

Estimation of CRP levels on a measure of stress response after Laparoscopic and open cholecystectomy

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Abstract

Objective: To determine CRP levels on a measure of stress response after Laparoscopic and open cholecystectomy.

Method: A cross-sectional observational study was conducted at Abbasi Shaheed hospital, Karachi from June 2015 to August 2015. Patients admitting with fever, abdominal pain, vomiting, nausea, anorexia diagnosed as case of cholelithiasis were selected. Laboratory investigations, ultrasonography and chest radiography were done on admission for cholecystectomy to confirm the diagnosis and avoid negative exploration of abdomen. Post-operatively the CRP levels were sent.

Result: Among 100 patients, who were found to be candidates for open and laparoscopic cholecystectomy, were admitted. The average age of patients with Standard deviation was 36.11 ± 8.009 years. There were 41 males and 59 females. The two groups were then compared at 4 hours, 8 and 24 hours. The mean CRP after 4 hours after laparoscopic cholecystectomy was 7.84 ± 2.99 ; however after open cholecystectomy was 11.24 ± 1.47 . The mean CRP after 8 hours after LC was 14.78 ± 6.37 ; however after Open cholecystectomy was 20.54 ± 3.44 . The mean CRP after 24 hours for LC was 24.42 ± 9.42 ; however after open cholecystectomy was 35.28 ± 6.34 . Both of procedures values were compared with t test applied which revealed statistically significant value $p < 0.000$. Post-operatively the CRP levels of both the patients were compared with statistically significant value found i.e; p -value 0.000. No postoperative complication and mortality was found in the present study.

Conclusion: CRP is a useful marker in determining stress response in patients with open cholecystectomy and laparoscopic cholecystectomy.

Keywords: C reactive protein, open cholecystectomy, laparoscopic cholecystectomy, stress response

Introduction:

Worldwide the laparoscopic cholecystectomy (LC) is considered as a gold standard treatment for complicated gallstones and has replaced the open cholecystectomy (OC) in terms of shorter hospital stay, minimally invasive surgery, minimal scar, decreased post-operative pain, lower-cost and early return to regular routine.¹⁻⁶

Stress response to different surgical operations elude a physiological response with release of stress hormones, fluid and metabolic balance regulation, increased release of acute phase re-

actants and negative nitrogen balance. Surgical trauma after incision stimulates a cascade of events with release of inflammatory cytokines with response of body depends on extent of injury. CRP is an important acute phase reactant that plays a crucial role in inflammation and is a sensitive inflammatory marker.⁷⁻¹⁰

Different studies have seen that in open cholecystectomy there is an increased stress response as compared to laparoscopic cholecystectomy.⁸⁻¹¹ Luo et al as found marked increase in CRP levels postoperatively with a statistically

Received:
4th June 2016

Accepted:
29th November 2016

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Table 1: Demographic data

Demographic variables	Frequency (percentages)
Age in yrs. Mean SD	36.11 ±8.009
Gender M:F	41:59 (41%:59%)
Duration of gall stones CRP Mean SD	1.36 ± 0.482
After 4 hours	9.54 ±2.9
After 8 hours	17.66±5.86
After 24 hours	29.85±9.67

Table 2: Mean CRP in Both Groups

CRP levels	Lap cholecystectomy	Open cholecystectomy	T test
CRP after 4 hours Mean SD	7.84 ±2.99	11.24± 1.47	0.000
CRP after 8 hours Mean SD	14.78 ±6.37	20.54 ±3.44	0.000
CRP after 24 hours Mean SD	24.42 ±9.42	35.28 ±6.34	0.000

significant value in patients with LC compared to open cholecystectomy.⁸ The Cochrane review by Cheng et al has found decreased morbidity, decreased postoperative stress in patients with LC compared to open cholecystectomy.¹⁰ Watt et al has stated in his systemic review that CRP is associated with magnitude of operative injury and on extent of invasiveness of the procedure.¹² Asghar et al has also found decreased level of stress and metabolic interference in patients undergoing LC compared to open cholecystectomy.¹³ The aim of this study is to evaluate the extent of stress after surgical trauma in patients undergoing laparoscopic cholecystectomy and open cholecystectomy by CRP levels measurement in order to identify that patient's benefit from minimally invasive surgery.

Materials & Methods:

Present study was a hospital based randomized trial conducted at Abbasi Shaheed hospital, Karachi from June 2015 to August 2015. All patients of both gender and ages 16 years and above presenting with symptomatic gall stone disease diagnosed previously undergoing laparoscopic and open cholecystectomy. Patients with jaundice, severe infection, or metabolic abnormalities, neurological or psychiatric dis-

ease, bleeding disorders and those who have not given consent were excluded. Informed consent was taken from the patient or next to kin. Patient name, age, gender, admission number and date of surgery were recorded. Surgery was performed by an experienced surgeon (Professor) of greater than five years assisted by the clinical researcher. The two groups were made; group 1 undergoing laparoscopic cholecystectomy and other group 2 with open cholecystectomy. Lottery method was used for dividing patients into groups.

Post-operatively after 4, 8, and 24 hours, CRP levels are sent to check stress response after laparoscopic and open cholecystectomy. For the CRP the upper reference limit was 3mg/dl measured by ELISA.

Data was analyzed by statistical software package SPSS version 20.0. Continuous variable that is patient's age, CRP and duration of symptoms were expressed as mean±SD. Qualitative variables were expressed as frequencies and percentages. CRP levels were measured both before and after the procedure in both laparoscopic cholecystectomy and open cholecystectomy with t-test keeping p value <0.005 to be significant.

Results:

Out of 100 patients enrolled with symptomatic gall stone. The average age of patients with standard deviation was 36.11±8.009 years (table1). There were 41 males and 59 females. The average age of both males and females was nearly same. The age group mostly affected was 20-35 yrs in 31 patients, 31-50 yrs in 37 and 51-65 yrs 12 as shown in figure1.

The two groups were made by lottery method group 1, 50 patients undergoing laparoscopic cholecystectomy and other group 2, 50 patients with open cholecystectomy. The patients underwent surgery and then post-operatively after 4, 8, and 24 hours, CRP levels are sent to check stress response after laparoscopic and open cholecystectomy.

The mean CRP levels in mg/dl after 4 hours

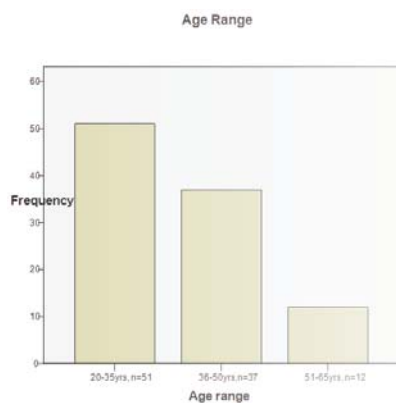


Figure 1:

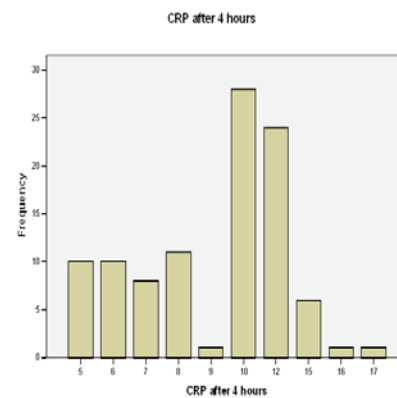


Figure 2:

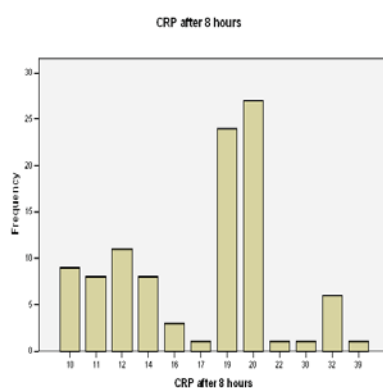


Figure 3:

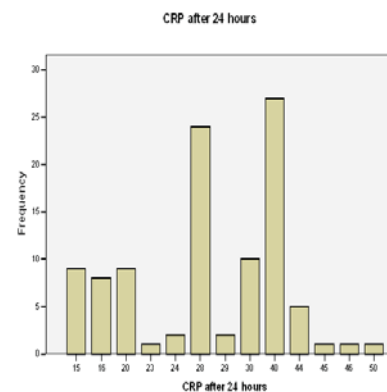


Figure 4:

of both the procedures were 9.54 ± 2.9 , after 8 hours was 17.66 ± 5.86 and after 24 hours was 29.85 ± 9.67 . Most of the patient's value was in between 10-12 mg/dl after 4 hours (figure 2). However the range of CRP after 8 hours and 24 hours was mostly between 19-20 mg/dl and 28 and 40 mg/dl respectively (figure 3 and 4).

The two groups were then compared at 4 hours, 8 and 24 hours. The mean CRP after 4 hours for LC was 7.84 ± 2.99 ; however after Open cholecystectomy was 11.24 ± 1.47 . The mean CRP after 8 hours for LC was 14.78 ± 6.37 ; however after open cholecystectomy was 20.54 ± 3.44 . The mean CRP after 24 hours for LC was 24.42 ± 9.42 ; however after open cholecystectomy was 35.28 ± 6.34 (table 2). Both of procedures values were compared with t test applied which revealed statistically significant value $p=0.000$.

No post-operative complication or mortality was present in our study.

Discussion:

Annually, laparoscopic cholecystectomy is one of the most frequently performed procedures with nearly more than 500,000 surgeries with overall complication rate of less than 1.5%, and the mortality rate of less than 0.1%.¹³⁻¹⁵ Laparoscopic cholecystectomy when compared with open cholecystectomy is the preferred surgical procedure since 1991 because of less morbidity, mortality and early return to work.¹⁵

CRP is an inflammatory marker and is called as acute phase reactant. Studies have shown that CRP is usually elevated in patients undergoing laparoscopic cholecystectomy due to pneumoperitoneum and abdominal lift as well as in open cholecystectomy post-operatively.¹⁶⁻²⁰ Surgical procedure or intervention is itself considered

as a form of trauma which is then trailed by inflammatory, hormonal and immunological response.²¹⁻²⁵ It is however known the laparoscopic cholecystectomy is associated with minimally invasive surgery with lesser complications and stress to patient.

In our study mostly the patients involved age groups ranging from 21-35 yrs and then 35-50 yrs respectively, with increased incidence among females compared to males for gallstones. This finding is similar to findings of gallstones in previous studies.²⁶⁻²⁸

Our study has also shown the similar results of decreased stress response in patients undergoing LC compared to open cholecystectomy. In our study the mean CRP when compared between two groups have shown statistically significant correlation with p value-0.000. Open cholecystectomy is an acceptable alternative for high risk patients or patients with complicated cholecystitis. Studies have shown patients with raised CRP pre-operatively, high TLC count, increased gall bladder thickness are associated with increased rate of complications and increased conversion rates into open cholecystectomy. Ambe et al has found increased incidence of conversion into open cholecystectomy in patients with higher CRP preoperatively.²⁴ Kohli et al has also found serum CRP raising considerably subsequent OC as compared to patients of LC (10.52 ± 1.96 mg% vs. 8.88 ± 1.23 mg %),²⁵ and thus concluded LC to be less traumatic. Skin incision cause maximum trauma to tissues and therefore is responsible for rising of acute phase responses. For that reason, LC prevents from reduction in trauma, decreased exploration of CBD, decreased hospital stay and hence decreased morbidity and therefore lesser levels of CRP.

Conclusion:

CRP is a useful marker in determining stress response in patients with open cholecystectomy and laparoscopic cholecystectomy.

Conflict of interest: None

Funding source: None

Role and contribution of authors:

Dr Anum Naz, FCPS Resident, General Surgery Unit 2, Abbasi Shaheed Hospital, Karachi, write the initial writeup and also helped in collecting the data and references.

Dr Taha Junaid, FCPS (General Surgery), Assistant Professor, General Surgery, Jinnah Medical & Dental College Hospital, Karachi, helped in writing the introduction, collecting the data, writing of discussion and result and critically review the article.

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