



Original Research

Histopathological Analysis of Gallbladder Specimens Obtained During Living Donor Hepatectomy

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Abstract

Objectives: Cholecystectomy is routinely performed during living donor hepatectomy and subsequently sent for routine histopathological examination. In this report, we reviewed the clinical and histopathological data of the resected gallbladders to give insight about the incidence of occult gallbladder pathologies among healthy adults.

Methods: The medical records of adult living liver donors between December 15th, 2017 and October 15th, 2023 were reviewed. Demographics, gallbladders gross and microscopic pathological data were collected. Male Vs. Female donors clinicopathological data were compared. A p value <0.05 was considered statistically significant.

Results: Two hundred-ninety five donors were reviewed. The median (95 % CI) age was 33 (32-35) years. The male/female ratio was 187 /108. The median (95 % CI) body mass index was 24.8 (24.2-26.0) kg/m². The blood group were as follows: O (145; 49%), A (95; 32%), B (46; 16%) and AB (9; 3%). Topographically, the resected gallbladders showed a median length of 75 (75-80) mm, median width of 30 (30-35) mm while the median wall thickness was 2.0 (2.0-3.0) mm. The overall incidence of chronic cholecystitis was 41% (122/295) and normal gallbladder structure was found in 166 (56%) cases. No metaplastic or invasive pathologies were detected. Male donors were younger [32 (30-34) vs 34 (32-37); p=0.040], with higher median BMI [26 (25.5-27.1) vs 22.9 (21.6-24.3); p=0.002], with longer gallbladders [80 (80-85) vs 75 (75-80); p=0.002] and with more thick gallbladder wall [2.0 (2.0-3.0) vs 2.0 (2.0-3.0); p=0.034] than females. There was no statistically significant gender difference as regards the incidence of final histopathological diagnoses.

Conclusion: Resected gallbladders during living donor hepatectomy should be routinely sent for histopathological analysis for the detection of occult pathologies among healthy adults.

Keywords: Cholelithiasis, Cholecystitis, Gallbladder, Living donor hepatectomy

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Living donor liver transplantation is predominantly practiced in many regions in the world to overcome the problem of organ shortage and protracted waitlist.^[1] Performing a safe donor surgery comes at the outset in all organ transplant centers.^[2] Cholecystectomy and clear delineation of the hilar anatomy along with intra-operative cholangiography are integral steps in the donor procedure to ensure

safety on both sides.^[3] Since the resected gallbladder is being routinely sent for histopathological examination, it has become an interesting subject of research as regard the incidence and prevalence of different gallbladder pathologies in otherwise healthy adults.^[4] In this study, we are providing a clinico-pathological review based upon a series of 295 resected gallbladders during living donor surgery.

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Methods

After obtaining the Institutional Review Board (IRB) approval the prospectively collected medical records of all healthy adults liver donors (≥ 18 years) who underwent partial hepatectomy between December 15th, 2017 and October 10th, 2023 were retrospectively reviewed. The demographics, as well as the topographic, gross and microscopic pathological information of the resected gall bladder were retrieved. Male and female donors were compared in terms of the incidence and prevalence of different gall bladder pathologies. All patients underwent open live donor surgery for harvesting of right hepatic lobe, left lobe or left lateral segment. Gallbladders were resected during the conventional donor surgery and all specimens are sent routinely for histopathologic examination.

Study Protocol and Ethics Committee Approval

This study involving human participants was by the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Ethical approval was obtained from the Inonu University Institutional Review Board (IRB) for Non-Interventional Clinical Research (Approval No: 2023/5337). STROBE (Strengthening the reporting of observational studies in epidemiology) guideline was utilized for considering the checklist related to the current study.

Statistical Analysis

Numerical variables were expressed using median and upper and lower bound of 95 % confidence interval (CI) and compared using t.test or Mann-Whitney U test as appropriate. Categorical variables were expressed as number (percent) and compared using Chi-square test or Fischer-exact test as appropriate. P value < 0.05 was considered statistically significant. Statistical analysis was performed using SPSS version 22.0 (IBM SPSS Statistics, Amarak, NY, USA).

Results

Between December 15th, 2017 and October 15th, 2023 295 living donor hepatectomy procedures were carried out at our transplant institution for living donor liver transplantation. The median (95 % CI) age of the living donors was 33 (32-35) years. The male/female ratio was 187 (36.6%) / 108 (63.4%). The median (95 % CI) height and weight were 164 (162-166) cm and 69 (67-71) kg, respectively. The median (95 % CI) body mass index was 24.8 (24.2-26.0) kg/m². The blood group of donors were distributed as follows: O (n=145; 49%), A (n=95; 32%), B (n=46; 16%) and AB (n=9; 3%). Regarding the topographic details of the resected gall bladders: the median length measured vertically from the mid-fundus to the stump

was 75 (75-80) mm, the median width taken transversely at the widest point on the fundus was 30 (30-35) mm while the median wall thickness at the midbody of gallbladders was 2.0 (2.0-3.0) mm. The incidence of cholelithiasis among our living liver donors was 8.1 % (24/295). The final pathological analyses were as follows: normal gallbladder structure (n=166, 56%), chronic cholecystitis (n=102; 35%), cholesterolosis (n=7; 2.5%) and double pathologies (n=20; 6.5%). Double pathologies included: chronic cholecystitis + cholesterolosis, chronic cholecystitis + gallbladder polyp and chronic cholecystitis + focal lymphangiectasis in 13, 6 and 1 specimens, respectively. So, the collective incidence of chronic cholecystitis was 41% (122/295). Detailed information was given in the Table 1.

Group Comparisons

Male living liver donors were at younger age [32 (30-34) vs 34 (32-37); p=0.040], with higher median BMI [26 (25.5-27.1) vs 22.9 (21.6-24.3); p=0.002], with longer gall bladders [80 (80-85) vs 75 (75-80); p=0.002] and with more thick gallbladder wall [2.0 (2.0-3.0) vs 2.0 (2.0-3.0); p=0.034] than females. There was no statistically significant gender difference as regards the incidence of cholelithiasis or final histopathological diagnoses. Likewise, no statistically significant difference among different blood groups in terms of aforementioned pathologies. Detailed information was given in the Table 2.

Table 1. Assessment of 295 living liver donors

Demographic and Clinicopathological Features	
Age (years)	33 (32-35)
Gender	
Male	187 (36.6)
Female	108 (63.4)
BMI (kg/m ²)	24.8 (24.2-26.0)
Blood Groups (%)	
A	95 (32.2)
B	46 (15.6)
AB	9 (3.1)
O	145 (49.2)
Gallbladder width (mm)	30 (30-35)
Gallbladder length (mm)	75 (75-80)
Gallbladder wall thickness (mm)	2.0 (2.0-3.0)
Cholelithiasis	
Yes	24 (8.1)
No	271 (91.9)
Histopathological findings (%)	
Normal structure	166 (56.3)
Chronic cholecystitis	102 (34.6)
Cholesterolosis	7 (2.4)
Chronic cholecystitis + Cholesterolosis	13 (4.4)
Chronic cholecystitis + Polyp	6 (2.0)
Chronic cholecystitis + Focal lymphangiectasia	1 (0.1)

Table 2. Comparison of male and female living liver donors

Parameter	Female Donors	Male Donors	P
Age (years)	34 (32-37)	32 (30-34)	0.04
BMI (kg/m ²)	22.9 (21.6-24.3)	26.0 (25.5-27.1)	0.002
GB length (mm)	75 (75-80)	80 (80-85)	0.002
GB width (mm)	30 (30-35)	30 (30-35)	0.294
GB wall thickness (mm)	2.0 (2.0-3.0)	2.0 (2.0-3.0)	0.034
Histopathoical findings (%)			0.812
Normal structure	61 (56.5)	105 (56.1)	
Chronic cholecystitis	35 (32.4)	67 (35.8)	
Cholesterolosis	3 (2.8)	4 (2.1)	
Double pathology	9 (8.3)	11 (5.9)	

Discussion

The routine histopathological assessment of gallbladder resected during cholecystectomy for CCC had been adopted in the recent literature for the purpose of detection of various adjoining occult pathologies especially invasive lesions.^[5]

Cholecystectomy, being a routine step in living donor hepatectomy for safe delineation of hilar anatomy and subsequent liver resection,^[6] has proven to be of no negative impact on the long term as regard donor GIT symptoms or quality of life.^[7] Donor hepatectomy with gallbladder preservation had been proposed in previous reports^[8] but its application is yet to be a standard of care.

From other perspective, the routinely removed gallbladder during donor hepatectomy surgery provides an endless source of clinical and histopathological insights about the incidence and prevalence of gallbladder pathologies among clinically healthy population.

Like the practice in almost all transplant centers, we send the gallbladder resected from 295 donors for routine histopathological examination. Overall, the prevalence of gallbladder pathology was 46% with the diagnosis of chronic cholecystitis being the most frequently encountered pathology in our donors' gallbladders reaching up to 41%. This incidence is much higher than the first series to address this concern by Akbulut and colleagues^[4] who reviewed the gallbladders of 1009 donor and found 27% of them harboring incidental pathologies with the histological findings of chronic cholecystitis found among 19 % of the whole cohort.^[4] In another study by Bhatti and colleagues,^[9] around of 52 % of donors' gallbladders harbored chronic cholecystitis. The authors concurred with the concept of routine histopathological analysis of the resected gallbladder.^[9]

As regard gender difference, male living liver donors in our series were younger and showed higher median BMI than females as well as longer longitudinal axis of their gallbladders. There was no statistically significant gender difference as regard the incidence of cholelithiasis or final histopathological diagnoses. In a larger updated series (n=2493) by Akbulut and colleagues,^[10] they found a statistically significant gender difference, with male donors being younger, having lower median BMI and longer mean gallbladder length. Looking into gallbladder wall pathology, they found no gender difference among different pathologies.^[10]

Cholesterolosis is a state of accumulation of cholesterol compounds in the gallbladder wall, that had been linked to the occurrence of idiopathic pancreatitis in previous reports. In our series, its incidence was 2.4 % and were all subtle clinically and radiologically before donor surgery.

In our study, no detected metaplastic or invasive pathologies in the resected gallbladder. In their early experience, Akbulut and colleagues. reported three cases with an area of metaplasia in the gallbladder mucosa. Our study has some limitations, being of small sample size and of retrospective nature.

Conclusion

The resected gallbladder from a healthy adult during living donor hepatectomy is an area of ongoing research to explore the incidence and clinical behaviour of subtle gallbladder pathologies. Although unusual pathological findings are rarely seen in young people such as living liver donors, all cholecystectomy specimens should be sent for histopathological examination.

Disclosures

Ethics Committee Approval: Inonu University Institutional Review Board (IRB) for Non-Interventional Clinical Research.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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