

# Comparison of Rise in Inflammatory Markers between Laparoscopic and Open Inguinal Hernia Surgery

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**Abstract:** *Background of study:* Open hernioplasty repair and the surgical stress associated with it can produce an increased inflammatory response in the patient as compared to Laparoscopic procedures. The aim of the study is to compare the inflammatory response by studying the levels of inflammatory markers in patients undergoing both open and laparoscopic inguinal hernia repair surgeries. *Method:* This study was conducted among patients who underwent inguinal hernia repair surgery (Both Open and Laparoscopic) at Saveetha Medical College, Thandalam. Pre - op and Post - op ESR and CRP values were measured and compared in both the open and laparoscopic repair groups. *Result:* Among 25 patients who underwent Open Inguinal Hernia Repair, 17 (68%) showed increase in CRP levels. Out of 25 patients who underwent laparoscopic repair, 15 (60%) showed increase in CRP levels. The mean value of CRP (6.1 mg/dl) and ESR (16mm/hr) was higher in patients who underwent open hernia repair. *Conclusion:* A greater increase in the inflammatory markers following open hernia repair indicates greater surgical stress and trauma caused by it, as compared to laparoscopic repair.

**Keywords:** hernioplasty repair, surgical stress, inflammatory response, laparoscopic procedures, inguinal hernia repair

## 1. Introduction

Inguinal hernia repair is a common surgical procedure that is performed all over the world. Inguinal hernias are treated by both open laparotomy and laparoscopic surgery. Although it has its own pros and cons associated with it, advent methods of laparoscopic hernioplasty procedures are of growing interest (1, 2, 3).

Surgical stress associated with open hernioplasty and the use of various prosthetic materials could induce an acute inflammatory and metabolic change (5, 6). Hypothalamic pituitary axis and the release of various stress hormones in response to stress is considered to be the mediator of inflammatory response (1). Hormones like cortisol and human growth hormone (6, 7) have been used in previous studies to study the response post operatively (1, 8). IL - 1, IL - 6 and TNF levels (10, 11) have also been used to study the cytokine response after surgery (12, 13).

The rise in acute phase proteins after surgical trauma is yet another measure of the inflammatory response post surgery. Increase in the levels of these acute phase reactants can be used to study the degree of inflammatory response (9, 10). Laparoscopic operations being minimally invasive are considered to be advantageous to open hernioplasty in terms of producing less trauma, minimal surgical stress and hence reduced inflammatory response (4, 5). Hence further studies are needed to compare both the procedures that are not uncommon for inguinal hernia repair.

In this study, CRP and ESR levels are used to compare the acute inflammatory reaction after laparoscopic and hernia operations.

## 2. Materials and Methods

The study was conducted among patients undergoing inguinal hernia surgery in Saveetha medical college, India over a period of 6 months. 50 patients were included in the study out of which 25 underwent open inguinal hernia repair and 25 underwent laparoscopic repair. Excluded patients were those with known chronic systemic illnesses, autoimmune diseases and other co - morbidities like diabetes mellitus, hypertension and cardiac diseases. Patients with recurrent hernias were also excluded to minimize the variation. Open hernia repairs were performed by Lichtenstein tension free hernioplasty and laparoscopic operations were performed by trans abdominal pre - peritoneal repair. Blood samples were collected pre operatively a day before surgery. Post operatively, blood was collected 48 hours after surgery. CRP was measured using CLIA method. The rise in CRP and ESR levels were measured in both groups and were compared.

## 3. Results

Out of the 50 patients that took part in the study, all were males and the mean age of the open repair group was 47 years (36 - 68), while that in laparoscopic repair group was 42 years (38 - 58). Out of 25 open inguinal hernia repairs, 17 were direct hernias and 8 were indirect hernias. Out of 25 laparoscopic repairs, 20 were direct and 5 were indirect hernias (Table 1).

Table 1

No. of patients	25	25
No. of male: No. of females	25:00:00	25:00:00
No of direct: indirect	17:08	20:05

Pre operatively, serum CRP was low in all the patients i. e. less than 5 mg/dl. But, serum CRP levels rose significantly

in both open and laparoscopic hernia repair groups after 48 hours of surgery. Among 25 patients who underwent open repair, 17 (68%) showed increase in CRP levels and out of 25 patients who underwent laparoscopic repair, 15 (60%) showed increase in CRP levels. Peak value of CRP in open hernia was 6.8 mg/dl and in laparoscopic repair was 3.4 mg/dl. The mean value of CRP was higher in patients who underwent open hernia repair (6.1 mg/dl) when compared to laparoscopic repair (5.2 mg/dl). ESR levels were also significantly raised post - op, peak value being 24 mm/hr in open repair and 16 mm/hr in laparoscopic repair. Mean ESR in open repair (18mm/hr) was higher than that in laparoscopic repair (14mm/hr).

#### 4. Discussion

The advent of laparoscopy in the field of Surgery has reaped a lot of advantages in the aspect of faster post - op recovery, reduced surgical stress and inflammation associated with it. In this study by measuring the value of acute phase reactants, we've learned that the inflammation associated with surgery was significantly higher in open hernia repairs when compared to laparoscopic repair.

C reactive protein (CRP), an acute phase reactant produced by liver, usually increases after 12 hours of injury and reaches the peak at 48 hours (20). Hence, CRP is an effective marker to quantify the trauma produced by a surgical procedure. (8)

In this study of patients who underwent inguinal hernia repair, the CRP and ESR levels was significantly raised in both the groups, but still higher in open hernia repair. This is in accordance with the result observed by K Akhtar et al. in a study which was conducted among open and laparoscopic hernia repair groups, where peak CRP level in open hernia was higher than in laparoscopic repair. (1)

But our result is in contrast to the result observed by Hill et al study (14), where there was no changes in CRP levels after hernia repair. Also, the rise in CRP and ESR values are of lesser magnitude as compared to other procedures like other surgical procedures (6, 7) like cholecystectomy (8, 9). Changes in IL - 6 and other cytokines values could attribute to this variation (15). . The result observed suggests that the surgical trauma and the inflammatory response produced by open inguinal hernia repair is greater than laparoscopic repair. This study has proven that, in - spite of being an invasive procedure, a laparoscopic surgery of hernia repair produces lesser inflammatory response as compared to an open procedure. This has let us know the effects of two different treatment modalities performed with the aim of producing a similar outcome on patients with inguinal hernia.

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