Assessment of Levels of CRP As A Measure of Stress Response After Open and Laparoscopic Cholecystectomy

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ABSTRACT

Laparoscopic cholecystectomy (LC) is supposed to be a first line treatment for complicated bile stones and is regarded as the minimally invasive surgery. Objectives: To determine the levels of CRP as a measure of stress response after open and Laparoscopic cholecystectomy. Methods: A total of 120 patients of both genders aged 20 years or above with fever, abdominal pain, vomiting, nausea and anorexia with symptomatic gall stone were chosen. Laboratory tests, ultrasound and chest radiography were carried out to verify the diagnosis of cholecystectomy and prevent a negative abdomen exploration. The comparison of CRP levels between the two groups was done at 4, 8 and 24 hours. The values of CRP in both procedures were compared with the t-test with P-0.000 taken as significant. Results: The patients mean age was 36.09 ± 8.10 years. There were 50 men and 70 women. Mean CRP was 7.20 ± 2.10 after 4 hours of laparoscopic cholecystectomy; however, after open cholecystectomy, it was 11.30 ± 1.80, CRP after 8 hours in LC was 13.50 ± 7.01 and 21.04 ± 2.14 after open cholecystectomy. The mean CRP levels in laparoscopic cholecystectomy after 24-hrs were 23.40 ± 7.92 and 34.81 ± 7.04 after open cholecystectomy. The most affected age group was 20-35 years in 39(32.5%) patients, 31-50 in 47(39.2%) and 51-65 in 34(28.3%) patients. This study did not find postoperative complications or mortality. Conclusions: CRP is a valuable marker in determining the response to stress in subjects with laparoscopic and open cholecystectomy.

INTRODUCTION

All over the world, laparoscopic cholecystectomy (LC) is supposed to be a first line treatment for complicated bile stones and is regarded as the minimally invasive surgery with short hospital stay, minimal scar, reduced postoperative pain, lower costs, early return to normal routine works in comparison to open cholecystectomy [1, 2]. The stress response in various surgical procedures causes the release of stress hormones as a normal physiological stimulus, regulation of metabolic and fluid balance, negative nitrogen balance and augmented release of acute phase reagents [3, 4]. After surgical incision; various stimulatory events occur including inflammatory cytokines depending on the size of the injury [5, 6]. The acute phase reactant is CRP which is a sensitive inflammatory marker and plays a very important role in inflammation [7]. Various researches have shown that in open cholecystectomy there is a stronger stress response than laparoscopic cholecystectomy [8]. Shukla and his
friends found a significant increase in CRP levels in the postoperative period with a statistically significant value in LC in comparison to open cholecystectomy [9]. Cochrane’s study conducted by Matovic and his friend showed a reduction in incidence of morbidity and stress response post-operatively in LC patients compared to open cholecystectomy [10]. Zhang et al., found in his system review that the levels of CRP release depend on the surgical injury extent and the degree of invasiveness of the procedure [11]. Krog and his friends also found a lower level of metabolic and stress response in LC patients in comparison to open cholecystectomy [12]. The purpose of this analysis was to determine the levels of CRP as a measure of stress response after open and Laparoscopic cholecystectomy.

**M E T H O D S**

This cross-sectional observation study was held in the surgical department of KMU IMS Kohat and THO hospital, Kakki Bannu during the period from November 2021 to April 2022. A total of 120 patients of both genders aged 20 years or above with fever, abdominal pain, vomiting, nausea and anorexia with symptomatic gall stone were chosen. From this study, patients with jaundice, serious infections or metabolic disorders, neurological or psychiatric diseases, coagulation disorders and patients who did not agree were excluded. The patient or his guardian have given informed consent to participate in this study. The patient’s age, name, admission number, gender and surgery date were documented. The operation was performed by an experienced surgeon with over five years of experience. Two groups were formed with lottery method: Laparoscopic cholecystectomy was done in group 1 and open cholecystectomy in group 2. The lottery method was used to divide patients into groups. The comparison of CRP levels between the two groups was done at 4 hours, 8 hours and 24 hours. The upper reference limit for CRP was 3 mg/dl measured by the ELISA test. The data was analyzed with SPSS software version 20.0. The age of the patient is taken as continuous variable and duration of symptoms and CRP were expressed as the mean ± SD. Qualitative variables were expressed as frequency and percentage. The values of CRP in both procedures were compared with the T test with P-0.000 taken as significant.

**R E S U L T S**

120 patients selected for laparoscopic and open cholecystectomy were included. The patients mean age was 36.09 ± 8.10 years shown in table 1. There were 50 men and 70 women.

| Features       | N(%)     |
|----------------|----------|
| Gender         |          |
| Males          | 50(41.7%)|
| Females        | 70(68.3%)|
| Mean Age       | 36.09 ± 8.10 years |

**Table 1:** Shows the demographic features of the patients

| CRP Levels | Laparoscopic Cholecystectomy | Open Cholecystectomy |
|------------|------------------------------|----------------------|
| At 4hrs    | 7.20 ± 2.10                  | 11.30 ± 1.80         |
| At 8hrs    | 13.50 ± 7.01                 | 21.04 ± 2.14         |
| At 24hrs   | 23.40 ± 7.92                 | 34.81 ± 7.04         |

Table 2: Shows the mean CRP values at various time intervals

**D I S C U S S I O N**

Every year, laparoscopic cholecystectomy is the most commonly used procedures from over 500,000 operations with <1.5% complication rate and a mortality below 0.1% [11, 12]. In comparison with open cholecystectomy, laparoscopic cholecystectomy has been a surgery since 1991 due to less morbidity, mortality and earlier return to work [13,14]. CRP is a strong inflammatory marker and is called the acute phase reactant. Various analysis has exhibited that CRP often increases in patients after laparoscopic cholecystectomy due to pneumoperitoneum and abdominal lift as well as in open cholecystectomy postoperatively [15, 16]. Helander et al., found that surgical procedure or intervention is considered a form of trauma in itself, followed by an inflammatory, hormonal and immune response [17]. It is known, however, that laparoscopic cholecystectomy is associated with smaller complications and stress for the patient and minimally invasive surgery [18]. In our study, most patients belonged to age groups from 21 to 35 and 35 to 50 years old, and the frequency of gall stones in women was higher than in men. This discovery is similar to the results of gallstones in previous studies [19, 20]. Our study also showed similar results of a reduced response to stress in patients with LC in comparison to open cholecystectomy. In our study, both groups were compared with the average CRP value with a statistically significant correlation P-value of 0.000. Open cholecystectomy is an acceptable alternative to patients from the high-risk group or patients with complicated cholecystitis. Various analysis revealed that the high preoperative CRP, the high number of TLC and the increased gallbladder thickness are related with a higher
percentage of problems and a higher conversion rate of open cholecystectomy [21]. In patients with high CRP before surgery, Kingo et al., found that the frequency of transition to open cholecystectomy was higher [22]. Beliaev et al., also found that high CRP in serum significantly increased the OC in comparison to patients with LC(8.88 ± 1.96% compared to 10.52 ± 1.96 mg) and came to the conclusion that LC was less traumatic [23]. Incision of the skin causes maximum tissue injury and is therefore responsible for the severity of the acute phase responses in OC. Therefore, LC prevents reduction of injury, reducing blood counts, length of stay in the hospital, and thus reducing the incidence, and thus lowering the CRP level [24].

**C O N C L U S I O N S**

CRP is a valuable marker in determining the response to stress in subjects with laparoscopic and open cholecystectomy.

**C o n f l i c t s o f I n t e r e s t**

The authors declare no conflict of interest

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