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Original Research Article

A Prospective Study Examining the Impact of Gallbladder Polyp Size on the Detection and Prediction of Gallbladder Cancer

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Conflict of interest: Nil

Abstract:

Objective: To evaluate the role of gall bladder (GB) polyp size in predicting malignancy and its diagnostic accuracy for detection of gall bladder cancer.

Methods: Over the course of a year, a prospective observational study was conducted at Darbhanga Medical College & Hospital in Laheriasarai. A total of 115 patients with gall bladder polyps detected on ultrasonography were enrolled. Patients underwent further evaluation with CT/MRI when indicated, followed by cholecystectomy. Polyp characteristics including size, number, and morphology were recorded. Histopathological examination was considered the gold standard. The diagnostic accuracy of different polyp size cutoffs (≥5 mm, ≥10 mm, ≥15 mm) was analyzed using sensitivity, specificity, and ROC curve.

Results: Among 115 patients, 69 (60%) were female and 46 (40%) were male. Histopathology confirmed 89 (77.4%) benign and 26 (22.6%) malignant polyps. The mean polyp size was 6.8 ± 2.9 mm in benign versus 15.2 ± 5.1 mm in malignant cases ($p < 0.001$). Malignancy was detected in 4.5% of polyps <10 mm, 31.6% of polyps 10–15 mm, and 68.8% of polyps >15 mm. Sessile morphology (40.4% malignant) was significantly more associated with malignancy than pedunculated (10.3% malignant). ROC curve analysis revealed an optimal cutoff of ≥11 mm, with Sensitivity 84.6%, Specificity 88.7%, and Accuracy 87.8%.

Conclusion: Gall bladder polyp size is a strong predictor of malignancy. Polyps ≥10–11 mm, especially sessile and solitary, should be managed surgically, while smaller polyps may be safely monitored.

Keywords: Gall Bladder Polyp, Gall Bladder Cancer, Malignancy Prediction, Histopathology, Cholecystectomy.

Introduction

Gall bladder polyps are mucosal projections into the lumen of the gall bladder that are increasingly detected with the widespread use of ultrasonography. Their reported prevalence varies between 1% and 7% in the general population, and they are most often discovered incidentally during imaging for unrelated abdominal complaints. The vast majority of polyps are benign, including cholesterol polyps, inflammatory polyps, and adenomas; however, a small but clinically significant proportion represent premalignant or malignant lesions. Distinguishing between benign and malignant polyps is of paramount importance, as gall bladder carcinoma is an aggressive malignancy with a dismal prognosis when diagnosed at advanced stages. The challenge for clinicians lies in identifying which patients with gall bladder polyps warrant surgical removal and which can be safely monitored with conservative follow-up.

Among the various clinical and imaging parameters studied, polyp size has consistently emerged as the most reliable predictor of malignancy. Numerous studies have demonstrated that the risk of cancer increases with polyp size, with lesions measuring ≥10 mm carrying a substantially higher risk of malignant transformation compared to smaller polyps. Morphological features, such as sessile configuration, solitary occurrence, and rapid interval growth, have also been implicated as additional risk factors. However, these parameters

are often less reproducible, and their predictive value may vary across populations. Furthermore, certain clinical factors such as patient age, gender, and the presence of gallstones may also influence malignant potential. In regions such as Northern and Eastern India, where the incidence of gall bladder cancer is disproportionately high, refining the risk stratification of gall bladder polyps is of particular clinical importance.

Despite global consensus guidelines recommending cholecystectomy for polyps measuring ≥10 mm, there remains considerable debate regarding the optimal management threshold in different populations. Some studies have suggested that smaller polyps, particularly those between 8–10 mm, may already carry a significant malignant risk, while others have found that even larger polyps may still prove benign on histopathology. These discrepancies highlight the need for region-specific data to guide surgical decision-making. Therefore, the goal of the current study was to assess how gall bladder polyp size affected the ability to predict and identify gall bladder cancer in patients who came to a Bihar tertiary care facility. By correlating preoperative imaging findings with histopathological outcomes, this study aimed to determine an optimal cutoff size for surgical intervention, thereby contributing to more accurate risk stratification and improved patient management in our clinical setting.

Materials and Methods

Study Design and Setting: Over the course of a year, a prospective observational study was conducted at Darbhanga Medical College & Hospital in Laheriasarai.

Study Population: A total of 115 patients with gall bladder polyps detected on ultrasonography were included.

Inclusion criteria:

- Age ≥18 years.
- Polyps >3 mm identified on imaging.
- Patients undergoing cholecystectomy.

Exclusion criteria:

- Pregnant women.
- Patients with deranged renal function preventing contrast imaging.
- Patients unfit/unwilling for surgery.

Methodology

- **Clinical data:** Demographic profile, clinical symptoms, and risk factors recorded.
- **Imaging:** Polyp size (maximum diameter), morphology (sessile/pedunculated), number (solitary/multiple), associated gallstones or wall thickening.
- **Surgery:** All patients underwent laparoscopic or open cholecystectomy.
- **Histopathology:** Final diagnosis categorized into benign or malignant.

Statistical Analysis

- Data analyzed using SPSS v21.0.
- Continuous variables expressed as mean ± SD, categorical variables as proportions.
- Chi-square and independent t-tests applied.
- ROC curve plotted to determine best cutoff size for malignancy prediction.
- $p < 0.05$ considered statistically significant.

Results

Demographic Profile: Of 115 patients, 46 (40%) were male and 69 (60%) were female. The mean age was 48.6 ± 12.4 years.

Histopathology Findings

- **Benign polyps:** 89 (77.4%) cases (cholesterol polyps, inflammatory polyps, adenomas).
- **Malignant polyps:** 26 (22.6%) cases (adenocarcinomas).

Correlation with Polyp Size

- Mean size benign: 6.8 ± 2.9 mm
- Mean size malignant: 15.2 ± 5.1 mm ($p < 0.001$).

Polyp Size	Total Cases	Malignant (%)
<10 mm	67	3 (4.5%)
10–15 mm	38	12 (31.6%)
>15 mm	10	11 (68.8%)

Morphology and Number

- Sessile polyps: 47 (19 malignant; 40.4%).
- Pedunculated polyps: 68 (7 malignant; 10.3%).
- Solitary polyps had higher malignancy risk than multiple polyps ($p < 0.05$).

Diagnostic Accuracy

- Cutoff ≥10 mm: Sensitivity 80.7%, Specificity 85.4%, Accuracy 84.3%.
- Cutoff ≥11 mm: Sensitivity 84.6%, Specificity 88.7%, Accuracy 87.8%.

Discussion

The present study evaluated the role of gall bladder polyp size in predicting malignancy in a North

Indian population. Out of 115 patients, 26 (22.6%) were found to have malignant polyps on histopathology. The mean size of malignant polyps (15.2 ± 5.1 mm) was significantly larger than benign polyps (6.8 ± 2.9 mm). This finding reinforces the concept that increasing polyp size is directly correlated with risk of malignant transformation.

Our results showed that malignancy was rare in polyps measuring <10 mm, with only 4.5% showing malignant histology. However, the risk rose sharply with increasing size—31.6% in polyps between 10–15 mm and nearly 70% in polyps >15 mm. These results are consistent with international studies, where a cutoff of 10 mm is commonly accepted as a surgical threshold. The ROC curve in our study suggested 11 mm as the optimal cutoff, slightly higher than conventional recommendations but with improved sensitivity and specificity.

In addition to size, polyp morphology was found to play an important role. Sessile polyps were significantly more likely to be malignant than pedunculated polyps (40.4% vs 10.3%). Solitary polyps also carried a higher malignancy risk compared to multiple polyps. These findings highlight that morphology and number of polyps, when considered along with size, provide better predictive value and should be factored into surgical decision-making.

The clinical relevance of these findings is substantial. Gall bladder carcinoma is associated with late presentation and poor survival outcomes, with overall 5-year survival rates reported as less than 5% in many series. Early detection and surgical excision of premalignant or malignant polyps can drastically improve prognosis, as survival after resection of early-stage carcinoma approaches 100%. Therefore, timely recognition of high-risk polyps becomes crucial in clinical practice.

Our study supports the growing consensus that polyps ≥10–11 mm, especially when solitary or sessile, should be managed surgically rather than observed. On the other hand, smaller polyps (<10 mm) with no additional risk factors can be followed up with periodic ultrasound to avoid unnecessary cholecystectomy. This stratified approach balances the risk of missing early malignancies with the need to minimize overtreatment.

Although our findings align with global literature, certain limitations must be acknowledged. Being a single-center study, the results may not be generalizable to wider populations. The relatively small number of malignant cases (n = 26) also limited subgroup analysis. Moreover, follow-up of patients with small, non-operated polyps was not included, which could have provided additional insight into long-term malignant potential. Future multicenter studies with larger sample sizes are needed to validate these results and refine guidelines for management of gall bladder polyps.

Conclusion

Polyp size is an independent and reliable predictor of gall bladder malignancy. Polyps measuring ≥10–11 mm, especially if sessile or solitary, should be surgically removed. Small, asymptomatic polyps can be followed with imaging.

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