	1.94	0.16

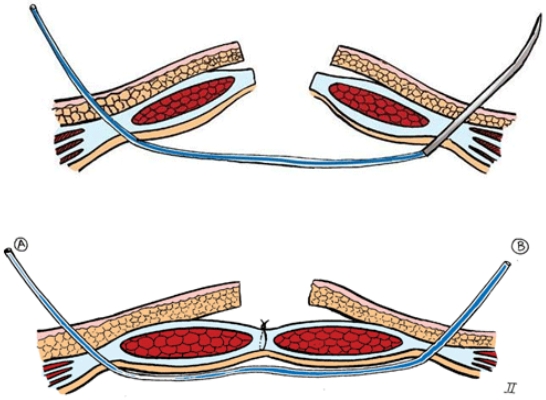

Fig 1.

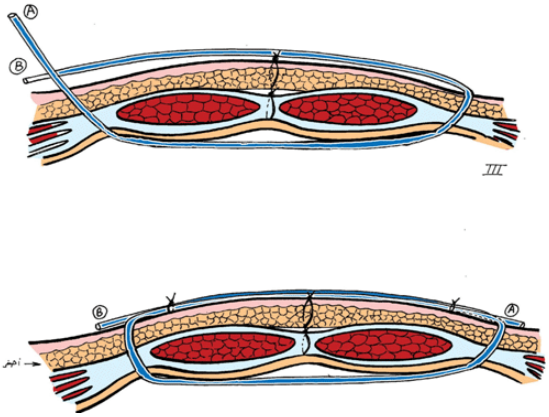

Fig 3.

Fig 2.

Fig 4.

DISCUSSION

Burst abdomen remains a terrifying postoperative event that carries high morbidity and mortality for laparotomy patients. This fact makes prevention of burst abdomen a holly goal, for which every effort should be done.

The idea of this technique is that by approximating the two recti without strangulating the tissue, we release tension over the midline sutures and giving the wound a better chance to heal with no tension or cutting through.

In this research, patients whose laparotomy incisions were closed with mass closure plus supporting plastic tubes never developed wound dehiscence in comparison to three bursts in the mass closure alone group. So, this technique appears to be totally protective against burst abdomen.

In comparison to the X- sutures technique developed by Sirvasta A et. al. in 2004[8] where they reported three bursts out of 98 patients (3.06% incidence) with their technique while the risk of burst was eliminated by our new technique.

The lower incidence of burst abdomen in the elective cases (1.56%) compared to 2.63 % in the emergency cases can be explained by that, in elective cases we have time to correct or control their risk factors such as anaemia, diabetes malnutrition hypo-proteinaemia….etc. Also they have no abdominal sepsis. Moreover increased intra-abdominal pressure is much less recorded in the elective cases

Regarding complications recorded with the technique, most of them can be avoided by proper application of the technique, strict selection of the trocar size and sites and by avoiding much tension on tying the plastic tubes But because these complications, this technique is not recommended for routine use and should be restricted to

patients with high risk for burst abdomen.

Regarding the two cases of incisional hernia in the research, they developed due to chronic yielding of the scar in front of intra abdominal pressure not on the top of partial burst because:

1- They developed at two and three months post-operatively.

2- No sero-sanguinous discharge (warning sign of burst) was noted in these two cases in the early post operative period and the patient recovered very well and their wounds healed perfectly.

It is worth to mention that the supporting tubes method is prophylactic only for burst abdomen not for incisional hernia.

In conclusion supporting plastic tubes method provides good prophylaxis against burst abdomen after midline laparotomy and it is advised to be used in all cases with high risk for burst abdomen.

Further studies are recommended on a large scale of patients to evaluate the effectiveness of the technique or possible modifications of it. Also I hope that a special manufactured set will be available to apply this technique instead of using naso-gastric tubes and non specific trocar.

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