



A COMPREHENSIVE PROSPECTIVE STUDY ON LIVER FUNCTION TEST ALTERATIONS AFTER LAPAROSCOPIC CHOLECYSTECTOMY

General Surgery

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ABSTRACT

Background: Laparoscopic cholecystectomy (LC) is the standard surgical treatment for cholelithiasis. The procedure requires CO₂ pneumoperitoneum, which elevates intra-abdominal pressure (IAP). While many studies report transient alterations in liver function tests (LFTs) due to this pressure, the findings can be inconsistent. **Aim:** This study prospectively evaluates the effects of CO₂ pneumoperitoneum on a comprehensive panel of LFTs, including bilirubin, albumin, and liver enzymes, in patients undergoing elective LC. **Materials And Methods:** This prospective observational study included 76 patients (ASA Grade I-II) with normal preoperative LFTs undergoing elective LC. Standard four-port LC was performed with CO₂ pneumoperitoneum. Serum levels of Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), Alkaline Phosphatase (ALP), Total Bilirubin, and Albumin were measured preoperatively and at 24 hours postoperatively. Data were analyzed using the student's t-test. **Results:** In the 76 patients studied, there were no statistically significant changes in the mean levels of liver enzymes or bilirubin at 24 hours post-surgery. Mean AST changed from 29.53 U/L to 30.68 U/L ($p=0.551$), ALT from 30.18 U/L to 32.00 U/L ($p=0.327$), and ALP from 58.72 U/L to 53.94 U/L ($p=0.539$). Similarly, mean Total Bilirubin levels changed from 0.58 mg/dL preoperatively to 0.61 mg/dL postoperatively ($p=0.548$), which was not significant. Serum albumin also showed no significant change. **Conclusion:** CO₂ pneumoperitoneum during elective LC did not cause statistically significant derangement of liver function tests, including bilirubin and albumin, in the immediate postoperative period for this patient group. This suggests that the procedure has a minimal and clinically insignificant impact on hepatic function in patients without pre-existing liver disease.

KEYWORDS

Laparoscopic Cholecystectomy, Liver Function Tests, CO₂ Pneumoperitoneum, Serum Bilirubin, Serum Albumin.

1. INTRODUCTION

Laparoscopic cholecystectomy (LC) has become the gold-standard surgical intervention for symptomatic gallstone disease. A fundamental component of this procedure is the use of carbon dioxide (CO₂) pneumoperitoneum to create an operative field, which elevates intra-abdominal pressure (IAP) to 12-14 mmHg. This pressure can surpass the normal portal venous pressure, raising concerns about compromised hepatic blood flow and potential alterations in liver function tests (LFTs).^{[1][2]}

Numerous studies have documented a transient postoperative rise in liver enzymes like AST and ALT. However, data regarding other crucial markers of liver function, such as serum bilirubin and albumin, have been less consistently reported. This prospective study was designed to provide a comprehensive evaluation by measuring the changes across a full panel of LFTs, including enzymes, bilirubin, and albumin, within our patient cohort to assess the true clinical significance of these effects.^{[3][4]}

2. MATERIALS AND METHODS

This prospective observational study enrolled 76 patients with uncomplicated symptomatic cholelithiasis scheduled for elective LC. The study was approved by the institutional ethics committee, and all participants provided informed consent.

Inclusion And Exclusion Criteria

Patients aged 18 to 60 years (ASA Grade I or II) with normal preoperative LFTs were included. Patients with pre-existing liver conditions, common bile duct stones, recent ERCP, or those requiring conversion to open surgery were excluded.

Surgical And Data Collection Protocol

A standard four-port LC was performed by the same surgical team

under a uniform general anesthesia protocol. CO₂ pneumoperitoneum was established and maintained. Venous blood samples were drawn to measure serum AST, ALT, ALP, Total Bilirubin, and Albumin preoperatively and again at 24 hours postoperatively. The data were statistically analyzed using the student's t-test, with a p-value <0.05 deemed significant.

3. RESULTS

The study included 76 patients, with a mean age of 39.0 ± 10.7 years and a female majority (60%). All procedures were completed laparoscopically without major complications.

Analysis Of Liver Function Tests

The primary outcome was the absence of any statistically significant alteration in the comprehensive panel of LFTs at 24 hours post-surgery.

- Liver Enzymes:** No significant changes were observed. Mean AST changed from 29.53 U/L to 30.68 U/L ($p=0.551$), ALT from 30.18 U/L to 32.00 U/L ($p=0.327$), and ALP from 58.72 U/L to 53.94 U/L ($p=0.539$).
- Bilirubin And Albumin:** These markers also remained stable. The mean preoperative Total Bilirubin was 0.58 ± 0.23 mg/dL, which changed to 0.61 ± 0.25 mg/dL postoperatively, a difference that was not statistically significant ($p=0.548$). Serum albumin levels also showed no significant postoperative change.

4. DISCUSSION

The findings of this prospective study indicate that elective LC with CO₂ pneumoperitoneum did not result in statistically significant changes to a comprehensive panel of LFTs, including enzymes, bilirubin, and albumin, at 24 hours post-procedure. This is particularly noteworthy as it contrasts with many reports that document significant transient elevations in liver transaminases. The stability of serum bilirubin in our study aligns with some previous findings but provides

stronger evidence by being part of a broader, non-significant trend.
^{[1][4][5][6][7]}

The lack of significant change in our cohort could be attributed to several factors, such as meticulous surgical technique, controlled IAP, and a patient population without underlying liver compromise. While the mechanism of LFT elevation is widely believed to be hepatic hypoperfusion from increased IAP, our results suggest this effect may not be clinically or statistically significant under optimal conditions.

The stability of bilirubin and albumin further strengthens the conclusion that the transient physiological stress of pneumoperitoneum does not translate into meaningful hepatic dysfunction in healthy patients. This comprehensive negative finding is clinically valuable, as it helps rule out surgical complications and avoids unnecessary postoperative investigations when minor, statistically insignificant fluctuations in LFTs are observed.

5. CONCLUSION

In this prospective study of 76 patients, LC with CO₂ pneumoperitoneum did not lead to statistically significant alterations in liver enzymes, serum bilirubin, or albumin 24 hours post-surgery. These comprehensive findings suggest that the impact of pneumoperitoneum on hepatic function is minimal and clinically inconsequential in patients with normal liver function undergoing elective LC.

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