

## POST-OPERATIVE ANALGESIC REQUIREMENT IN NON-CLOSURE AND CLOSURE OF PERITONEUM DURING OPEN APPENDECTOMY

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### ABSTRACT

**Objective:** To compare the mean post-operative analgesic requirement in non-closure and closure of peritoneum during open appendectomy.

**Study Design:** Randomized controlled trial.

**Place and Duration of Study:** Department of General Surgery Combined Military Hospital Quetta, from 1<sup>st</sup> August 2014 to 30<sup>th</sup> April 2015.

**Material and Methods:** A total of 60 patients were included in this study and were divided into two groups of 30 each. Patients in group A underwent open appendectomy with closure of peritoneum while patients in group B had non-closure of peritoneum during the same procedure. Post-operatively, pain severity was assessed on visual analogue scale (VAS) numeric pain distress scale. On presence of VAS numeric pain distress scale between 5 to 7, intramuscular (IM) diclofenac sodium was given and on score >7, intravenous (IV) tramadol was given. The final outcome was measured at day 0 and day 1.

**Results:** Pain score and analgesic requirements were significantly less in non-closure group than closure group on day 0 and day 1, showing statistically significant difference between the two groups.

**Conclusion:** Mean post-operative analgesic requirement is significantly less in non-closure group as compared to closure group during open appendectomy.

**Keywords:** Analgesic, Appendectomy, Peritoneum, Post-operative,.

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### INTRODUCTION

Appendectomy is the most commonly performed emergency surgical intervention worldwide with a lifetime risk of appendicitis being 8.6% in males and 6.7% in Females<sup>1</sup>. In 1880, first appendectomy for appendicitis was performed by Robert Lawson Tait in England<sup>2</sup>. Around 20-33% of patients having suspected acute appendicitis have atypical clinical and laboratory findings making the diagnosis more difficult<sup>3</sup>. Early diagnosis and prompt operative intervention is the key for successful management of acute appendicitis<sup>4</sup>. Open appendectomy has been the gold standard time tested treatment for over 100 years<sup>5</sup>.

There are many possible ways and

techniques of performing an abdominal operation which depend upon disease being treated and operating surgeon's preference. Traditionally every surgeon is taught to close all the layers that are cut during surgery except for the parietal peritoneum that may be closed or left unsutured<sup>6</sup>. Peritoneum has ability to heal simultaneously through out the wound by multiple sites of repair leading to spontaneous reperitonealisation within 48-72 hours as compared to epidermis where healing occurs gradually from wound borders only<sup>7</sup>. Peritoneum also has rich nerve supply and poor blood supply. Closure of peritoneum may result in more pain because of ischemia produced by suturing with increased adhesion formation during reparation<sup>8</sup>. Leaving the peritoneum open does not have any untoward effect but has several advantages which are supported by clinical and animal data. These advantages include reduced operative time, lower operative morbidity, early discharge from hospital, reduced

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postoperative pain and associated sympathetic overactivity<sup>9</sup>.

Peritoneal closure following appendectomy is a standard practice in our setup. Most of the studies on the beneficial effects of non-closure of peritoneum had been conducted following cesarean section and a very little data exists about the effects of non-closure of peritoneum following appendectomy on post-operative pain and analgesic requirements. Therefore, we conducted this study to compare the mean analgesic requirement in closure and non-closure of peritoneum following open appendectomy in our setup so as to adopt a procedure that requires less analgesic requirement and will ultimately lessen the burden on the treating facilities and will help in improving the patient care.

## PATIENTS AND METHODS

This randomized controlled trial was carried out at CMH Quetta from 1<sup>st</sup> August 2014 to 30<sup>th</sup> April 2015. Post-operative analgesic requirement in closure group was  $34 \pm 24.08$  while post-operative analgesic requirement in non-closure group was  $10 \pm 2.80^{10}$ , power of test 90%, confidence interval being 95%, so calculated sample size was 60 (30 patients in each group) by using WHO sample size calculator. Both male and female patients between 18 to 45 years of age fulfilling American Society of Anesthesiology (ASA) class I and II presenting with right iliac fossa (RIF) pain suspected to have acute appendicitis were included in the study. Patients presenting with appendicular mass or appendicular abscess, patients addict to narcotics and patients having psychiatric disorders were excluded from the study.

All patients were initially assessed by adequate history, thorough examination and investigations (leukocyte counts and urine examination). Other investigations such as those required for evaluation of fitness for general anesthesia were also carried out. After confirming the diagnosis of acute appendicitis, patients were divided into two groups by using lottery method. Informed written consent was obtained for

surgery. All patients underwent open appendectomy under general anesthesia after preoperative preparation. In group A, closure of peritoneum was done following appendectomy while in group B peritoneum was left open. In both the groups, all other abdominal layers were closed. Post-operatively pain severity was assessed on VAS numeric pain distress scale. If the score was between 5 to 7, IM diclofenac sodium (75mg) was given and on score  $>7$ , IV tramadol (100 mg) was given. Pain score and analgesic requirements were measured at day 0 (operation day) and day 1 (1<sup>st</sup> postoperative day).

All the data collected through the proforma were entered into the Statistical Package for Social Sciences (SPSS) version 18.0. Mean and standard deviation was used for quantitative data like age while frequency and percentage was calculated for qualitative data like gender. Independent samples t-test was used for comparison of pain score and analgesic requirements. A *p*-value of  $<0.05$  was considered as significant.

## RESULTS

A total of 60 patients were included in the study during the study period. Out of total 60 patients, 76.7% ( $n=23$ ) in group-A and 63.3% ( $n=19$ ) in group-B were male and 23.3% ( $n=7$ ) in group-A and 36.7% ( $n=11$ ) in group-B were female. Age distribution of the patients showed that 73.3% ( $n=22$ ) in group-A and 60% ( $n=18$ ) in group-B were less than 30 years of age, whereas 26.6% ( $n=8$ ) in group-A and 40% ( $n=12$ ) in group-B were more than 30 years of age, mean  $\pm$  sd was calculated as  $28.63 \pm 5.29$  year and  $29.80 \pm 5.53$  year respectively.

On day 0, VAS numeric pain distress scale in group A was  $21.13 \pm 3.89$  while in group B it was  $15.27 \pm 2.96$ , *p*-value being  $<0.001$ . Similarly on day 1 it was  $14.50 \pm 2.85$  in group A and  $10.23 \pm 3.46$  in group B, *p*-value being  $<0.001$  (table-I).

Diclofenac sodium requirement on day 0 in closure and non-closure group was  $132.50 \pm 58.04$  and  $100.01 \pm 35.96$  respectively (*p*-value=0.01),

similarly on day 1 its requirement between the two groups was  $115.00 \pm 38.06$  and  $90.00 \pm 30.51$  ( $p$ -value=0.01), showing significant difference between the two groups. On the other hand, tramadol requirement on day 0 in closure and non-closure group was  $120.10 \pm 61.02$  and  $86.67 \pm 34.57$  respectively ( $p$ -value 0.01), similarly on day 1 its requirement between the two groups was  $70.01 \pm 46.61$  and  $43.33 \pm 50.40$  ( $p$ -value 0.03), showing statistically significant difference between the two groups (table-II).

**DISCUSSION**

Every surgeon is taught to suture all the layers which are cut during surgery to restore the anatomy<sup>11</sup>. Closing the peritoneum has been the standard practice after all types of abdominal surgeries. After injury or trauma, mesothelial cells activation lead to accelerated healing from

operative period<sup>14</sup>. It is found to be more cost effective and is simpler than the traditional technique of peritoneal closure being practiced by many surgeons.

A number of studies have been carried out in past to demonstrate the beneficial effects of peritoneal non-closure after cesarean section. Closure of peritoneum at lower segment caesarean section does not offer any additional advantage, rather is associated with more complications. Non-closure of both visceral and parietal peritoneum at the caesarean section produces a significant reduction in the post-operative use of analgesics leading to shorter hospital stay<sup>15</sup>. However, a little data exist about the effect of peritoneal non-closure on postoperative pain and analgesic requirements in open appendectomy.

**Table-I: Comparison of VAS numeric pain distress scale among group A and B (n=60).**

	Closure group (mean ± sd)	Non-closure group (mean ± sd)	p-value
Day-0	21.13 ± 3.89	15.27 ± 2.96	<0.001
Day-1	14.50 ± 2.85	10.28 ± 3.46	<0.001

**Table-II: Comparison of analgesic requirements.**

	Diclofenac Sodium IM			Tramadol IV		
	Closure group (mean ± sd)	Non-closure group (mean ± sd)	p-value	Closure group (mean ± sd)	Non-closure group (mean ± sd)	p-value
Day-0	132.50 ± 58.04	100.01 ± 35.96	0.01	120.10 ± 61.02	86.67 ± 34.57	0.01
Day-1	115.00 ± 38.06	90.00 ± 30.51	0.01	70.01 ± 46.61	43.33 ± 50.40	0.03

multiple sites at the edges leading to complete healing in five to six days duration<sup>12</sup>. Unlike other tissues, peritoneum does not require apposition of tissue edges for closure after surgery. Suture material used for peritoneal closure during surgery may act as a foreign body leading to profound inflammatory response and dense adhesions formation in post-operative period<sup>13</sup>.

Non-closure of peritoneum at lower abdominal surgery has been found to be associated with a number of advantages including shorter operative time, early recovery, shorter hospital stay, less adhesions formation, decreased postoperative pain leading to decreased analgesics requirements in post-

In this study, we compared the mean post-operative analgesic requirement in peritoneal non-closure group with peritoneal closure group after open appendectomy. In our study, VAS numeric pain distress scale on day 0 in closure group was  $21.13 \pm 3.89$  as compared to  $15.27 \pm 2.96$  in non-closure group with  $p$ -value of <0.001. On the other hand VAS numeric pain distress scale on day 1 in closure group was  $14.50 \pm 2.85$  as compared to  $10.28 \pm 3.46$  in closure group with calculated  $p$ -value of <0.001. These findings in our study are comparable to a study carried by Ghongdemath JS<sup>16</sup> and colleagues. However, in contrast to our findings Demirel et al<sup>17</sup> observed no statistically significant difference in VAS in

their study but they found that pain scores were much less in non-closure group as compared to the closure group.

In our study, diclofenac sodium requirement on day 0 in closure and non-closure group was  $132.50 \pm 58.04$  and  $100.01 \pm 35.96$  respectively ( $p$ -value 0.01), similarly on day 1 its requirement between the two groups was  $115.00 \pm 38.06$  and  $90.00 \pm 30.51$  ( $p$ -value=0.01), showing significant difference between the two groups. On the other hand, tramadol requirement on day 0 in closure and non-closure group was  $120.10 \pm 61.02$  and  $86.67 \pm 34.57$  respectively ( $p$ -value 0.01), similarly on day 1 its requirement between the two groups was  $70.01 \pm 46.61$  and  $43.33 \pm 50.40$  ( $p$ -value=0.03), showing statistically significant difference between the two groups. These findings in our study are in accordance to a study conducted by Suresh B and colleagues<sup>10</sup>.

Hajseidjavadi et al<sup>18</sup> showed that the mean analgesic requirement in non-closure group was 90.8 mg of diclofenac and 1.16 capsules of mefenamic acid over a period of 24 hours whereas in closure group it was 112.9 mg of diclofenac and 2 capsules of mefenamic acid, the difference was found to be statistically significant. Anthony et al<sup>19</sup> showed in their study that trend mean analgesia requirement was significantly less in non-closure group with improved short-term postoperative outcome. Xionget al<sup>20</sup> revealed that peritoneal closure has no effect on short term morbidity while unnecessarily lengthening operative time and exposure to anesthetic agents. They proposed that practice of peritoneal closure during radical hysterectomy should be abandoned. Similar findings were observed in another study conducted on patients undergoing cesarean section revealed that pain scores and analgesic requirements assessed at 24 hours postoperatively were significantly lower in the non-closure group as compared to the closure group<sup>21</sup>. In another study conducted in a Military hospital in Pakistan revealed that peritoneal non-closure reduces the duration of surgery, exposure of

anesthesia, helps in quicker recovery and early hospital discharge following caesarean section<sup>22</sup>.

In another study conducted Hull DB<sup>23</sup> peritoneal non-closure during caesarean section was found to be associated with early return of bowel functions ( $p$ -value=0.03) and less requirement of oral analgesics ( $p$ -value=0.014) as compared to closure group. Grundsell HS<sup>24</sup> showed that postoperative febrile morbidity and wound infection were significantly less in non-closure group with  $p$ -values of <0.001 and <0.05 respectively. Sparic R<sup>25</sup> concluded that practice of peritoneal closure should be abolished during caesarean section due to increased risk of postoperative adhesions formation making the subsequent surgery difficult and risky.

There are certain limitations in this study. Firstly, we only measured the analgesic requirements depending upon pain severity in postoperative period. Other parameters like operative time and mean hospital stay were not considered in our study. Secondly, effects of peritoneal non-closure on long term morbidity and adhesion formation were not studied.

## CONCLUSION

Mean post-operative analgesic requirement is significantly less in non-closure group as compared to closure group during open appendectomy.

## CONFLICT OF INTEREST

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

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