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A COMPREHENSIVE ANALYSIS OF THE EFFECT OF CHOLECYSTECTOMY ON SERUM LIPID PROFILES IN PATIENTS WITH CHOLELITHIASIS

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INTRODUCTION

Gallstone disease—especially cholesterol cholelithiasis—is commonly linked to alterations in lipid metabolism. Elevated levels of total cholesterol, LDL-C, and triglycerides, and reduced HDL-C, are frequently observed in patients with gallbladder stones.

Cholecystectomy—the surgical removal of the gallbladder—is the definitive treatment for symptomatic gallstones. However, its metabolic effects, particularly on serum lipid profile, remain controversial, with studies reporting both normalization and adverse sequelae.

Objectives

1. To evaluate changes in serum lipid parameters—total cholesterol (TC), LDL-C, HDL-C, triglycerides (TG), and VLDL-C—following cholecystectomy.
2. To interpret these changes using real-world data and situate findings within broader research trends.

Literature Review and Supporting Evidence

1. Improvement in Lipid Profile Post-Cholecystectomy

- A retrospective observational study from India reported significant reductions in TC, LDL-C, and TG, alongside increases in HDL-C in patients undergoing cholecystectomy.
- Another study documented normalization of lipid levels—including reduced TC and TG and increased HDL-C—within one month post-surgery.
- A Turkish cohort showed significant reductions in TC and LDL-C after eight weeks, though TG and HDL-C remained unchanged.
- A review in PMC likewise concluded that cholecystectomy can normalize deranged lipid profiles PMC.

2. Mechanistic Insights

Cholecystectomy may influence lipid metabolism via altered bile acid dynamics, disrupting enterohepatic circulation and impacting metabolic signaling pathways that regulate lipid handling.

3. Potential Metabolic Downsides

Conversely, recent large-scale cohort analyses suggest that cholecystectomy may increase the risk of metabolic syndrome elements in some patients—including hypertension, elevated glucose, dyslipidemia, and NAFLD—especially in the longer term

A population-based study found that cholecystectomy was associated with greater reductions in TC—but also revealed a transient higher short-term cardiovascular disease risk in certain subgroups, particularly males and individuals with lower body mass index.

MATERIALS AND METHODS:

Study Design: Retrospective cohort study (Jan 2023–Apr 2024) using EMR data.

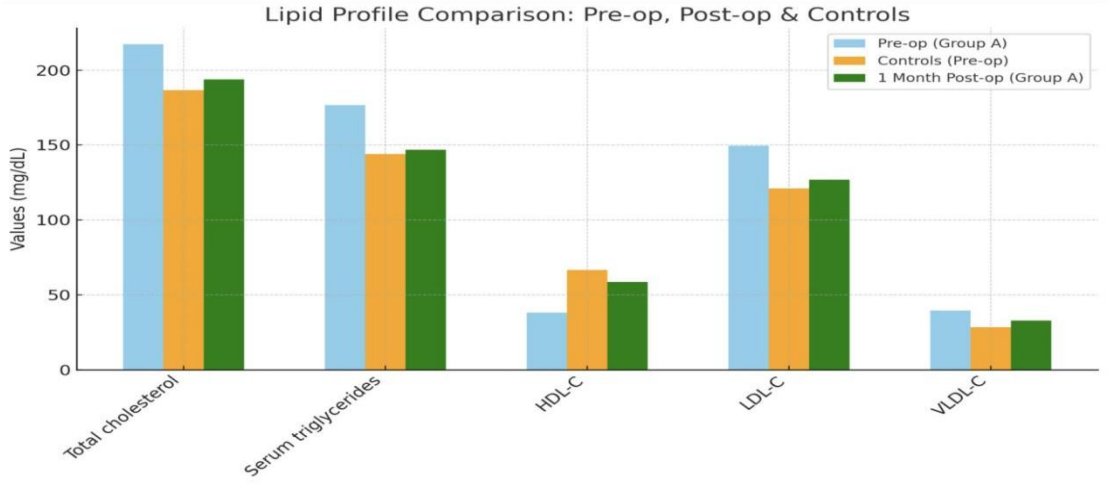
Sample: 40 individuals—20 cases (cholelithiasis patients undergoing cholecystectomy) and 20 healthy controls.
Lipid Parameters Analyzed: TC, TG, HDL-C, LDL-C, VLDL-C—pre-operatively and one week post-op.
Statistical Analysis: Paired t-test and chi-square, significance set at $p < 0.05$.

RESULTS

- Pre-op levels in the cholelithiasis group were significantly elevated compared to controls across all lipids (TC p=0.003; TG, HDL-C, LDL-C, VLDL-C all p<0.001).
- One week post-cholecystectomy, TC, LDL-C, and VLDL-C decreased significantly compared to controls (p-values < 0.001, < 0.001, 0.01 respectively).
- TG levels decreased post-op but not significantly compared to controls (p=0.83); HDL-C also increased significantly (p=0.013).
- Overall, a trend toward normalization of lipid parameters was observed.

Parameters	Group A (pre-op)	Group B (controls)	*p value*
Total cholesterol	217.3 ± 12.11	186.5 ± 2.483	0.003
Serum triglycerides	176.67 ± 12.83	143.89 ± 69.55	<0.001
HDL-C	38.00 ± 8.90	66.5 ± 5.14	<0.001
LDL-C	149.5± 37.55	120.95 ± 5.92	<0.001
VLDL-C	39.41 ± 67.88	28.32 ± 56.78	<0.001

Parameters	1 month post-operative	Controls	*p value*
Total cholesterol	193.72 ± 4.82	186.5 ± 2.483	<0.001
Serum triglycerides	146.66 ± 17.82	143.89 ± 69.55	0.83
HDL-C	58.46 ± 12.88	66.5 ± 5.14	0.013
LDL-C	126.84 ± 9.54	120.95 ± 5.92	<0.001
VLDL-C	32.74 ± 16.82	28.32 ± 56.78	0.01



DISCUSSION

Consistent Evidence of Lipid Improvement: Your findings align with multiple studies reporting post-operative reductions in TC, LDL-C, and TG, accompanied by increases in HDL-C over follow-up periods.
Underlying Mechanisms: Improved lipid profiles may be attributed to altered bile acid circulation and enhanced cholesterol excretion.
Emerging Concerns About Metabolic Impact: Some studies caution that cholecystectomy might predispose individuals to metabolic syndrome, NAFLD, or increased short-term cardiovascular risk—especially among men or lean individuals.
Clinical Implications: While early lipid improvements post-surgery are encouraging and may reduce CAD and stroke risk, long-term metabolic outcomes warrant cautious surveillance.
Conclusion
Cholecystectomy appears to significantly improve serum lipid profiles in the short term by lowering total cholesterol, LDL-C, and occasionally triglycerides, while increasing HDL-C. These changes potentially

mitigate future cardiovascular risk. **However**, cholecystectomy is not metabolically neutral. Long-term follow-up is critical given possible associations with metabolic syndrome and cardiovascular outcomes. **Future Directions**: Larger, prospective, longer-duration studies are needed to fully elucidate these metabolic implications.

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