



ORIGINAL ARTICLE

## Comparison of outcome of open appendectomy with and without peritoneum closure in terms of mean operative time and post-operative pain.

Ahmed Siddique Ammar<sup>1</sup>, Zahra Sattar<sup>2</sup>, Sahar Saeed<sup>3</sup>, Muhammad Basit Hashmi<sup>4</sup>, Hafiz Muhammad Awais<sup>5</sup>, Syed Asghar Naqi<sup>6</sup>

**Article Citation:** Ammar AS, Sattar Z, Saeed S, Hashmi MB, Awais HM, Naqi SA. Comparison of outcome of open appendectomy with and without peritoneum closure in terms of mean operative time and post-operative pain. Professional Med J 2022; 29(2):150-154.  
<https://doi.org/10.29309/TPMJ/2022.29.02.6536>

**ABSTRACT... Objective:** To compare the open appendectomy with & without peritoneum closure in term of post-operative pain and operative time. **Study Design:** Comparative study. **Setting:** EAST Surgical Ward, MAYO Hospital Lahore, Pakistan. **Period:** July 2019 to June 2020. **Material & Methods:** Sample size of 150 patients were selected by consecutive non probability sampling technique. Patients were divided into 2 groups with 75 patients in each group. In Group A patients, peritoneum was closed while in Group B patients, peritoneum was not closed. The results of both groups were compared. Data was collected by pre designed proforma and evaluated by SPSS 26. **Results:** Out of total 150 patients, 96 (64%) were male and 54 (36%) were females. Most common age group was between 31 years to 40 years. The mean operation time taken by the patients in which peritoneum was closed was about 41 minutes with standard deviation of  $\pm 10.54$  minutes as compared to the Group B in which peritoneum was not closed and it took about 32 minutes with standard deviation of  $\pm 6.22$  minutes (P Value 0.025). On first post-operative day, mean pain experienced, by visual analogue score by Group A patients was 5.6 while 3.9 in Group B patients (P Value = 0.03). **Conclusion:** Non closure of peritoneum after open appendectomy reduces the operative surgery time and post-operative pain.

**Key words:** Appendicitis, Appendectomy, Operative Time, Peritoneum, Pain.

### INTRODUCTION

Acute appendicitis is one of the most common pathology and appendectomy is one of the most common surgical procedure done in surgical emergency.<sup>1</sup> Also, it is the first operation done by a surgery resident in his/her surgical residency. Appendectomy can be done by conventional open method and laparoscopically. Though previously open appendectomy was considered as standard procedure but now laparoscopic appendectomy is considered as popular treatment modality in the last decade. In laparoscopic appendectomy, closure of peritoneum is not considered necessary but in open appendectomy surgeons pay special attention to the closure of peritoneum.<sup>2</sup>

Peritoneum is a serous membrane present inside the abdominal cavity and it lines the internal abdominal organs, blood vessels, lymphatic

vessels and nerves. It is further divided into 2 layers. Outer parietal peritoneum which lines the internal abdominal wall and inner visceral peritoneum which covers the surface of internal organs. Peritoneum is sensitive to stretch only. In case if there is inflammation of the underlying structure, the peritoneum gets inflamed and condition is known as peritonitis. Peritoneum has secretory as well as absorptive functions. Peritoneum can regrow in case it is divided. The normal mesothelium shows fibrinolytic activity and peritoneal regeneration get started 48 after injury and completed till 8 days after injury.<sup>3</sup>

The debate between closure and non-closure of peritoneum is very old with many studies compare the results of closure and non-closure of peritoneum. In a study done by Emile SH et al, it is proved that peritoneal closure increases the

1. MBBS, MS (General Surgery), Senior Registrar Surgical Unit-I (EAST Surgical Ward), Mayo Hospital Lahore Pakistan.  
2. MBBS, FCPS (General Surgery), Senior Registrar Surgical Unit-I (EAST Surgical Ward), Mayo Hospital Lahore Pakistan.  
3. MBBS, FCPS (General Surgery), Senior Registrar Surgical Unit-I (EAST Surgical Ward), Mayo Hospital Lahore Pakistan.  
4. MBBS, Medical Officer, DHQ Teaching Hospital Dera Ismail Khan.  
5. MBBS, Post Graduate Resident General Surgery EAST Surgical Ward, Mayo Hospital Lahore.  
6. MBBS, FCPS, FACS, FRCS, MCPS-HPE, Professor and Head of Surgical Unit-I EAST Surgical Ward, Mayo Hospital Lahore, Pakistan.

**Correspondence Address:**  
Dr. Ahmed Siddique Ammar  
Department of Surgical Unit-I (EAST Surgical Ward) Mayo Hospital Lahore Pakistan.  
asammar1912@gmail.com

**Article received on:** 14/04/2021  
**Accepted for publication:** 14/06/2021

operative time but it showed same pain perception in groups where peritoneum was closed and not closed.<sup>4</sup> Another study done by Islam et al, showed no significant difference in improving quality of life in patients where peritoneum was closed.<sup>5</sup> Many gynecological studies are available which showed advantages of peritoneal closure over non closure after cesarean section.<sup>6</sup> The data on closure of peritoneum after open appendectomy is little and no consensus is developed till now regarding superiority of closure over non closure of peritoneum.

The objective of this study is to assess the mean operative time and post-operative pain experience in two groups of patients where peritoneum was closed in one group and not closed in second group.

## MATERIAL & METHODS

It was a comparative study conducted in EAST Surgery ward of MAYO Hospital which is the tertiary care hospital of Punjab and teaching hospital of King Edward Medical University (KEMU) Lahore Pakistan. The duration of the study was 1 year, from 1<sup>st</sup> July 2019 to 30<sup>th</sup> June 2020. The study was approved by the Institutional Review Board of King Edward Medical University 21<sup>st</sup> June 2020 (IRB No 285/RC/KEMU).

A total of 150 patients were selected for this study by consecutive non probability sampling technique. These 150 patients were divided into 2 groups, Group A and Group B each containing 75 patients. Group A included those patients in which peritoneum was closed with continuous absorbable suture after doing open appendectomy while Group B patients were those in which peritoneum was not closed after doing open appendectomy. Inclusion criteria included all patients with age of more than 13 years diagnosed as acute appendicitis by a consultant surgeon who had at least 2 years of post-graduation experience, patients of both genders and all cases of inflamed, gangrenous and perforated appendicitis. Exclusion criteria include patients with co-morbid conditions like diabetes or hypertension and patients with appendicular mass.

Open appendectomy was performed by Lanz incision and by technique described by Rafique et al.<sup>7</sup> Written and informed consent was taken from all the patients for including them in study and for open appendectomy under general anesthesia. Open appendectomy was performed by different consultant general surgeons with operative experience of more than 2 years after post-graduation. Operative time was calculated from the time of giving skin incision to the time of skin closure. Pre-operatively one dose of injectable third generation cephalosporin 1 gram was given at the time of skin incision. Post operatively 2 doses of injectable of third generation cephalosporin 1 gram was given at interval of 12 hours. Single dose of Injectable NSAID, diclofenac sodium was given post operatively before shifting to ward. In ward post-operative Visual Analogue Score (VAS) was calculated 8 hours after surgery and then further analgesia was given if considered necessary. Data was analyzed on SPSS 26 and was expressed as mean  $\pm$  standard deviation (minimum – maximum). Multivariate analysis was done using logistic regression analysis. Categorical data analysis was done using Chi-square test and Student's t-test.  $P < 0.05$  was considered statistically significant. Comparison of proportions between both groups was made by using the  $\chi^2$  test and The Fisher's exact test was used when applicable.

## RESULTS

Out of total 150 patients 96 (64%) were male and 54 (36%) were females. Majority of the patients were male 96 (64%) while female percentage was 54 (36%). Male to female ratio was 1.7:1. The most common age group presented with acute appendicitis was age group of 31 – 40 years of age 63 (42%) in both males 44 (29.3%) and females 19 (12.6%) groups (Table-I). The mean operation time taken by the patients in which peritoneum was closed was about 41 minutes with standard deviation of  $\pm 10.54$  minutes as compared to the Group B in which was not closed which took about 32 minutes with standard deviation of  $\pm 6.22$  minutes ( $P$  – Value 0.025). On first post-operative day the mean pain experienced, by visual analogue score (VAS) by Group A patients was 5.6 while on the other hand this score was

3.9 in Group B patients (P – Value = 0.03) (Table-II).

Age Group	Patients (%)	Male (%)	Female (%)
13 – 20 years	22 (14.6%)	15 (10%)	7 (4.66%)
21 – 30 years	39 (26%)	22 (14.6%)	17 (11.33%)
31 – 40 years	63 (42%)	44 (29.3%)	19 (12.6%)
41 – 50 years	17 (11.3%)	9 (6%)	8 (5.3%)
51 – 60 years	9 (6%)	6 (4%)	3 (2%)
Total	150 (100%)	96 (64%)	54 (36%)

**Table-I. Age distribution of the patients.**

	Group A (with peritoneum closure, N= 75)	Group B (without Peritoneum closure, N=75)	P- Value
Operation time	41 minutes ± 10 minutes	32 minutes ± 6 minutes	0.025
Mean pain on 1 <sup>st</sup> Post-operative day	5.6	3.9	0.03

**Table-II. Comparison of mean operation time and mean pain score on 1<sup>st</sup> post-operative day between Group A and Group B.**

## DISCUSSION

In our setup closure of peritoneum after appendectomy is a standard procedure. Open appendectomy is usually the first procedure done by the general surgical residents and usually it advised and taught everywhere to close the peritoneum.<sup>8</sup> To restore the anatomy all residents are taught to suture all the layers which are cut during surgery.<sup>9</sup> This practice of closing the peritoneum is considered as a standard practice after all types of abdominal surgeries. It had been proved that unlike many other tissues, peritoneum doesn't require apposition of tissue edges for closure after surgery.<sup>10</sup> Also, the suture material which is used for closure of peritoneum can act as a foreign body which in turn leads to inflammatory response and dense adhesion formation in the post-operative period.<sup>11</sup>

The effect of non-closure of peritoneum in terms of post-operative pain is the subject of debate.

In a study done by Hussain et al, peritoneal non closure group experienced less post-operative pain and lesser hospital stay.<sup>12</sup> While on the other hand, a study done by Schnüriger et al and Barmparas et al, there was no difference in post-operative pain by visual analogue score between both groups.<sup>13,14</sup> A famous CORONIS trial done in 2007 showed that there are some advantages of peritoneal closure including lower risk of post-operative infections, shorter hospital stays and shorter operative time but the sample size of this trial was small and methodology was not strong.<sup>15</sup> Many studies showed less requirements of analgesia in post-operative period in patients with non-closure of peritoneum after open appendectomy.<sup>16</sup> In a study done by Madhu et al patients with non-closure of peritoneum showed less requirement of post-operative analgesia.<sup>17</sup> In another study done by Wang et al, one disadvantage of closure of peritoneum in addition to long mean operative time and increased post-operative pain was that it provides an extra suture line which in turn leads to site of adhesion of intestine and omentum and this may leads to adhesion obstruction later.<sup>18</sup>

Non closure of peritoneum after caesarean section has been discussed by many studies. It has been observed that the closure of peritoneum after lower section caesarean section doesn't offer any additional advantage rather it can lead to many complications.<sup>19</sup> On the other hand, closing the peritoneum take time which in turn increase the duration of operation and in turn anesthesia time of the patient. In a study done by Machungo et al, non-closure of peritoneum after lower abdominal surgeries is associated with shorter post-operative time early recovery, shorter hospital stays, less adhesion formation and decreased post-operative pain as compared to the group in which peritoneum was closed.<sup>20</sup> While the study done by Joergensen et al, there is no significant difference In post-operative anesthesia requirements by both groups.<sup>21</sup> In this study it is found that the pain at first post-operative day after open appendectomy assessed by visual analogue score is different. In group A, in which peritoneum was closed, experienced mean visual analogue score of 5.6 as compared to 3.9 in

group B where peritoneum was not closed (P-Value=0.03). In a study done by Çintesun et al, there is no significant difference in pain score in post-operative period after open appendectomy while study done by shows significant difference in both peritoneum closure and non-closure groups.

There are certain limitations to this study. First the sample size is relatively small. More studies with large sample size can give us more accurate information regarding the advantages of peritoneal closure after open appendectomy. Secondly it a single center study and more studies form different centers can show the true advantage of non-closure of peritoneum after open appendectomy.

## CONCLUSION

The non-closure of peritoneum has dual advantage of not only decreasing the mean operative time and preventing the patients from long anesthesia while also post-operative recovery becomes very smooth and painless as compared to those patients where peritoneum was closed.






Copyright© 14 June, 2021.

## REFERENCES

1. Abdulhamid AK, Sarker S-JJAom, **surgery. Is abdominal drainage after open emergency appendectomy for complicated appendicitis beneficial or waste of money? A single centre retrospective cohort study.** 2018; 36:168-172.
2. Younis MU, Sarwar MZ, Saad SJTPMJ. **Laparoscopic appendectomy.** 2019; 26(02):242-246.
3. Cheong Y, Premkumar G, Metwally M, Peacock J, Li TJEJoO, **Gynecology, et al. To close or not to close? A systematic review and a meta-analysis of peritoneal non-closure and adhesion formation after caesarean section.** 2009; 147(1):3-8.
4. Emile SH, Elfallal AH, Abdel-Razik MA, El-Said M, Elshobaky AJIJoS. **A randomized controlled trial on irrigation of open appendectomy wound with gentamicin-saline solution versus saline solution for prevention of surgical site infection.** 2020; 81:140-146.
5. Islam AMM, Akhter N, Imam MZ, Rahman M, Rumi JUMJJoNIoNB. **Efficacy of local use of metronidazole solution among acute appendicitis patients for the prevention of wound infection after appendectomy: A randomized control trial.** 2020; 6(1):54-58.
6. Khan AW, Maqsood R, Saleem MM, Pervaiz MJPAFMJ. **Post-operative analgesic requirement in non-closure and closure of peritoneum during open appendectomy.** 2017; 67(2):194-198.
7. Rafique Z, Shibli K, Russell I, Lindow SJBAIJoO, **Gynaecology. A randomised controlled trial of the closure or non-closure of peritoneum at caesarean section: Effect on post-operative pain.** 2002; 109(6):694-698.
8. Gupta A, Singh AJJAJoS. **Comparative evaluation of open and laparoscopic method of appendectomy in acute appendicitis.** 2020; 1:8-11.
9. Wilkinson T, Chauhan MK, Trivedi IJISJ. **Peritoneal closure or non-closure in open appendectomy: A reality or a myth.** 2018; 5(9):3102-3106.
10. Kliuchanok K, Keßler W, Partecke I, Walschus U, Schulze T, Heidecke C, et al. **A comparison of non-absorbable polymeric clips and staplers for laparoscopic appendiceal stump closure: Analysis of 618 adult patients.** 2019; 404(6):711-716.
11. Tartaglia D, Fatucchi LM, Mazzoni A, Miccoli M, Piccini L, Pucciarelli M, et al. **Risk factors for intra-abdominal abscess following laparoscopic appendectomy for acute appendicitis: A retrospective cohort study on 2076 patients.** 2020; 72(4):1175-1180.
12. Hussain A, Mahmood H, Geddoa E, James AJES. **Three none: A new technique for open appendectomy. Prospective non-randomized comparative study.** 2008; 40(3):125-129.
13. Barmparas G, Branco BC, Schnüriger B, Lam L, Inaba K, Demetriades DJJoGS. **The incidence and risk factors of post-laparotomy adhesive small bowel obstruction.** 2010; 14(10):1619-1628.
14. Schnüriger B, Barmparas G, Branco BC, Lustenberger T, Inaba K, Demetriades DJTAJoS. **Prevention of postoperative peritoneal adhesions: A review of the literature.** 2011; 201(1):111-121.
15. Group TCCJTL. **Caesarean section surgical techniques (CORONIS): A fractional, factorial, unmasked, randomised controlled trial.** 2013; 382(9888):234-248.

16. Pędziwiatr M, Lasek A, Wysocki M, Mavrikis J, Mysliwiec P, Bobowicz M, et al. **Complicated appendicitis: Risk factors and outcomes of laparoscopic appendectomy: Polish laparoscopic appendectomy results from a multicenter, large-cohort study.** 2019; 25(2).
17. Madhu D. **A study on Laparoscopic Vs open appendectomy: A prospective comparative case series (Doctoral dissertation, Kilpauk Medical College, Chennai).**
18. WANG JY, LI Q, WANG HH, WANG YH. **Related factors for incision infections after appendicitis surgery and the prevention countermeasures [J].** Chinese Journal of Nosocomiology. 2013;6.
19. Hayat S, Riaz O, Usman M, Lodhi MFB, Khan AAJPMJ. **Comparison of open versus laparoscopic appendectomy in terms of post-operative pain and operative duration.** 2019; 26(10):1706-1711.
20. Machungo F, Cascella S, Cavaliere E, Zanconato GJAjorh. **Advantages of peritoneal closure at the time of cesarean section.** 2019; 23(4):129-131.
21. Joergensen SL, Settnes AJJoGS. **Post-Cesarean adhesion syndrome.** 2019; 35(5):314-317.

### AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Ahmed Siddique Ammar	Substantial contribution to the design of the work. Revising it critically for important intellectual content. Final approval of the version to be published and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigations and resolved.	
2	Zahra Sattar		
3	Sahar Saeed		
4	Muhammad Basit Hashmi		
5	Hafiz Muhammad Awais		
6	Syed Asghar Naqi		