



Journal Homepage: - www.journalijar.com
**INTERNATIONAL JOURNAL OF
 ADVANCED RESEARCH (IJAR)**

Article DOI: 10.21474/IJAR01/6213
 DOI URL: <http://dx.doi.org/10.21474/IJAR01/6213>



RESEARCH ARTICLE

COMPARISON BETWEEN DELAYED PRIMARY CLOSURE AND IMMEDIATE PRIMARY CLOSURE OF ABDOMINAL INCISIONS IN PATIENTS WITH SEPTIC PERITONITIS.

Ahmed Raafat, Fady M. Habib, Ahmed M. Sallam and Loay M. Gertallah.

Department of General surgery, Faculty of Medicine, Zagazig University, Zagazig, Egypt.

Manuscript Info

Manuscript History

Received: 04 November 2017
 Final Accepted: 06 December 2017
 Published: January 2018

Key words:-

delayed primary closure (DPC); primary closure (PC), wound dehiscence.

Abstract

Background: It is still a point of controversy if performing delayed primary closure (DPC) of abdominal incisions in cases of abdominal septic operations could be able to reduce incidence of surgical-site infection and its bad long term sequels in comparison with immediate primary closure (PC).

The Aim: To compare between delayed primary closure and immediate primary closure of abdominal incisions, in patients with peritonitis that results from septic operations regarding superficial surgical site infection.

Patients & Methods: we have carried out such study on 60 patients with septic peritonitis that were collected and operated surgically during 2 years in in Department of General Surgery, Zagazig University Hospital. We have divided our cases into 2 groups; **Group (1):** cases that are managed by immediate PC of the skin and subcutaneous tissue using polypropylene sutures and insertion of subcutaneous drain. **Group (2):** included cases that are managed by DPC of the skin and subcutaneous tissue, using polypropylene sutures and without insertion of drain. We have followed all patients for 2 weeks for; infection or dehiscence of the wound and for occurrence of burst abdomen, seroma or sub cutaneous collection.

Results: we have detected that DPC is better than immediate PC as regard decreasing incidence of wound infection & dehiscence ($p=0.009$), less liability for occurrence of burst abdomen ($p=0.042$), sub cutaneous collection ($p=0.003$) and seroma ($p<0.001$).

Conclusion: performing DPC will be better than immediate PC in management of patients with septic peritonitis.

Copy Right, IJAR, 2018., All rights reserved.

Introduction:-

Peritonitis that is a relatively common surgical problem is that term which described inflammation of visceral and parietal peritoneal serosal membranes also, it could be defined as as intra-abdominal sepsis (1). Management principles of peritonitis included controlling the primary source of original infection, removing bacteria and toxins, replenish organ system function in addition to controlling the systemic inflammatory response. Surgical procedures are still the mainstay of management septic peritonitis (2). Even in cases of adequate surgical management of such problem superficial surgical-site (SSI) is still a complication of peritonitis which causes a significant morbidity (3). Worldwide, appendectomy is a one of the commonest emergency surgical operations (4). SSI is still the commonest

Corresponding Author:- Loay M. Gertallah.

Address:- Department of General surgery, Faculty of Medicine, Zagazig University, Zagazig, Egypt.

postoperative complication postoperatively followed appendectomy (5), particularly after complicated cases like gangrenous or ruptured appendicitis (4). SSI has several drawbacks e.g. prolonged hospital stays, readmission after primary discharge, prolonged nursing care and antibiotic therapy. This could increase the costs for both patients and health care providers (6). It has been noted that the method of skin closure is the most important risk factor which influence the occurrence of postoperative SSI (2). The rate of SSI in cases of intra-abdominal sepsis is about 40% of all cases with peritonitis (4). DPC of abdominal incisions was the commonest management for peritonitis (6), and is recommended by many standard textbooks (7), but it has some disadvantages as more patient discomfort during performance of dressing and increasing costs of treatment in comparison to primary closure (PC) (8).

The Aim:-

We have carried out such study to compare superficial SSIs between DPC and PC in patients with septic peritonitis.

Patients & Methods:-

We have carried out the study in Department of General Surgery, Zagazig University Hospital.

We have the approval of the local Ethics Committee and Institutional Research Board (IRB) before performing the study. We have included 60 patients with septic peritonitis that we collected them and surgically operated in 2 years.

Inclusion Criteria of our patients:-

- Patients that are more than 18 years old.
- Adult males and females with septic operations.
- Patients who want to undergo surgery for perforated appendix and perforated peptic ulcer and accept participation in our study.

Exclusion Criteria:-

- We excluded patient who refused to give us consent, cases with incomplete data and those lost to follow-up.

Tools:-

All patients will be subjected to:

1. Full history taking
2. Complete clinical examination.
3. Full preoperative investigations which include:
 - C.B.C, liver function& renal function tests
 - Coagulation profile.
 - Blood glucose level.
 - Abdominal ultrasound.
 - Plain -X ray erect and supine positions.

Operational design:-

- Type of study: comparative study.
- Pre-operative prophylactic Intravenous broad spectrum antibiotic will be given to all patients.
- All patients will be divided into 2 groups

Group (A): Cases of septic peritonitis which are managed by immediate PC of the skin and subcutaneous tissue using polypropylene sutures then insertion of subcutaneous drain.

Group (B): Cases of septic peritonitis which are managed by DPC of the skin and subcutaneous tissue using polypropylene sutures without insertion of a drain For every patient the following will be recorded:

- The operative time.
- The need for blood and plasma transfusion.

Oral feeding will be started in patients of the first and second group on first postoperative morning after restoration of bowel movement

All patients would be followed up in the early postoperative period for:-

- The length of hospital stays (days).

- Hemorrhage.
- Wound infection.
- DVT/PE.
- Ileus.
- Wound dehiscence.
- Burst abdomen (partial&complete).
- Postoperative pain.

All patients would be followed up for 2 weeks for:-

- SSI.
- Wound dehiscence.
- Seroma.
- Collection
- Burst abdomen
- Need for second hospital admission.



Fig A:- Packing of the wound with guez soaked with bovodine iodine



FIG B:- making stay sutures over the pack



FIG C:- fixation of stay sutures over the skin



Fig D:- After removal of pack and closure of wound



FIG:- After removal of sutures after complete healing without infection

Statistical Analysis:-

We have expressed continuous variables SD and the categorical variables as the mean \pm SD and as a number (percentage) respectively. We compared percent of categorical variables by using Chi-square test. All tests were two sided $p < 0.05$ is statistically significant. We have analyzed all data by Statistical Package for Social Science for windows version 18.0 (SPSS Inc., Chicago, IL, USA).

Results:-

Main features of our patients are found in Table 1 & 2; Group A consisted of 30 patients that included 23 (76.7%) males and 7 (33.30%) females. Group B consisted of 30 patients that included 22 (73.3%) males and 8 (26.7%) females, mean age of our patients 36.6 ± 7.9 years.

Table1:- Baseline characteristics of our studied patients (N=60)

Variables	No. (Frequency)	
Age, Years (Mean \pm SD)	36.6 \pm 7.9	
Sex	F	15 (25.0%)
	M	45 (75.0%)
Comorbid Condition	Absent	32 (53.3%)
	Present	28 (46.7%)
Trunkal Obesity	Absent	38 (63.3%)
	Present	22 (36.7%)
Cause Of Operation	Perforated Appendix	40 (66.7%)
	Perforated Peptic Ulcer	20 (33.3%)

Table2:- Operative characteristics of patients in Delayed and Immediate closure groups

		Type Of Closure		p
		DPC N=30	Immediate PC N=30	
Age, years*		36.6 \pm 7.9	33.5 \pm 6.8	0.112
Sex	F	8 (26.7%)	7 (33.30%)	<0.001
	M	22 (73.3%)	23 (76.7%)	
Comorbid Condition	Absent	8 (26.7%)	24 (80.0%)	<0.001
	Present	22 (73.3%)	6 (20.0%)	
Trunkal Obesity	Absent	10 (33.3%)	28 (93.3%)	<0.001
	Present	20 (66.7%)	2 (6.7%)	
Subcutaneous Drain	Absent	30 (100.0%)	0 (0.0%)	<0.001
	Present	0 (0.0%)	30 (100.0%)	
Duration of Hospital First Admission In Days*		5.4 \pm 1	2.3 \pm 0.5	<0.001
LOS	<4 Days	0 (0.0%)	30 (100.0%)	<0.001
	4-7 Days	30 (100.0%)	0 (0.0%)	
Hospital Second Admission In Days	Absent	22 (73.3%)	11 (36.7%)	0.004
	Present After 7 Days	8 (26.7%)	19 (63.3%)	
Cause Of Operation	Perforated Appendix	20 (66.7%)	20 (66.7%)	1.00
	Perforated Peptic Ulcer	10 (33.3%)	10 (33.3%)	
Duration of Systemic Antibiotic Use In Days *		3.9 \pm 0.8	8.9 \pm 1.3	<0.001
Duration Systemic Antibiotic Use	< 6 Days	30 (100.0%)	0 (0.0%)	<0.001
	6-10 Days	0 (0.0%)	30 (100.0%)	

All variables were compared using Chi-square X^2 test except (*) Independent T test

Postoperative results Table 3

We found DPC is better than immediate PC as regard decreasing incidence of wound infection & dehiscence ($p=0.009$), less incidence of burst abdomen ($p=0.042$), sub cutaneous collection ($p=0.003$) and seroma ($p<0.001$)

Table 3:- Outcome of patients compared between DPC and Immediate PC

		Type Of Closure		P
		DPC N=30	ImmediatePC N=30	
Wound Infection	Absent	22 (73.3%)	12 (40.0%)	0.009
	Present	8 (26.7%)	18 (60.0%)	
Burst Abdomen	Absent	28 (93.3%)	21 (70.0%)	0.042
	Present	2 (6.7%)	9 (30.0%)	
Wound Dehiscence	Absent	22 (73.3%)	12 (40.0%)	0.009
	Present	8 (26.7%)	18 (60.0%)	
Collection	Absent	24 (80.0%)	13 (43.3%)	0.003
	Present	6 (20.0%)	17 (56.7%)	
Seroma	Absent	23 (76.7%)	8 (26.7%)	<0.001
	Present	7 (23.3%)	22 (73.3%)	
Post-operative pain on dressing	Absent	2 (6.7%)	21 (30.0%)	0.042
	Present	28 (93.3%)	9 (70.0%)	

All variables were compared using Chi-square X^2 test except (*) Independent T test

Discussion:-

DPC of septic abdominal operations is a common practice which has been made for several years [9]. DPC was advised by several military surgeons, during the world wars and the Korean war, where, DPC was performed only after presence of a clean wound, usually at 3-7 days post-surgery [10]. The occurrence of postoperative wound contamination and infection post- appendectomy might be increased with increasing severity of the appendicitis treated, and majority of infections can occur after emergency or perforated appendicitis [11]. during surgery the major risk of occurrence of subsequent wound infection is bacterial contamination during surgical intervention and the incriminated organisms are bacteria from the colon flora [12].

Many surgeons advice the use of perioperative antibiotic to allows for PC of appendectomy wounds, while others stated that septic wounds are always liable to higher rate of occurrence of postoperative wound infection [13].

We performed such research to assess the effect of leaving the incision of skin open that is called DPC in comparison with immediate complete closure of a surgical wound PC and we proved the better outcomes of DPC versus PC of a surgical wound in post septic operation as regard decreasing incidence of wound infection & dehiscence ($p=0,009$), less incidence of burst abdomen ($p=0.042$), sub cutaneous collection ($p=0.003$) and seroma ($p<0.001$).

So we have stated that when patients has a perforated appendix the liability of leaving the incision of the skin opened will produce a higher rates of cure with less liability of occurrence of SII.

Additionally we have clarified other indications of DPC e.g. if the patient had septicemia, was malnourished or has higher BMI, so it will be better to leave the incision open which will decrease incidence of infection. Similar to our results [14] have reported the better results of performing DPC versus immediate PC closure of a surgical wound class IV during emergent colectomy when patients presented with colonic perforation as an indication for colectomy it will be better to leave the incision of the skin open that will not associated with occurrence of wound dehiscence that was similar to ours.

Also similar to our results [Bhangu et al., Duttaroy et al., have clarified the benefits of performing DPC [8&15], additionally Yellin and colleauges [16] found a decreased SII infection rate of 4% after DPC of appendicitis wounds.

Similar to ours Ruey-An Chiang et al., [17], found the DPC was an adequate procedure of wound management as it leads to lower incidence of wound infection in comparison to PC. And Chiang and others in [18], proved that the rate of wound infection is 4.2% in DPC patients presented with perforated appendicitis when compared to 43.9% in

PC patients. **Duttaroy et al.**, [15], found that superficial SSI was lower in the DPC than in the PC patients. [19] in 1968 found a wound infection rate of 2.3% for DPC that was less than 14.6% with PC.

We also proved that better debridement of the wounds prior to DPC will reduce bacteria load that will lead to decreased incidence of wound infection rate [15].

In contrast to our results; **Kache et al.**, & **Henry MC**, **Moss RL**. have proved different results; that immediate PC of contaminated incisions during management of perforated appendicitis lead to a low rate of SII infection, and they have proved that DPC or leaving the incision open so as to heal with secondary intentions are of no benefits and unnecessary [7 & 19]., also

Boonying Siribumrungwong et al., [20], found that SSI rate was 72% lower in PC than in DPC patients. [**Henry MC**, **Moss RL**. [19], found that PC did not increase the rate of SII infection rates postoperatively so advised to do PC because they found no benefits of performing DPC.

Boonying Siribumrungwong et al [20], study detected that the risk of SSI in septic abdominal wounds was not different between PC and DPC.

These conflicting results may be due to variability in inclusion criteria of patients with different operations types (appendicitis, other procedures), age and sex of patients and incision sites (midline or right lower quadrant). As a result, there should be caution in applying the results of these findings to patients.

Conclusion:-

We have concluded that DPC is the method of choice for wound management in patients with septic peritonitis resulting from many causes e.g perforated appendicitis, perforated peptic ulcer or gall bladder.

Recommendations:-

We recommend performing DPC of abdominal wounds in septic peritonitis. As our results might be liable to selection biases of patients, so we recommend, performing a further large scale clinical trial for analysis of PC versus DPC

References:-

1. **Nasib G, Inamullah S and Bashir A (2015):** “Laparotomy for peritonitis: Primary or delayed primary closure?” . J Ayub Med. Coll. Abbottabad ., 27 (3).
2. **Mishra S, Tiwary S and Mishra M (2014):** “ An introduction of tertiary peritonitis” . J Emerg Trauma Shock, 7 (2): 121-3.
3. **Siribumrungwong B , Srikuea K and Thakkinstian A (2013) :** “ Comparison of superficial surgical-site infection between delayed primary and primary wound closures in ruptured appendicitis” . Asian J Surg., 37 (3) 120-4.
4. **Lee JH, Park YS and Choi JS (2010) :** The epidemiology of appendicitis and appendectomy in South Korea: national registry data. J Epidemiol. 20:97e105.
5. **Noudeh YJ, Sadigh N and Ahmadnia AY (2007):** Epidemiologic features, seasonal variations and false positive rate of acute appendicitis in Shahr-e-Rey, Tehran. Int J Surg.,5:95e98.
6. **Olsen MA, Chu-Ongsakul S, Brandt KE, Dietz JR, Mayfield J and Fraser VJ (2008):** Hospital-associated costs due to surgical site infection after breast surgery. Arch Surg.,143:53e60 discussion 61.
7. **Kache S, Mshelbwala PH and Ameh E (2016):** “ Outcome of primary closure of abdominal wounds following laparotomy for peritonitis in children” . AFR J pediatric Surg., 13 (4): 185-188.
8. **Bhangu A, Singh P and Lundy J (2013):** “ Systemic review and meta-analysis of randomized clinical trials comparing primary VS delayed primary skin closure in contaminated and dirty abdominal incisions” . JAMA Surg., 148 (8): 779-86.
9. **Stone HH, Hester TR (1972).** Topical antibiotic and delayed primary closure in the management of contaminated surgical incisions. J Surg Res; 12:70e6.
10. **Stone HH, Hester TR. Incisional and peritoneal infection after emergency celiotomy. Ann Surg 1973; 177:669e78**
11. **Berry J, Malt RA (1984).** Appendicitis near its centenary. Ann Surg; 200: 567e75.

12. **Raahave D, Friis-Moller A (1986)**, Bjerre-Jepsen B. The infective dose of aerobic and anaerobic bacteria in postoperative wound sepsis. Arch Surg 1986; 121:924e9.
13. **Centers for Disease Control. (1996)**. The National Infection Surveillance System: the national nosocomial infection surveillance (NNIS) report, data summary from October 1986e1996. Am J Infect Control 24:380e8.
14. **Anand Dayama*, Catherine A. Fontecha, Shahin Foroutan, Jonathan Lu, (2017)**. Comparison of surgical incision complete closure versus leaving skin open in wound class IV in emergent colon surgery The American Journal of Surgery xxx 1e5.
15. **Duttaroy DD, Jitendra J, Duttaroy B, et al. (2009)**. Management strategy for dirty abdominal incisions: primary or delayed primary closure? A randomized trial. Surg Infect. 10:129e136.
16. **Yellin AE, Berne TV, Heseltine PN(1993)**. Prospective randomized study of two different doses of clindamycin admixed with gentamicin in the management of perforated appendicitis. Am Surg; 4:248e55.
17. **Ruey-An Chiang*, Shan-Long Chen, Yao-Chung Tsai (2012)**. Delayed primary closure versus primary closure for wound management in perforated appendicitis: A prospective randomized controlled trial Journal of the Chinese Medical Association 75 156e159
18. **Chiang RA, Chen SL, Tsai YC, Bair MJ (2006)**. Comparison of primary wound closure versus open wound management in perforated appendicitis. J Formos Med Assoc; 105:791e5.
19. **Henry MC, Moss RL (2005)**. Primary versus delayed wound closure in complicated appendicitis: an international systematic review and meta-analysis. Pediatr Surg Int. 21:625e630.
20. **Boonying Siribumrungwong a,b,* , Kanoklada Srikuea a, Ammarin Thakkinstian (2014)**. Comparison of superficial surgical site infection between delayed primary and primary wound closures in ruptured appendicitis Asian Journal of Surgery 37, 120e124.