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Dear Colleagues,

We are pleased to present a new issue of the Journal of Comprehensive Surgery as we proudly enter the fourth year of our publication journey. What began as a vision to provide a truly multidisciplinary platform for the surgical sciences has steadily evolved into a journal that reflects both the diversity and depth of contemporary surgical practice.

In an era of rapidly advancing subspecialization, we remain committed to maintaining a comprehensive perspective—one that brings together original research, clinical insight, and academic rigor across the broad spectrum of surgery. Over the past years, our journal has continued to strengthen its presence in international indexing platforms, a milestone made possible through the dedicated efforts of our editorial team, the invaluable and impartial contributions of our reviewers, the trust of our authors, and the continued engagement of our readers. I would like to express my sincere gratitude to all who have contributed to this progress.

As we move forward into our fourth year, our focus extends beyond sustaining quality to further enhancing scientific impact, editorial standards, and visibility. Ongoing developments within our editorial structure and review processes aim to improve efficiency, transparency, and academic excellence. Our long-term goal remains clear: to serve as a reliable and respected platform that bridges disciplines and contributes meaningfully to the advancement of surgical science.

This first issue of the fourth year includes three original research articles, one case report, and one editorial, reflecting the scientific diversity and scope that define the Journal of Comprehensive Surgery. We believe that the contributions presented in this issue will provide valuable insights and stimulate further research across surgical disciplines.

I would like to extend my heartfelt thanks to MHA and their team, as well as to everyone who has contributed to the continued publication and growth of the Journal of Comprehensive Surgery. We look forward to another year of collaboration, progress, and shared academic achievement.

Best regards,

Assoc. Prof. Fatma KAVAK AKELMA
Editor-in-Chief

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Incidence of malignancy in appendectomy specimens: a three-year retrospective analysis

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ABSTRACT

Aims: Appendectomy is one of the most commonly performed surgical procedures for acute abdominal pain. Although inflammatory changes are the predominant pathological findings, unexpected neoplastic lesions may also be identified in a small proportion of appendectomy specimens.

Methods: This study included all patients who underwent appendectomy at our institution between August 2022 and August 2025. All appendix specimens removed, regardless of the surgical indication, were evaluated. Pathology reports were retrieved from the electronic archive and analyzed on a patient-specific basis.

Results: A total of 1168 appendectomy cases were included. Patient ages ranged from 7 to 84 years, with a median age of 33 years (IQR: 24-42) and a mean age of 34.6±12.5 years. Of the patients, 690 (59.1%) were male and 477 (40.8%) were female; sex information was unavailable for one patient. Malignancy was detected in three cases. According to morphology codes, malignancy subtypes were recorded as NET G1 (8240/3) and unspecified malignant neoplasm (8000/3). In addition, four cases were diagnosed as low-grade appendiceal mucinous neoplasm (LAMN). The ages of patients with LAMN ranged from 35 to 65 years, with an equal sex distribution.

Conclusion: This study demonstrates that the incidence of malignancy in appendectomy specimens is low; however, distinct histopathological entities with potential implications for clinical management may be encountered. In addition to malignant subtypes such as neuroendocrine tumors and adenocarcinoma, LAMN should be carefully reported as a separate diagnostic category. Given the potential association of LAMN with complications such as pseudomyxoma peritonei, these lesions carry particular clinical relevance. The findings underscore the importance of thorough histopathological evaluation of all appendectomy specimens and suggest that reporting contemporary incidence data from our country may contribute to the standardization of pathological reporting and postoperative follow-up strategies.

Keywords: Appendectomy, neoplasms, neuroendocrine tumors, adenocarcinoma

INTRODUCTION

Appendectomy is one of the most frequently performed emergency surgical procedures worldwide, and although the majority of specimens reveal inflammatory pathology, a small proportion contain incidental neoplastic lesions.¹ Recent systematic reviews have reported that the incidence of neoplasia in appendectomy specimens ranges approximately between 0.7% and 2%, with neuroendocrine tumors (NETs) being consistently identified as the most common histological subtype.^{2,3}

Epidemiological analyses from population-based registries have demonstrated that primary appendiceal neoplasms remain rare; however, a significant increase in incidence has been observed over the last two decades, likely reflecting improved pathological recognition and increased surgical volume.^{4,5}

Among non-invasive mucinous lesions, low-grade appendiceal mucinous neoplasm (LAMN) constitutes a distinct pathological category due to its potential progression to pseudomyxoma peritonei (PMP) when associated with perforation or extraluminal mucin. Current World Health Organization (WHO) and expert consensus guidelines emphasize the importance of reporting LAMN separately from malignant tumors because of its unique biological behavior.⁶

Given these epidemiological patterns and evolving pathological classifications, understanding the incidence and distribution of appendiceal neoplasms—even in routine appendectomy series—remains clinically relevant. The present study evaluates all appendectomy specimens processed at our institution over a three-year period, with the objective of determining the incidence of malignancy (behavior code/3) and describing the frequency of LAMN as a separate diagnostic subgroup.

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METHODS

Approval for the study was obtained from the Scientific Researches Ethics Committee of Sincan Training and Research Hospital (Date: 27.10.2025, Decision No: SEAH-BAEK-2025-105). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

This study was conducted using a single-center, retrospective, observational design. All patients who underwent appendectomy at our institution between August 2022 and August 2025 were consecutively included. All appendix specimens removed, regardless of the indication for surgery (acute appendicitis, incidental appendectomy, etc.), were included in the study. Pathology reports were retrieved from the electronic archive and combined to ensure each patient was unique. Incidental appendectomies could not be reliably differentiated within the pathology-based dataset, because the study was designed using pathology archive records rather than operative notes. For this reason, all appendectomy specimens reported by pathology (whether primary or incidental) were included in the analysis, consistent with previous pathology-driven incidence studies.

All specimens underwent routine histopathological evaluation (H&E), and lesions were classified according to ICDO morphology and behavior codes. Malignancy was defined as tumors reported with behavior code /3 (e.g., adenocarcinomas, NETs). LAMN cases were accepted as borderline behavior mucinous neoplasms with the ICDO code 8480/1 and were reported as a separate subgroup without being included in the malignancy incidence. The current pathology classification was referenced for the diagnosis and reporting principles of LAMN.⁶

The primary endpoint was to determine the incidence of malignancy in appendectomy specimens, expressed as a percentage with 95% confidence intervals. Secondary analyses included the frequency of LAMN, distribution of malignant subtypes, and distribution by age, sex, and year. For continuous variables, the mean±SD or median [IQR] was calculated; for categorical variables, the number and percentage were calculated. Percentages were calculated using the 95% confidence interval (CI) Wilson method. All statistical analyses were performed using IBM SPSS Statistics (IBM Corp., Armonk, NY); a two-tailed $p < 0.05$ was considered statistically significant.

RESULTS

The study included a total of 1,168 appendectomy cases performed between August 2022 and August 2025. The patients' ages ranged from 7 to 84 years. The median age was 33 years (IQR: 24-42), and the mean age was 34.6±12.5 years. There were 690 male patients (59.1%), 477 female patients (40.8%), and 1 patient whose gender was unknown. Sex information for the single patient with missing data was unavailable due to incomplete demographic records in the electronic pathology archive. The demographic data of the patients are summarized in [Table 1](#).

A total of 3 malignancy cases were detected (rate: 0.26%; 95% CI: 0.09%-0.75%). Malignancy subtypes, according to morphology codes, were recorded as NET G1 (8240/3)

Table 1. Basic characteristics of patients and incidence of malignancy/LAMN

| Variable | Value |
|------------------------------------|-------------|
| Total number of cases | 1168 |
| Age (median [IQR]) | 33 [24-42] |
| Age (mean±SD) | 34.6±12.5 |
| Gender (male) | 690 (59.1%) |
| Gender (female) | 477 (40.8%) |
| Malignancy, n (%) | 3 (0.26%) |
| Malignancy 95% confidence interval | 0.09%-0.75% |
| LAMN, n (%) | 4 (0.34%) |
| LAMN 95% confidence interval | 0.13%-0.88% |

* Note: Gender information was not available for one patient; percentages were calculated based on the total number of cases. LAMN: Low-grade appendiceal mucinous neoplasm, IQR: Interquartile range, SD: Standard deviation

and unspecified malignant neoplasm (8000/3). The subtype distribution of cases with detected malignancy is summarized in [Table 2](#).

Table 2. Subtype distribution of cases with detected malignancy

| Morphology code | Definition | Number of cases |
|-----------------|--------------------|-----------------|
| 8000/3 | Malignant neoplasm | 2 |
| 8240/3 | Carcinoid tumor | 1 |

Additionally, 4 cases were reported as LAMN (rate: 0.34%; 95% CI: 0.13%-0.88%). The ages of LAMN cases ranged from 35 to 65 years, with two male and two female patients.

DISCUSSION

In this single-center retrospective study, malignant appendiceal tumors were rarely identified in routine appendectomy specimens; however, the histological spectrum observed underscores the clinical relevance of incidental neoplastic findings. When interpreted in the context of the existing literature, the low incidence observed in our series is not unexpected and falls within the wide range of rates reported for appendiceal neoplasms detected after appendectomy. Previous appendectomy-based studies have reported that appendiceal neoplasms are detected in approximately 0.7%-2.5% of specimens, with variability largely attributed to differences in study design, patient selection, and pathological classification systems.^{2,3} Accordingly, the lower incidence observed in our series may be related to the single-center retrospective design, the limited absolute number of malignant cases, and the use of a pathology-based dataset that did not allow stratification by appendicitis severity or operative indication.

With respect to histological subtypes, NETs are consistently reported as the most frequent neoplastic lesions encountered in appendectomy specimens across different series. Large appendectomy series and population-based analyses have shown that NETs account for a substantial proportion of appendiceal neoplasms, frequently representing the most common histological subtype identified after appendectomy.^{2,4} In our series, only a very limited number of NETs were identified, a finding that should be interpreted cautiously given the overall low number of malignant cases and the single-center retrospective nature of the study. Despite their

generally indolent behavior, the identification of appendiceal NETs remains clinically important, as current ENETS guidelines emphasize tumor size, mesoappendiceal invasion, and margin status as key determinants of postoperative management and the need for additional surgery.⁷

LAMN represents a distinct pathological entity that differs from invasive appendiceal adenocarcinoma in terms of biological behavior and clinical management and therefore warrants separate consideration in appendectomy series. Although LAMN lacks conventional histological invasion, it may be associated with the development of PMP in the presence of perforation or extra-luminal mucin, which underlies current recommendations to classify and report LAMN separately from invasive appendiceal adenocarcinoma.⁶ In our series, the identification of LAMN highlights the importance of careful histopathological evaluation of appendectomy specimens, as these lesions may otherwise remain unrecognized despite their potential implications for postoperative follow-up. To reduce ambiguity in appendiceal mucinous lesions, the PSOGI consensus provides standardized terminology and diagnostic definitions for routine reporting, including clear separation of non-infiltrative mucinous neoplasms from invasive adenocarcinoma.⁶

The reported incidence of unexpected appendiceal neoplasms in appendectomy specimens varies across studies, reflecting differences in case-mix (adult vs pediatric population), clinical presentation, and surgical strategy (e.g., immediate vs interval appendectomy).^{2,3} Large retrospective datasets further suggest that the probability of detecting an underlying neoplasm increases with advancing age and is higher in complicated appendicitis phenotypes (e.g., perforation or periappendicular abscess), where malignant histologies (such as adenocarcinoma or pseudomyxoma) are disproportionately represented.⁸ In line with this, adult cohorts managed with an interval approach after complicated appendicitis have shown substantially higher neoplasm rates compared with immediate appendectomy groups.⁹ In the present series, the small number of malignant cases (n=3) precluded a meaningful assessment of age-related risk; however, LAMN cases occurred in adult patients (35-65 years), which is compatible with the predominantly adult distribution reported in contemporary appendectomy series that include mucinous neoplasms among the most frequent appendiceal tumor types.^{2,3} Taken together, these data support interpreting malignancy rates in appendectomy-based studies within an appropriate clinical and demographic context-particularly in adults and in complicated appendicitis-rather than assuming uniform risk across all age groups.^{8,9}

Limitations

The relatively low malignancy rate observed in the present study may be explained by several factors. First, the cohort consisted predominantly of younger patients, with a median age of 33 years, a demographic characteristic that has been associated with lower appendiceal neoplasm detection rates in prior studies. Second, the study reflects routine emergency appendectomy practice rather than a selected population undergoing interval appendectomy after complicated disease, a context in which higher neoplasm rates have been reported. Finally, the retrospective, single-center design and the limited absolute number of malignant cases inherently constrain

the detection of less common appendiceal tumors. These considerations should be taken into account when comparing malignancy rates across appendectomy series with differing patient profiles and clinical settings.

CONCLUSION

In this large single-center retrospective series, the incidence of malignant appendiceal neoplasms detected after appendectomy was low. While malignancy remains an uncommon finding in routine appendectomy specimens, the presence of clinically relevant neoplastic entities such as LAMN highlights the need for careful pathological evaluation. The findings emphasize that malignancy rates should be interpreted in light of patient age, clinical presentation, and study context. Further multicenter studies with larger cohorts may help to better define risk profiles and inform tailored diagnostic and follow-up strategies in patients undergoing appendectomy.

ETHICAL DECLARATIONS

Ethics Committee Approval

Approval for the study was obtained from the Scientific Researches Ethics Committee of Sincan Training and Research Hospital (Date: 27.10.2025, Decision No: SEAH-BAEK-2025-105).

Informed Consent

As this was a retrospective study, formal written informed consent was not required and was therefore not obtained.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Financial Disclosure

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Author Contributions

Concept: T.E.S., G.K.; Design: T.E.S., H.H.A.; Control: T.E.S., G.K.; Data collection and/or processing: T.E.S.; Analysis and/or interpretation: T.E.S., G.K.; Literature review: T.E.S., H.H.A.; Article writing: T.E.S., G.K.; Critical review: All authors.

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Predictors of length of hospital stay after endoscopic transnasal pituitary surgery: a 5-year single-center retrospective analysis

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ABSTRACT

Aims: To identify clinical, radiological, surgical, and postoperative factors associated with prolonged hospitalization following endoscopic transnasal/transsphenoidal pituitary surgery in a single tertiary neurosurgical center.

Methods: This retrospective observational cohort study included 40 patients who underwent endoscopic transnasal/transsphenoidal pituitary surgery between January 2020 and December 2024. Demographic, clinical, radiological, surgical, and postoperative data were collected from electronic medical records. Length of hospital stay was analyzed as a continuous variable and dichotomized based on the cohort median to define prolonged hospitalization. Variables that were significant or near-significant in univariate analyses were included in multivariable logistic regression models to identify independent predictors of prolonged hospital stay.

Results: A total of 40 patients were analyzed. Length of hospital stay did not follow a normal distribution, with a median length of stay of 8 days. In univariate analyses, suprasellar extension, postoperative cerebrospinal fluid leakage, and postoperative meningitis were significantly associated with prolonged hospital stay. Due to the strong clinical association between cerebrospinal fluid leakage and meningitis, these variables were not included together in the same multivariable model. After adjustment for Knosp grade, suprasellar extension remained an independent predictor of prolonged hospital stay (odds ratio: 11.1; 95% confidence interval: 1.03-119.5; $p=0.04$).

Conclusion: Suprasellar extension is an independent determinant of prolonged hospital stay following endoscopic transnasal/transsphenoidal pituitary surgery. Preoperative radiological assessment may assist in anticipating postoperative care requirements and optimizing perioperative management strategies.

Keywords: Pituitary adenoma, endoscopic transnasal surgery, transsphenoidal surgery, length of hospital stay, suprasellar extension

INTRODUCTION

Pituitary adenomas account for approximately 10-15% of all primary intracranial tumors and represent a common pathology of the central nervous system.¹ Although typically benign, these tumors may cause significant neurological and endocrine morbidity due to mass effect, hormonal hypersecretion, hypopituitarism, or, less commonly, pituitary apoplexy. Except for prolactinomas, surgical resection remains the primary treatment modality for most pituitary adenomas.

Transsphenoidal surgery has long been considered the standard surgical approach for pituitary adenomas. Over the past two decades, endoscopic transnasal transsphenoidal techniques have largely replaced microscopic approaches.^{2,3} Endoscopic surgery provides a wider field of view, improved access to parasellar and suprasellar regions, and comparable or lower complication rates. Consequently, endoscopic transnasal transsphenoidal surgery is widely accepted as a

safe and effective technique for the surgical management of pituitary adenomas.⁴

Despite advances in surgical technique and perioperative care, postoperative complications such as cerebrospinal fluid leakage, meningitis, electrolyte disturbances, and diabetes insipidus remain clinically relevant. LOS reflects not only the occurrence of postoperative complications but also overall quality of care, efficiency of perioperative management, and healthcare resource utilization.⁵

Previous studies have evaluated factors associated with prolonged hospitalization after endoscopic pituitary surgery; however, reported results regarding the relative impact of radiological tumor characteristics and postoperative complications remain heterogeneous.⁶⁻⁸ In addition, data derived from single-center cohorts outside high-volume referral institutions are limited. Recent data from 2025 suggests

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that the definition of "prolonged" stay itself can alter which risk factors appear significant.⁹ Furthermore, understanding local predictors is essential for implementing "Enhanced Recovery After Surgery" (ERAS) protocols effectively.¹⁰

Therefore, this study aimed to identify factors associated with prolonged hospital stay in patients undergoing endoscopic transnasal transsphenoidal pituitary surgery.

METHODS

The study was conducted with the permission of the Ankara Bilkent City Hospital Medical Research Scientific Researches Ethics Committee (Date: 12/24/2025, Decision No: TABED2/1774/2025). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.¹¹

This study was designed as a single-center retrospective observational cohort study. Adult patients who underwent endoscopic transnasal transsphenoidal surgery for pituitary adenoma between January 2020 and December 2024 were retrospectively reviewed.

Patients aged 18 years or older with histopathologically confirmed pituitary adenoma who underwent endoscopic transnasal transsphenoidal surgery were included. Patients with incomplete medical records, pediatric patients, those who underwent transcranial or combined approaches, and revision surgeries following primary procedures performed at other institutions were excluded.

Demographic data, clinical presentation, radiological tumor characteristics, surgical details, and postoperative complications were obtained from electronic medical records and radiological databases. Radiological evaluation included tumor size, presence of suprasellar extension (defined as tumor extension above the diaphragma sellae), and cavernous sinus invasion assessed according to the Knosp classification. Knosp grades were dichotomized as low grade (0-2) and high grade (3-4) for analysis.

Postoperative diabetes insipidus was defined according to established clinical criteria, including polyuria with associated laboratory abnormalities and the need for desmopressin or fluid replacement therapy.¹² Hyponatremia was defined as a serum sodium concentration below 135 mEq/L.¹³ Postoperative cerebrospinal fluid leakage was identified based on clinical rhinorrhea with or without biochemical confirmation. Postoperative meningitis was diagnosed based on clinical findings and laboratory evaluation.

The primary outcome measure was LOS, defined as the number of days from the day of surgery to discharge, inclusive. Length of stay was analyzed as a continuous variable and dichotomized according to the cohort median (>8 days) due to non-normal distribution.

Statistical analyses were performed using IBM SPSS Statistics software. Normality of continuous variables was assessed using the Shapiro-Wilk test. Continuous variables were presented as mean±standard deviation or median with range, as appropriate. Categorical variables were expressed as counts and percentages. Group comparisons were performed using Student's t test, Mann-Whitney U test, chi-square

test, or Fisher's exact test, as appropriate. Variables with a p value less than 0.10 in univariate analyses were entered into multivariable logistic regression models. To avoid model instability and collinearity, postoperative cerebrospinal fluid leakage and meningitis were not included together in the same multivariable model. Results were reported as odds ratios (OR) with 95% confidence intervals (CI). A p value less than 0.05 was considered statistically significant.

RESULTS

A total of 40 patients were included in the analysis. The mean age was 54.4±13.5 years, and 60% of patients were male. The mean tumor diameter was 20.9±7.1 mm. Suprasellar extension was present in 77.5% of patients. According to the Knosp classification, 62.5% of patients had low-grade and 37.5% had high-grade cavernous sinus invasion.

LOS ranged from 3 to 23 days, with a median of 8 days. In univariate analyses, suprasellar extension, postoperative cerebrospinal fluid leakage, and postoperative meningitis were significantly associated with prolonged hospital stay (Table 1, Table 2). In multivariable logistic regression analysis, after adjustment for Knosp grade, suprasellar extension remained an independent predictor of prolonged hospital stay (OR: 11.1; 95% CI: 1.03-119.5; p=0.04) (Table 3).

Table 1. Demographic, clinical, and surgical characteristics of the study cohort (n=40)

| Characteristic | Value |
|-------------------------------------|------------|
| Age (years) | |
| Mean±SD | 54.4±13.6 |
| Range (minimum-maximum) | 24-82 |
| Gender, n (%) | |
| Male | 24 (60.0%) |
| Female | 16 (40.0%) |
| Comorbidities, n (%) | |
| Present | 20 (50.0%) |
| Absent | 20 (50.0%) |
| Tumor characteristics | |
| Maximum diameter (mm), mean±SD | 20.9±7.1 |
| Tumor functionality, n (%) | |
| Functional | 20 (50.0%) |
| Non-functional | 20 (50.0%) |
| Suprasellar extension, n (%) | |
| Present | 31 (77.5%) |
| Absent | 9 (22.5%) |
| Knosp grade, n (%) | |
| Low grade (0-2) | 25 (62.5%) |
| High grade (3-4) | 15 (37.5%) |
| Surgical data, n (%) | |
| Intraoperative CSF leak | 4 (10.0%) |
| Reconstruction technique | |
| Nasoseptal flap | 28 (70.0%) |
| Graft/none | 12 (30.0%) |
| Length of stay (days) | |
| Median (range) | 8.0 (3-23) |

SD: Standard deviation, CSF: Cerebrospinal fluid

Table 2. Univariable analysis of factors associated with length of stay

| Variable | n | Median LOS (days) | p-value |
|----------------------------------|----|-------------------|---------|
| Gender | | | 0.17 |
| Male | 24 | 8.0 | |
| Female | 16 | 8.5 | |
| Comorbidities | | | 0.31 |
| Present | 20 | 8.5 | |
| Absent | 20 | 8.0 | |
| Tumor functionality | | | 0.18 |
| Functional | 20 | 8.0 | |
| Non-functional | 20 | 9.0 | |
| Suprasellar extension | | | 0.02* |
| Present | 31 | 9.0 | |
| Absent | 9 | 5.0 | |
| Knosp grade | | | 0.98 |
| Low grade (0-2) | 25 | 8.0 | |
| High grade (3-4) | 15 | 8.0 | |
| Intraoperative CSF leak | | | 0.24 |
| Present | 4 | 10.5 | |
| Absent | 36 | 8.0 | |
| Reconstruction technique | | | 0.12 |
| Nasoseptal flap | 28 | 8.5 | |
| Graft/none | 12 | 7.0 | |
| Postoperative diabetes insipidus | | | 0.37 |
| Present | 3 | 10.0 | |
| Absent | 37 | 8.0 | |
| Postoperative hyponatremia | | | 0.32 |
| Present | 3 | 11.0 | |
| Absent | 37 | 8.0 | |
| Postoperative CSF leak | | | 0.01* |
| Present | 4 | 14.5 | |
| Absent | 36 | 8.0 | |
| Postoperative meningitis | | | 0.02* |
| Present | 3 | 16.0 | |
| Absent | 37 | 8.0 | |

*LOS: Length of stay, CSF: Cerebrospinal fluid. Statistical significance tested using Mann-Whitney U test. p<0.05 indicates statistical significance

Table 3. Multivariable logistic regression analysis for predictors of prolonged hospital stay

| Variable | OR | 95% CI | p-value |
|-----------------------|------|------------|---------|
| Suprasellar extension | 11.1 | 1.03-119.5 | 0.04* |
| Knosp grade | 3.57 | 0.78-16.6 | 0.10 |

*Dependent variable: Prolonged length of stay (>median of 8 days). The Odds Ratio (OR) indicates the likelihood of prolonged stay compared to the reference group. p<0.05 indicates statistical significance, OR: Odds ratio, CI: Confidence interval

DISCUSSION

The primary objective of this 5-year retrospective analysis was to identify the determinants of hospital LOS following endoscopic transnasal pituitary surgery in a tertiary referral center. Our most significant finding is that suprasellar extension serves as the strongest independent predictor of prolonged hospitalization. The association between suprasellar extension and prolonged hospital stay may be attributed to increased surgical complexity and the need for more cautious postoperative monitoring, even in the absence of overt complications. Tumors with suprasellar extension often

require extensive arachnoid dissection and diaphragmatic manipulation, prompting closer observation for potential delayed cerebrospinal fluid leakage, visual changes, or hypothalamic dysfunction. This contrasts with a substantial body of literature that prioritizes postoperative endocrine dysfunction as the main driver of delayed discharge.^{6,7} Our results suggest that in developing centers with standardized endocrine protocols, the "anatomical burden" of the tumor dictates the recovery trajectory more than physiological variables.

The association between suprasellar extension and prolonged LOS (OR: 11.1) can be explained by several surgical and perioperative factors. Tumors extending into the suprasellar cistern often necessitate wider arachnoid dissection and manipulation of the diaphragma sellae to achieve gross total resection.¹⁴ Even in the absence of an overt intraoperative cerebrospinal fluid (CSF) leak, surgeons tend to adopt a more cautious postoperative observation strategy for these patients due to the theoretical risk of delayed occult leaks or tension pneumocephalus.⁴ Furthermore, patients with significant suprasellar extension require more intensive visual field monitoring and are at higher risk for transient hypothalamic dysfunction, which may subtly influence discharge decision-making even if not capturing strictly defined complication criteria.⁹ Guerra et al.¹⁵ recently demonstrated that tumor characteristics, particularly those affecting surgical complexity such as suprasellar extension, were significantly associated with early versus late discharge patterns in pituitary adenoma patients undergoing endoscopic endonasal surgery, supporting our findings regarding the primacy of anatomical factors in determining length of stay.

Interestingly, neither diabetes insipidus (DI) nor hyponatremia emerged as significant predictors of LOS in our cohort. This finding diverges from the results of Vimawala et al.⁶ and Bohl et al.,⁷ who identified these complications as major contributors to delayed discharge. This finding may be explained by the presence of a well-coordinated perioperative endocrine management strategy at our institution, supported by close collaboration between neurosurgery and endocrinology teams in both the preoperative and postoperative periods. Early recognition and prompt ward-based management of fluid-electrolyte disturbances may mitigate their impact on discharge timing, even when such complications occur. More recently, Devarajan et al.¹⁶ in a large single-center cohort of 310 patients similarly found that postoperative DI (p<0.01) was a significant predictor of prolonged length of stay, with a median stay of 54.9 hours in their series. We attribute this discrepancy to our institution's aggressive, ward-based management protocol for fluid-electrolyte disturbances. By enabling the administration of oral desmopressin and hypertonic saline in a non-ICU setting, we prevent the administrative delays often associated with endocrine monitoring. This supports the hypothesis by Gurses et al.¹⁷ that optimized outpatient-focused care pathways can mitigate the impact of clinical complications on discharge timing.

Consistent with Shimanskaya et al.,¹⁸ we found that postoperative CSF leak and meningitis were associated with the longest hospital stays (median 14.5 and 16.0 days, respectively). These complications invariably trigger a cascade of resource-intensive interventions, including lumbar drainage, prolonged bed rest, and intravenous antibiotic courses. Although the incidence of these complications

was low in our series, their profound impact on LOS underscores the critical importance of meticulous skull base reconstruction. The use of vascularized nasoseptal flaps in high-risk patients (suprasellar extension) is a key strategy to minimize these outlier events.

The concept of ERAS is gaining traction in skull base surgery. Recent data from Arnaout et al.¹⁰ demonstrated that structured ERAS protocols could reduce the mean LOS to 2.7 days. Our median LOS of 8.0 days indicates a potential for improvement. While our discharge timing reflects the cautious approach of a developing center, the lack of significance for endocrine factors suggests that we are clinically ready to adopt more aggressive ERAS pathways. Future protocols targeting "early mobilization" specifically for patients with suprasellar extension could help bridge the gap between our current practice and high-volume centers.

Limitations

This study is limited by its retrospective design and the sample size of 40 patients, which resulted in wide CI for the odds ratios. Additionally, we did not account for the "learning curve" effect, which Kabil et al.³ suggest can influence complication rates over time. Furthermore, our definition of prolonged LOS (>8 days) differs from some contemporary studies using >4 days (e.g., Vimawala et al.⁶) or varying thresholds as noted by Shah et al.,⁹ which may limit direct comparisons. Nevertheless, our data provides a valuable "real-world" perspective on the factors influencing discharge in a non-high-volume setting.

CONCLUSION

Suprasellar extension is a robust and independent predictor of prolonged hospital stay following endoscopic transnasal pituitary surgery in our practice, overshadowing the impact of endocrine complications. While surgical complications such as CSF leak naturally extend hospitalization, they are less frequent than the routine delays caused by the observation of anatomically complex tumors. Our findings suggest that preoperative identification of suprasellar extension should trigger "pre-emptive" discharge planning.¹⁹ Furthermore, the successful ward-based management of endocrine issues in our cohort supports the feasibility of implementing future ERAS protocols to safely reduce length of stay even in complex cases.

Further large-scale, multi-center prospective studies are warranted to validate these findings and to establish standardized discharge criteria for anatomically complex pituitary adenomas.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was conducted with the permission of the Ankara Bilkent City Hospital Medical Research Scientific Researches Ethics Committee (Date: 12/24/2025, Decision No: TABED2/1774/2025).

Informed Consent

As this was a retrospective study, formal written informed consent was not required and was therefore not obtained.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

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Author Contributions

Concept: Y.Ü.; Design: Y.Ü.; Control: M.Ö.Ö. Y.Ü.; Data collection and/or processing: A.Y. Y.Ü.; Analysis and/or interpretation: M.Ö. Y.Ü.; Literature review: M.Ö. Y.Ü.; Article writing: M.Ö. Y.Ü.; Critical review: M.Ö.Ö. Y.Ü.;

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Diagnostic value of routine preoperative esophagogastroduodenoscopy and concordance with sleeve gastrectomy specimen histopathology: a single-center retrospective study

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ABSTRACT

Aims: The role of routine preoperative esophagogastroduodenoscopy (EGD) before laparoscopic sleeve gastrectomy (LSG) remains controversial. Although EGD may identify clinically relevant pathology that influences surgical planning, its routine use and concordance with postoperative histopathological findings continue to be debated. The aim of this study was to evaluate the diagnostic yield of preoperative EGD and its concordance with sleeve gastrectomy specimen histopathology.

Methods: This retrospective, single-center observational study included adult patients who underwent primary LSG between January 2017 and June 2025 and had both preoperative EGD (with endoscopic biopsy when performed) and postoperative sleeve gastrectomy specimen histopathology available. Preoperative endoscopic findings, endoscopic biopsy results when performed, and final specimen histopathology were analyzed descriptively to assess diagnostic yield and preoperative-postoperative concordance.

Results: A total of 305 patients were included. Preoperative EGD identified reflux esophagitis in 17.4% of patients and hiatal hernia in 3.9%. Endoscopic biopsy was performed in 37.4% of patients, with *Helicobacter pylori* (*H. pylori*) detected in 50.9% of biopsied cases. In contrast, *H. pylori* positivity in sleeve gastrectomy specimens was markedly lower (12.1%). No dysplasia or malignancy was identified in either preoperative biopsy specimens or postoperative sleeve gastrectomy specimens. Intestinal metaplasia was rare in surgical specimens (0.7%).

Conclusion: Preoperative EGD may contribute to safer surgical planning in patients undergoing LSG by identifying reflux-related pathology that can influence operative decisions. However, the rarity of high-grade premalignant or malignant lesions in this cohort does not support a universal requirement for routine EGD or postoperative histopathological examination in all patients. A selective, risk-adapted approach to preoperative EGD, together with standardized management of *H. pylori*, appears to represent a balanced strategy, while the role of specimen histopathology as a potential safety measure should be considered according to institutional patient profiles and available resources.

Keywords: Obesity, upper gastrointestinal diseases, endoscopy, *H. pylori*, gastritis, bariatric procedures

INTRODUCTION

Obesity is a major global health problem associated with substantial increases in morbidity and premature mortality.¹ Bariatric surgery is widely recognized as the most effective long-term treatment for achieving sustained weight loss and meaningful improvement in obesity-related comorbidities.^{2,3} Among bariatric procedures, laparoscopic sleeve gastrectomy (LSG) is currently the most commonly performed operation worldwide.⁴

Despite the well-established benefits of laparoscopic sleeve gastrectomy, the optimal strategy for preoperative evaluation remains a matter of ongoing debate, particularly with respect to the routine use of esophagogastroduodenoscopy (EGD). While several guidelines and expert panels advocate a selective, symptom-based approach to preoperative endoscopic assessment,⁵⁻⁷ others support routine EGD to detect clinically

relevant upper gastrointestinal pathology that may otherwise remain unrecognized and potentially influence surgical planning.⁸⁻¹⁰

The rationale for routine EGD is largely based on the reported high prevalence of upper gastrointestinal abnormalities in obese patients, even in the absence of gastrointestinal symptoms.⁶ In line with these findings, reliance on symptoms alone appears insufficient to predict endoscopic abnormalities, as a substantial proportion of asymptomatic patients are found to have gastritis, esophagitis, hiatal hernia, or *Helicobacter pylori* (*H. pylori*) infection on preoperative evaluation.^{6,11} At the same time, the majority of abnormalities detected on routine EGD are mild and infrequently lead to changes in surgical management, raising questions regarding the clinical utility and cost-effectiveness of universal screening.^{10,12}

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This debate acquires an additional, procedure-specific dimension in LSG, as the resected stomach is routinely available for histopathological evaluation. Published series have demonstrated that sleeve specimens may reveal unexpected findings, most commonly chronic gastritis, less frequently premalignant lesions such as intestinal metaplasia, and only rarely malignant pathology.^{13,14} Notably, a subset of these lesions may escape detection on preoperative endoscopy, highlighting a potential discordance between endoscopic findings and histopathological assessment of the resected specimen.^{13,14} Although upper gastrointestinal malignancies are rare among candidates for bariatric surgery, professional societies recognize the limited availability of high-quality evidence and therefore recommend an individualized approach that balances potential diagnostic benefit against procedural risks, costs, and resource utilization.^{5,10}

Given the limited number of studies directly comparing preoperative EGD findings with final sleeve gastrectomy specimen pathology in routine clinical practice, the aim of the present study was to evaluate the diagnostic value of routine preoperative EGD and its concordance with postoperative histopathological findings in a single-center cohort. By systematically analyzing endoscopic findings alongside definitive pathological results, we sought to better define the clinical yield of routine EGD and clarify its role in the preoperative assessment of patients undergoing laparoscopic sleeve gastrectomy.

METHODS

This retrospective study was reviewed and approved by the Gaziantep University Non-interventional Clinical Researches Ethics Committee (Date: 05.11.2025, Decision No: 2025/397). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

This retrospective, single-center observational study was conducted at the Department of General Surgery, Gaziantep University Şahinbey Research and Training Hospital. The study population consisted of adult patients who underwent primary LSG between January 2017 and June 2025 and had both preoperative upper gastrointestinal endoscopy and postoperative sleeve gastrectomy specimen histopathology available. No sampling was performed. All consecutive patients who met the predefined eligibility criteria during the study period were included in the analysis.

Patients were included if they met all of the following criteria:

- Age between 18 and 65 years,
- Underwent primary laparoscopic sleeve gastrectomy,
- Had preoperative EGD performed,
- Had a complete postoperative sleeve gastrectomy specimen histopathology report available.

Patients were excluded if any of the following criteria were present:

- Incomplete or inaccurate clinical, endoscopic, or pathological data,
- Age <18 years or >65 years,
- Absence of preoperative EGD,

- Absence of postoperative histopathological examination of the sleeve gastrectomy specimen.

Study data were retrospectively obtained from the institutional Hospital Information Management System. Collected variables included demographic characteristics, comorbid conditions, preoperative endoscopic findings, endoscopic biopsy results when available, histopathological findings of sleeve gastrectomy specimens, and operative notes.

Preoperative upper gastrointestinal endoscopy findings were recorded for all included patients. Endoscopic biopsies were performed at the discretion of the endoscopist based on endoscopic findings. In practice, biopsies were generally obtained when visible pathological findings were present during endoscopy; however, beyond this context, no predefined or standardized biopsy protocol was applied, and biopsy decisions—including whether to assess *H. pylori* status—were made according to the individual endoscopist's clinical judgment. Patients with *H. pylori* positivity detected on preoperative endoscopic biopsy routinely received standard eradication therapy in accordance with institutional clinical practice. This management strategy represents the routine approach at our center and was applied before surgery when *H. pylori* infection was identified. All sleeve gastrectomy specimens were submitted for routine histopathological examination. Pathological assessment included evaluation for *H. pylori*, chronic and active gastritis, intestinal metaplasia, dysplasia, and malignancy.

Statistical Analysis

Data analyses were performed using IBM SPSS Statistics version 22.0 (IBM Corp., Armonk, NY, USA). The primary aim of the analysis was descriptive. Continuous variables were summarized as mean±standard deviation or median with interquartile range (IQR), depending on data distribution. Categorical variables were presented as frequencies and percentages. Endoscopic biopsy findings were analyzed only in patients who underwent biopsy, and percentages were calculated using the corresponding subgroup as the denominator. No imputation was performed for missing data. Given the descriptive nature of the study, no formal hypothesis testing or multivariable modeling was performed.

RESULTS

A total of 305 adult patients who underwent primary sleeve gastrectomy were included in the study. The cohort was predominantly female (74.1%), with a median body mass index (BMI) of 44.5 kg/m² (IQR: 7.1) and most patients classified as American Society of Anesthesiologists (ASA) physical status II–III. Detailed baseline demographic and clinical characteristics of the study population are summarized in [Table 1](#).

Preoperative EGD identified reflux esophagitis in 53 patients (17.4%). Hiatal hernia was identified in 12 patients (3.9%), and duodenogastric (alkaline) reflux in 10 patients (3.3%). Gastritis was a frequent finding, most commonly involving the antrum (182 patients, 59.7%), followed by the corpus (61 patients, 20.0%), bulbus (31 patients, 10.2%), and fundus (25 patients, 8.2%). Multiple endoscopic findings could coexist in the same patient. Erosive gastritis and/or gastric ulcer was detected in 38 patients (12.5%). Gastric polyps were identified in 6 patients (2.0%), and duodenal ulcer in 15 patients (4.9%). No

Table 1. Baseline demographic and clinical characteristics of the patients (n=305)

| Variable | Value |
|--------------------------------------|--|
| Age, years | Median: 33 (IQR: 17); Mean±SD: 34.0±10.9; Range: 18-64 |
| Sex | |
| Female | 226 (74.1%) |
| Male | 79 (25.9%) |
| BMI (kg/m²) | Median: 44.5 (IQR: 7.1); Mean±SD: 45.8±6.5; Range: 35.9-77.4 |
| ASA score | |
| ASA I | 3 (1.0%) |
| ASA II | 85 (27.9%) |
| ASA III | 217 (71.1%) |
| Smoking status | |
| Non-smoker | 181 (59.3%) |
| Smoker | 124 (40.7%) |
| Length of hospital stay, days | Median: 5 (IQR: 1); Mean±SD: 4.89±1.26; Range: 4-15 |
| Any comorbidity, n (%) | 124 (40.7%) |

BMI: Body-mass index, ASA: American Society of Anesthesiologists, SD: Standard deviation, IQR: Interquartile range

fundal varices or findings suggestive of portal hypertension were observed. Endoscopic biopsy was performed in 114 patients (37.4%). Detailed preoperative endoscopic findings are presented in [Table 2](#).

Table 2. Preoperative endoscopic findings (n=305)

| Endoscopic finding | n | % |
|---|-----|------|
| Reflux esophagitis | 53 | 17.4 |
| Lower esophageal sphincter laxity | 16 | 5.2 |
| Hiatal hernia | 12 | 3.9 |
| Duodenogastric (alkaline) reflux | 10 | 3.3 |
| Antral gastritis | 182 | 59.7 |
| Corpus gastritis | 61 | 20.0 |
| Fundus gastritis | 25 | 8.2 |
| Bulbus gastritis | 31 | 10.2 |
| Erosive gastritis or gastric ulcer | 38 | 12.5 |
| Gastric polyp | 6 | 2.0 |
| Duodenal ulcer | 15 | 4.9 |
| Fundal varices/portal hypertension findings | 0 | 0.0 |
| Endoscopic biopsy performed | 114 | 37.4 |

Among the 114 patients who underwent endoscopic biopsy, *H. pylori* was detected in 58 patients (50.9%). Chronic gastritis was identified in 82 patients (71.9%), while active gastritis was present in 59 patients (51.8%). Atrophic gastritis was detected in 4 patients (3.5%). Intestinal metaplasia was identified in 7 patients (6.1%). Hyperplastic polyps were identified in 2 patients (1.8%). Importantly, no dysplasia or malignancy was identified in any endoscopic biopsy specimen. Endoscopic biopsy findings are summarized in [Table 3](#).

Histopathological evaluation of sleeve gastrectomy specimens was available for all 305 patients. *H. pylori* positivity was identified in 37 specimens (12.1%). Chronic gastritis was observed in 145 patients (47.5%), whereas active inflammation was present in 17 patients (5.6%). Intestinal metaplasia was

Table 3. Endoscopic biopsy findings (n=114)

| Variable | Value |
|---------------------------------------|-------------|
| Endoscopic biopsy performed | 114 (37.4%) |
| <i>Helicobacter pylori</i> positivity | 58 (50.9%) |
| Chronic gastritis | 82 (71.9%) |
| Active gastritis | 59 (51.8%) |
| Atrophic gastritis | 4 (3.5%) |
| Intestinal metaplasia | 7 (6.1%) |
| Malignancy | 0 (0.0%) |
| Dysplasia (any grade) | 0 (0.0%) |
| Polyp type: hyperplastic | 2 (1.8%) |

detected in 2 specimens (0.7%). No cases of atrophic gastritis, dysplasia, polyp, neoplasia, or malignancy were identified in any surgical specimen. Lymphoid aggregates were observed in 4 patients (1.3%). Specimen pathology findings are detailed in [Table 4](#).

Table 4. Sleeve gastrectomy specimen pathology findings (n=305)

| Pathological finding | n | % |
|---------------------------------------|-----|------|
| <i>Helicobacter pylori</i> positivity | 37 | 12.1 |
| Chronic gastritis | 145 | 47.5 |
| Active inflammation | 17 | 5.6 |
| Atrophic gastritis | 0 | 0.0 |
| Intestinal metaplasia | 2 | 0.7 |
| Dysplasia | 0 | 0.0 |
| Polyp/neoplasia | 0 | 0.0 |
| Lymphoid aggregates | 4 | 1.3 |
| Malignancy | 0 | 0.0 |

Across the entire cohort, no dysplasia or malignancy was identified in either preoperative endoscopic biopsy specimens or sleeve gastrectomy specimens.

DISCUSSION

Although the routine versus selective use of preoperative EGD before bariatric surgery remains controversial, the clinical relevance of reflux-related pathology appears to be more pronounced in patients scheduled for sleeve gastrectomy. In the IFSO Endoscopy Task Force position statement, Brown et al.¹² report that the existing literature demonstrates a non-negligible rate of unexpected upper gastrointestinal findings even among asymptomatic patients. The authors further emphasize that a more liberal use of preoperative EGD may be justified, particularly in patients planned for sleeve gastrectomy or one-anastomosis gastric bypass, and that endoscopic surveillance at defined intervals after sleeve gastrectomy should be considered. In our own series, the presence of hiatal hernia and esophagitis in our cohort supports the notion that the absence of symptoms does not reliably exclude clinically relevant pathology. These findings suggest that, at least in candidates for sleeve gastrectomy, preoperative EGD may provide clinically relevant information by informing surgical decision-making and guiding concomitant interventions, such as hiatal hernia repair or preoperative medical optimization.

The shared rationale of studies supporting routine preoperative EGD is the potential to identify clinically relevant

findings that may influence surgical decision-making even in asymptomatic patients, while symptom-based selection alone may fail to detect certain important lesions. Chang et al.¹⁵ reported that routine preoperative upper gastrointestinal endoscopy resulted in a change in the planned surgical procedure in 18.4% of patients. When Barrett's esophagus was identified, the choice of bariatric procedure was frequently influenced in favor of gastric bypass rather than sleeve gastrectomy. Importantly, the authors also demonstrated that symptom-based screening alone may fail to detect Barrett's esophagus, as its prevalence did not differ significantly between symptomatic and asymptomatic patients. Similarly, Praveenraj et al.¹⁶ showed that although routine preoperative endoscopy did not alter the planned bariatric procedure in the majority of cases, it led to postponement of surgery or a change in surgical approach in approximately 11-12% of patients. Owing to the lack of correlation between symptoms and clinically meaningful endoscopic findings, the authors suggested that a routine preoperative endoscopic evaluation may be considered even in the absence of symptoms. Taken together, this body of evidence helps contextualize clinical decision-making, particularly in candidates for sleeve gastrectomy, in whom reflux-related pathology and Barrett's esophagus remain clinically relevant considerations.

Conversely, studies supporting a selective approach emphasize that even when the prevalence of endoscopic findings is relatively high, the proportion of lesions that meaningfully alter clinical management may remain limited, with considerations of resource utilization becoming increasingly relevant. Salama et al.¹⁷ emphasized that in large LSG series, routine preoperative esophagogastroduodenoscopy (EGD) did not alter surgical management in the vast majority of asymptomatic patients, while its clinical impact appeared to be mainly confined to symptomatic patients or specific subgroups. The authors also highlighted that upper gastrointestinal malignancy was exceedingly rare in this setting.

Similarly, in an adolescent and young adult population, Ogle et al.¹⁸ reported that routine preoperative EGD most commonly revealed normal or only mild abnormalities, with findings rarely leading to changes in surgical or medical management. Based on the low yield of clinically actionable pathology in this age group, the authors suggested that a selective preoperative endoscopic approach may be more rational than routine screening. Elkin et al.¹⁴ reported that clinically significant gastric pathology may be identified on bariatric surgical specimens. Taken together with the broader literature, these observations suggest that the identification of such findings alone does not necessarily justify universal routine preoperative EGD for all patients, but rather supports the consideration of individualized, risk-based selective strategies. In parallel, Zidan et al.¹⁹ highlighted that real-world EGD utilization is often selective and may be influenced by institutional and economic constraints. From this perspective, our findings-demonstrating the absence of malignancy or dysplasia and a very low burden of premalignant lesions-appear to be consistent with such selective practice patterns.

The ability of preoperative endoscopy to anticipate reflux-related outcomes after sleeve gastrectomy represents a distinct area of discussion. Bellorin et al.²⁰ reported that approximately 17% of patients developed gastroesophageal reflux disease (GERD) after primary sleeve gastrectomy and

demonstrated that esophagitis identified on preoperative endoscopy-including in asymptomatic patients-was an independent predictor of postoperative GERD. The authors further emphasized that symptom-based selection alone may fail to identify patients at increased risk. This key message underscores that preoperative EGD may serve not only to detect malignant pathology but also to facilitate a more informed preoperative risk stratification and management of post-sleeve reflux risk. In line with this perspective, the observed prevalence of esophagitis and the presence of hiatal hernia in our cohort further supports the potential clinical value of EGD, when considered in the context of sleeve gastrectomy suitability and concomitant operative planning.

Heiat et al.²¹ compared preoperative endoscopic biopsy histopathology with postoperative sleeve gastrectomy specimens and reported that the negative predictive value of preoperative EGD for detecting *H. pylori* infection, gastritis, metaplasia, and atrophy was 95%, 79%, 93%, and 98%, respectively. However, when all pathological entities were considered together, the overall negative predictive value declined to 53.4%. Notably, moderate gastritis and focal intestinal metaplasia were significantly underdiagnosed on preoperative assessment ($p < 0.001$), highlighting that even when endoscopy is performed preoperatively, inherent sampling limitations and the patchy distribution of gastric mucosal pathology may lead to missed inflammatory or focal premalignant changes.

In a large single-center series, Owen et al.²² reported that 5.4% of patients undergoing sleeve gastrectomy exhibited clinically significant or potentially clinically significant postoperative pathological findings, excluding *H. pylori*. Autoimmune metaplastic atrophic gastritis (AMAG) was identified in 2.3% of patients, a notable finding given its association with a 3-5-fold increased risk of gastric cancer. Importantly, all cases of AMAG and intestinal metaplasia that were diagnosed preoperatively were identified through gastric body biopsies, indicating that antral-only sampling may be insufficient to detect selected premalignant conditions. Furthermore, the lack of preoperative detection of submucosal lesions, including gastrointestinal stromal tumors and gastric adenocarcinoma, supports the view that postoperative histopathological examination of the sleeve specimen may serve as an additional diagnostic safeguard, particularly in settings where preoperative endoscopic evaluation or biopsy sampling is limited.

The clinical value of routine postoperative histopathological examination has largely been discussed in the context of rare but potentially high-impact findings. Alessandris et al.¹³ reported an incidental neoplasia rate of 2.4% in a consecutive series of 501 sleeve gastrectomy patients, with a substantial proportion of these lesions being detected exclusively on specimen histopathology rather than on preoperative endoscopy. Taken together, these observations suggest that the combined use of preoperative upper gastrointestinal endoscopy and postoperative histopathological examination may represent a more comprehensive strategy to minimize the risk of missed clinically relevant pathology, particularly in the setting of lesions that may escape detection during preoperative assessment. Similarly, Di Palma et al.²³ demonstrated that while many sleeve gastrectomy specimens show no clinically significant abnormalities, a small but clinically meaningful subset harbors unexpected histopathological findings that

require changes in postoperative management or follow-up. Importantly, although a selective preoperative endoscopic approach was associated with a lower proportion of such unexpected diagnoses, it did not completely eliminate them, highlighting that postoperative histopathological examination of the sleeve specimen may retain residual diagnostic value even when preoperative endoscopy is selectively applied.

Against this background, our findings indicate that while postoperative histopathological examination of sleeve gastrectomy specimens may provide an additional diagnostic safeguard—particularly for rare or submucosal lesions that can escape preoperative assessment—the overall clinical yield of actionable pathology appears limited in routine practice. In our cohort, no malignancy or dysplasia was identified, suggesting that the incremental diagnostic benefit of routine postoperative histopathology may be modest in unselected sleeve gastrectomy populations. These results support a balanced interpretation in which postoperative specimen analysis is recognized as a complementary, rather than universally mandatory, component of pathological evaluation, particularly when preoperative endoscopy and clinical assessment are selectively and appropriately applied.

Conversely, a large single-center series from a high-volume United Kingdom bariatric unit, together with a contemporaneous systematic review, suggests that the clinical yield of routine histopathological examination may be limited, particularly in LSG specimens that appear macroscopically normal. In this cohort, no pathological abnormality was identified on histology in 90.4% of 404 sleeve gastrectomy specimens, and even within the small subset of macroscopically normal specimens harboring incidental pathology (approximately 2-3%), no changes in patient management were observed. Furthermore, the accompanying systematic review encompassing 26,670 patients published between 2013 and 2023 demonstrated exceedingly low rates of rare malignancy, with comparable prevalences of incidental pathology between series that did and did not perform routine preoperative endoscopy. Based on these findings, the authors recommended a selective histopathological approach limited to specimens demonstrating macroscopic abnormalities.²⁴

In contrast, the absence of dysplasia or malignancy in our own series suggests that the clinical yield of routine postoperative histopathological examination may vary according to each institution's patient profile and pathological assessment protocols. Accordingly, conclusions should be framed within a balanced perspective rather than as a mandate for universal routine practice. Although neoplastic findings are rare, their potential clinical impact when missed is substantial; therefore, decisions regarding routine histopathological evaluation should be considered in conjunction with local risk profiles, patient age distribution, access to preoperative endoscopy, and the associated pathological workload and cost.

From the perspective of *H. pylori* infection and inflammatory findings, our data highlight an important practical consideration. While the prevalence of *H. pylori* positivity was relatively high in the preoperative biopsy group, this rate declined markedly in postoperative sleeve gastrectomy specimens. Di Palma et al.²⁵ reported that preoperative *H. pylori* screening and eradication reduced the prevalence of *H. pylori* detected in sleeve gastrectomy specimens; however, this strategy did not significantly influence postoperative

morbidity. The authors further suggested that the routine clinical value of preoperative *H. pylori* screening may be limited, particularly in asymptomatic patients undergoing laparoscopic sleeve gastrectomy.

Similarly, in a small prospective series, Onzi et al.²⁶ observed no increase in gastric mucosal inflammation in the early period following sleeve gastrectomy. Instead, a trend toward improvement in inflammatory patterns was noted, which the authors suggested may be related, at least in part, to preoperative *H. pylori* eradication rather than to the surgical procedure itself. In our series, the pronounced difference between preoperative and postoperative *H. pylori* detection underscores that preoperative treatment and eradication strategies can directly influence histopathological concordance and the interpretation of follow-up findings. Accordingly, when inflammatory changes are used to assess preoperative-postoperative agreement or discordance, the impact of clinical management—particularly the administration of eradication therapy—should be explicitly taken into account.

When considered together, our findings point to two key clinical messages. First, preoperative EGD may enhance the safety of surgical planning—particularly in patients scheduled for sleeve gastrectomy—by identifying lesions such as reflux-related pathology, hiatal hernia, or esophagitis. This perspective is consistent with the IFSO position statement¹² as well as with series highlighting Barrett's esophagus and associated changes in surgical strategy.¹⁵

Second, the near absence of high-grade premalignant or malignant lesions in our cohort, together with their absence in resection specimens, does not in itself necessarily support a mandate for universal routine EGD or histopathological examination for all patients. A more pragmatic approach may involve a liberal yet selective EGD strategy in sleeve-dominant practice—one that clarifies indications based on risk profile, age, symptoms, endoscopic appearance, and biopsy criteria—alongside standardized management of *H. pylori*. Finally, given that rare neoplasms detectable only on specimen histopathology have been reported in the literature,¹³ the role of specimen examination as a potential "safety net" should be discussed in the context of each institution's patient profile.

Limitations

Several limitations of this study should be acknowledged. First, the single-center design may limit the generalizability of the findings to other institutions with different patient profiles, endoscopic practices, or pathological assessment protocols. Second, preoperative endoscopic biopsy was not performed in all patients, which may have resulted in histological prevalence estimates reflecting a selected patient population rather than the entire cohort, and the selective nature of preoperative biopsy sampling and the inherent methodological differences between focal endoscopic biopsies and whole sleeve gastrectomy specimens may have contributed to the observed discrepancies in inflammatory findings and *H. pylori* prevalence. Third, beyond sampling-related limitations, inflammatory findings identified preoperatively were frequently managed before surgery—most notably through *H. pylori* eradication—which inherently affects preoperative-postoperative histopathological concordance and limits direct comparability between biopsy and resection specimens. Accordingly, analyses based on inflammation-related parameters cannot be interpreted independently

of clinical interventions. Finally, the limited availability of long-term postoperative reflux symptoms and endoscopic follow-up data restricts a comprehensive assessment of the impact of preoperative EGD findings on long-term clinical outcomes. These limitations highlight the need for future prospective studies with standardized preoperative protocols and extended follow-up to further clarify the optimal role of endoscopic and histopathological evaluation in sleeve gastrectomy practice.

CONCLUSION

In conclusion, preoperative EGD may meaningfully support surgical planning in patients undergoing sleeve gastrectomy by identifying reflux-related pathology, including hiatal hernia and esophagitis, that can influence operative decisions. At the same time, the near absence of high-grade premalignant or malignant lesions in our cohort—both preoperatively and in resection specimens—does not justify a universal requirement for routine EGD or postoperative histopathological examination in all patients. A pragmatic approach favoring liberal yet selective use of preoperative EGD, guided by individual risk factors, age, symptoms, endoscopic appearance, and clearly defined biopsy indications, together with standardized management of *H. pylori*, appears more appropriate. Given that rare neoplasms detectable only on specimen histopathology have been reported, the role of postoperative specimen examination as a potential safety measure should be considered in the context of institutional patient profiles and available resources.

ETHICAL DECLARATIONS

Ethics Committee Approval

This study has been reviewed and approved by the Gaziantep University Non-interventional Clinical Researches Ethics Committee (Date: 05.11.2025, Decision No: 2025/397).

Informed Consent

As this was a retrospective study, formal written informed consent was not required and was therefore not obtained.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

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Author Contributions

Author contributions: L.Y., A.A., İ.B.; Design: L.Y.; Data collection and/or processing: L.Y.; Analysis and/or interpretation: L.Y.; Literature review: L.Y., A.A.; Article writing: L.Y.; Critical review: All authors.

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Primary cervical hydatid cyst presenting as a subcutaneous neck mass: ten-year recurrence-free outcome without albendazole

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ABSTRACT

Hydatid disease, caused by *Echinococcus granulosus*, predominantly involves the liver and lungs; primary soft-tissue involvement is exceedingly rare. Cervical localization accounts for <1% of all reported cases. Because of its atypical anatomical site and nonspecific clinical features, diagnosis is challenging, and the lesion may easily mimic benign cystic masses. We present a rare case of a primary hydatid cyst located in the left posterior cervical triangle (Level V) of a 41-year-old woman from an endemic rural region in Eastern Anatolia, Türkiye. The lesion was excised en bloc under local anesthesia, which was deemed appropriate due to its superficial position and limited size. Intraoperatively, a thick-walled cyst was identified within the subcutaneous plane. A focal pericystic breach was noted; however, the cyst was removed without spillage, and the operative field was irrigated with hypertonic saline. Histopathological evaluation confirmed a fertile hydatid cyst. Postoperative thoracoabdominal imaging and serological testing revealed no visceral involvement. Given the complete excision without contamination and the absence of systemic disease, postoperative albendazole therapy was not initiated. No recurrence was detected during a ten-year follow-up period. Hydatid disease should be considered in the differential diagnosis of cystic neck masses, particularly in patients from endemic areas. When feasible, meticulous excision without cyst rupture can result in a sustained disease-free outcome. Long-term clinical and radiological surveillance remains essential. In selected patients, complete excision of a primary cervical hydatid cyst without spillage may achieve long-term disease-free survival even without adjuvant albendazole therapy. Careful surgical technique and structured follow-up are critical for success.

Keywords: Hydatid cyst, *Echinococcus granulosus*, neck mass, posterior cervical triangle, case report

INTRODUCTION

Cystic echinococcosis (CE), also known as hydatid disease, is a zoonotic parasitic infection caused by the larval form of *Echinococcus granulosus*.¹ The disease remains a major public health concern in endemic regions such as the Mediterranean basin, the Middle East, South America, and parts of Asia and Africa.² Humans become accidental intermediate hosts through direct contact with infected dogs or consumption of food or water contaminated with parasite eggs.³

The liver (50-70%) and lungs (20-30%) constitute the primary target organs.⁴ Extrahepatic and extrapulmonary localizations are relatively uncommon, comprising only about 10% of all cases.⁵ Among these, soft-tissue and subcutaneous hydatid cysts are exceptionally rare, representing approximately 1-2% of reported cases.⁶ Primary subcutaneous hydatid cysts without concomitant visceral involvement are even rarer and are thought to arise from hematogenous or lymphatic dissemination of the embryos.⁷

Cervical hydatid disease constitutes an exceedingly uncommon form of extrahepatic involvement. The rich lymphatic and vascular drainage of the neck is believed to hinder larval implantation.⁸ Supraclavicular involvement,

particularly, is extremely rare, with only a limited number of cases reported in the literature.⁹ In this region, hydatid cysts may clinically resemble benign lesions such as lipoma, epidermoid cyst, branchial cleft cyst, or lymphadenopathy.¹⁰

Diagnosis is often challenging, especially in isolated soft-tissue disease, as serological tests may be negative due to low antigenic stimulation.⁷ Although ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI) can demonstrate characteristic cystic morphology, atypical cervical presentations may remain inconclusive.¹¹ Consequently, definitive diagnosis is frequently made intraoperatively and confirmed by histopathological examination.¹²

Despite isolated case reports, long-term outcomes of primary hydatid cysts located in the posterior cervical triangle (Level V) remain poorly documented, particularly in patients treated successfully with complete excision alone without adjuvant albendazole therapy. Herein, we present a rare case of a primary isolated subcutaneous hydatid cyst in the left posterior cervical triangle, excised without spillage under local anesthesia, with no recurrence observed during ten years of postoperative follow-up.

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CASE

A 41-year-old woman residing in a rural endemic area presented with a painless swelling in the left posterior cervical triangle that had gradually increased in size over the course of one year. She had no history of trauma, fever, weight loss, or chronic illness (Figure 1). The patient reported long-term contact with domestic and farm animals.

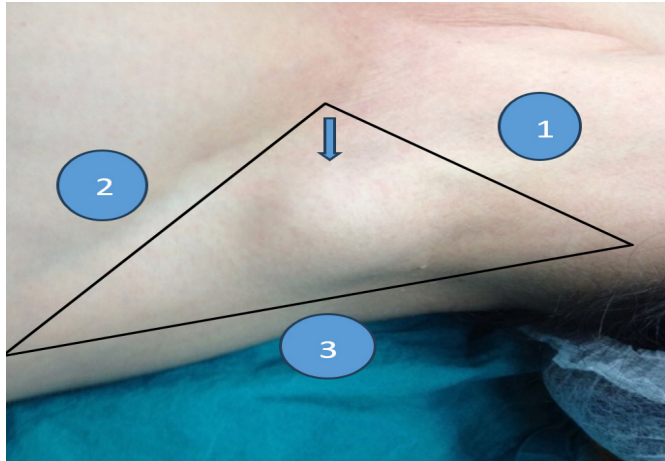


Figure 1. Preoperative appearance of a subcutaneous mass in the left posterior cervical triangle (1) Sternocleidomastoid muscle, (2) Clavicle, (3) Anterior border of the trapezius muscle. Hydatid cyst (indicated by arrow)

On physical examination, a well-defined, mobile, non-tender subcutaneous mass measuring approximately 5×3 cm was palpated in the left posterior cervical region. Routine laboratory findings were within normal limits. Because hydatid disease was not initially suspected, preoperative serologic testing was not performed. Ultrasonography demonstrated a well-circumscribed, anechoic cystic lesion measuring 32×23 mm.

Surgical excision was performed under local anesthesia. Intraoperatively, a thick-walled cyst was identified in the subcutaneous plane (Figure 2). During careful dissection, a minor pericystic breach of approximately 2 cm was observed; however, the cyst was removed without macroscopic spillage of daughter cysts or other cyst contents (Figure 3). The operative field was irrigated with 3% hypertonic saline to minimize the risk of contamination (Figure 4). In view of the complete excision, absence of visible spillage, and lack of systemic involvement, adjuvant medical therapy was deemed unnecessary.



Figure 2. Intraoperative view showing the opened pericystic layer during dissection under local anesthesia
Pericystic layer opened during dissection



Figure 3. Operative field after cyst excision showing the preserved external jugular vein and hypoglossal nerve
The cyst base showing the external jugular vein and hypoglossal nerve



Figure 4. Complete cyst excision without rupture or spillage of cystic contents
Intraoperative image showing complete cyst excision without rupture or spillage of daughter cysts or cyst fluid

Gross examination revealed a whitish laminated cyst wall, while histopathological evaluation confirmed a fertile hydatid cyst with laminated membrane and surrounding inflammatory reaction (Figures 5, 6, and 7). Postoperative thoracoabdominal imaging showed no additional lesions, and serological testing was negative for *Echinococcus* infection. Albendazole therapy was not administered.

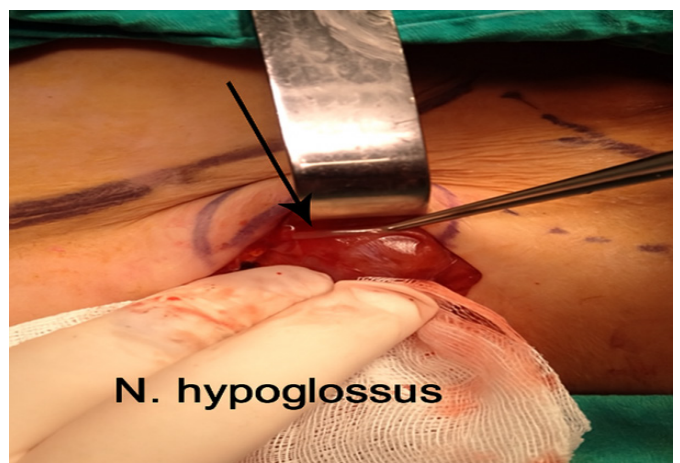


Figure 5. Intact pearly-white germinative membrane of the cyst with the hypoglossal nerve (arrow) visible on the surface
Intraoperative image showing intact germinative membrane and branch of the hypoglossal nerve (arrow)

The patient underwent postoperative follow-up with serology, ultrasonography, and clinical evaluation at 3, 6, 9, and 12 months, and annually thereafter. At the tenth year of follow-up, neck and hepatobiliary ultrasonography, chest radiography, and serological tests demonstrated no evidence of recurrence.

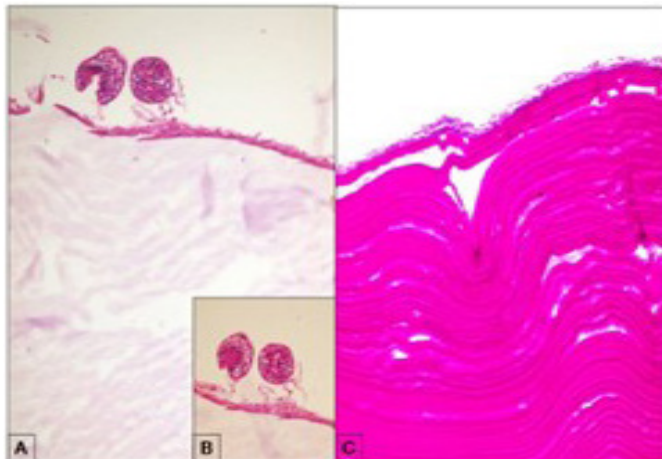


Figure 6. Microscopic image showing protoscolex within the germinative layer (H&E, x100)

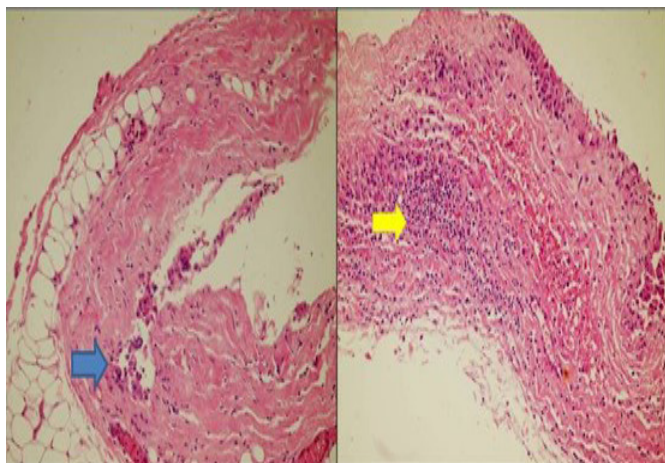


Figure 7. Laminated membrane of the cyst with surrounding inflammatory reaction in fibroadipose tissue (H&E, x200).

Microscopic image showing laminated membrane of the hydatid cyst with inflammatory reaction in the surrounding fibroadipose tissue (Hematoxylin & Eosin, x200)

DISCUSSION

Hydatid disease primarily affects the liver and lungs, whereas involvement of soft or subcutaneous tissues is exceedingly uncommon, accounting for only 1-2% of all cases.¹³ Primary isolated subcutaneous cysts without visceral involvement are exceptionally rare. In the cervical region, active muscular contractions and extensive lymphatic drainage are believed to

hinder larval implantation.^{14,15} Consequently, localization within the posterior cervical triangle (Level V) is extremely rare and often misdiagnosed because of its nonspecific clinical features.¹⁶

Subcutaneous hydatid cysts typically present as slowly enlarging, painless swellings that resemble benign lesions such as lipoma, epidermoid cyst, or branchial cleft cyst.⁶ In the present case, the lesion was presumed benign preoperatively, and the diagnosis of hydatid disease was established intraoperatively. This reflects the general diagnostic challenge posed by the absence of characteristic clinical or imaging findings in isolated soft-tissue hydatidosis.¹¹

Serological assays may contribute to diagnosis; however, false-negative results are common because localized soft-tissue disease produces limited antigenic stimulation.¹⁷ Consistent with previous reports, postoperative serology was negative in our patient. Ultrasonography is the preferred initial imaging modality, but classical hydatid features-such as daughter cysts or hydatid sand-are frequently absent in atypical extrahepatic presentations.

Surgical excision remains the definitive treatment for hydatid cysts. The fundamental surgical principle is complete removal of the cyst without rupture, thereby preventing dissemination and recurrence.¹⁸ In the present case, despite a small pericystic defect, meticulous dissection allowed intact excision without macroscopic spillage, and the patient has remained recurrence-free for ten years.

The role of adjuvant albendazole following total excision remains controversial. While some authors advocate its routine use in cases involving intraoperative rupture, multiple cysts, or visceral involvement, others note that it may be unnecessary after complete removal of an isolated, intact cyst.¹⁹ Recent expert consensus-including the Turkish HPB Surgery Association guidance aligned with WHO-IWGE recommendations-emphasizes that perioperative albendazole is primarily indicated in patients with multiple cysts, systemic involvement, or a risk of intraoperative contamination, whereas individualized decision-making is appropriate after uncomplicated complete excision.²⁰ Our long-term outcome aligns with these recommendations, demonstrating sustained disease-free status without antiparasitic therapy.

The table summarizes demographic characteristics, localization, serological status, surgical approach, use of albendazole, and clinical outcomes (**Table**).^{9,12,15-17}

A review of previously reported cervical and supraclavicular hydatid cysts (**Table**) indicates a predominance among women aged 20-45 years, suggesting that certain hormonal or immunologic factors may influence soft-tissue localization.²⁶

Table. Summary of published cases of subcutaneous hydatid cysts in the cervical region*

| Author/year | Age/sex | Localization | Serology | Treatment | Albendazole | Outcome |
|-------------------------------------|---------|---|---------------|----------------|-------------|--------------------------|
| Ok et al. (2000) ²¹ | 45/M | Subcutaneous (head/neck) | Negative | Total excision | No | No recurrence (2 years) |
| Gul et al. (2015) ²² | 36/F | Cervical region | Negative | Total excision | Yes | No recurrence (1 year) |
| Çelik et al. (2006) ²³ | 40/M | Cervical region | Not reported* | Cystectomy | No | No recurrence (8 months) |
| Tbini et al. (2021) ²⁴ | 28/F | Cervical region (supraclavicular area) | Not reported | Total excision | Yes | No recurrence (1 year) |
| Muhedin et al. (2022) ²⁵ | 30/F | Cervical region | Negative | Total excision | Yes | No recurrence (1 year) |
| Muhedin et al. (2022) ²⁵ | 33/F | Cervical region | Negative | Total excision | Yes | No recurrence (1 year) |
| Present case (2025) | 41/F | Cervical region (posterior triangle, level V) | Negative | Total excision | No | No recurrence (10 years) |

*: The table adapted from previously reported cases in the literature.^{9,12,15-17}

Most cases presented as painless masses with negative serology, reinforcing the diagnostic challenges associated with isolated soft-tissue hydatidosis. Regardless of whether albendazole was administered, all reported patients remained disease-free following meticulous total excision-highlighting that surgical completeness, rather than adjuvant therapy, appears to be the principal determinant of outcome.

To the best of our knowledge, the present case represents the longest recurrence-free follow-up (10 years) reported for a primary subcutaneous hydatid cyst of the cervical region. Despite the absence of a preoperative diagnosis, complete surgical removal and diligent postoperative surveillance resulted in a sustained disease-free course. This outcome underscores the importance of surgical precision and long-term follow-up in the management of extrahepatic hydatidosis.

In conclusion, this case reinforces that complete cyst excision without rupture can achieve definitive, long-term control even in the absence of antiparasitic therapy. A high index of suspicion, careful intraoperative handling, and continued radiological and clinical monitoring remain essential for the successful management of this rare cervical localization.

CONCLUSION

Primary isolated cervical hydatid cysts are extremely rare and may pose significant diagnostic challenges. This case underscores the importance of including hydatid disease in the differential diagnosis of cystic neck masses, particularly in patients from endemic regions. Complete excision without rupture remains the key determinant of successful long-term control, and adjuvant antiparasitic therapy may be individualized in cases where the cyst is removed intact. Long-term clinical and radiological follow-up is essential to confirm sustained disease-free status.

ETHICAL DECLARATIONS

Informed Consent

Written informed consent was obtained from the patient(s) included in this report. Signed consent forms are retained by the authors and are available upon request.

Peer Review Process

This report underwent external peer review.

Conflict of Interest

The authors declare no conflicts of interest.

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Author Contributions

Concept: B.B.; Design: B.B.; Control: M.S.S.; Data collection and/or processing: M.S.S.; Analysis and/or interpretation: M.S.S.; Literature review: S.D.; Article writing: T.S.; Critical review: All authors.

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Rebound pain: the silent complication

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Dear Editor,

Regional anesthesia constitutes a significant portion of daily anesthesia practice. Regional anesthesia encompasses both neuraxial techniques and peripheral nerve blocks. In recent years, there has been a noticeable shift from neuraxial techniques toward the use of peripheral nerve blocks.

Regional anesthesia techniques are known to provide effective postoperative pain control, reduce perioperative opioid consumption, and shorten hospital length of stay. Owing to these advantages, regional anesthesia has become an essential component of multimodal anesthesia and analgesia strategies.¹

However, in recent years, a clinical phenomenon known as rebound pain has been described, which can negatively affect patient comfort following regional anesthesia. This phenomenon, which occurs after the resolution of the nerve block, has emerged as a clinically relevant problem that may diminish some of the analgesic benefits offered by these techniques.²

Rebound pain is characterized as a burning and dull pain that emerges once the nerve block wears off. It has been most commonly reported within 12 to 24 hours after block resolution. The pain may occur at rest or during movement and can last up to 2 hours. Its intensity has been reported to reach 7 or higher on a 10-Point Pain Scale. The incidence varies depending on patient populations, surgical procedures, and block techniques, with reports as high as 50%. Female sex, younger age, and orthopedic procedures such as shoulder and knee surgeries have been identified as risk factors for the development of rebound pain. Moreover, techniques involving blockade of areas with dense nerve distribution, such as the brachial plexus and popliteal fossa, have also been associated with increased risk.³⁻⁵

Although the pathophysiology of rebound pain has not been fully elucidated, several mechanisms have been proposed, including central sensitization, peripheral hyperalgesia, increased inflammatory mediators, and abrupt offset of local anesthetic effect. Additional factors, such as the pro-inflammatory effects of local anesthetics, mechanical nerve

injury, and abnormal spontaneous C-fiber activity, may also play a role.^{3,4}

Proactive analgesic strategies should be considered for the effective prevention and management of rebound pain. Initiating systemic analgesics before the expected resolution of the block is recommended to prevent or reduce the severity of rebound pain. Rather than relying on a single analgesic agent, a multimodal analgesia approach-combining nonsteroidal anti-inflammatory drugs, opioids, and acetaminophen-is preferred.⁶ In the literature, the addition of adjuvant agents such as dexamethasone and dexmedetomidine to perineural local anesthetics has been shown to be beneficial. Furthermore, systemic administration of dexamethasone, in addition to perineural use, may prolong the duration of the block and reduce the incidence of rebound pain.⁷

The use of peripheral nerve block catheters has also been reported as an alternative approach for some surgical populations. In a study using perineural catheters for interscalene block, both the incidence and severity of rebound pain were reduced.⁸ This effect may be attributed to the prolonged maintenance of sensory blockade, allowing enough time for tissue healing and attenuation of the inflammatory response. Moreover, the gradual tapering of continuous local anesthetic infusion may prevent the abrupt resolution of the block, thereby minimizing rebound pain. Although the placement and follow-up of perineural catheters can be challenging, they should be considered-particularly in patients at high risk for rebound pain-to improve postoperative comfort.

In conclusion, rebound pain is an important clinical issue that should not be overlooked in the era of widespread use of peripheral nerve blocks. Increasing anesthesiologists' awareness, providing appropriate preoperative patient counseling, and planning suitable analgesic strategies can help mitigate the negative impact of this complication. Moreover, future studies are warranted to better understand rebound pain and to optimize preventive strategies.

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ETHICAL DECLARATIONS

Informed Consent

Written informed consent was obtained from the patient for the publication of this correspondence and any related clinical details.

Peer Review Process

This letter was externally peer-reviewed.

Conflict of Interest

The authors declare no conflicts of interest.

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Author Contributions

The author is solely responsible for the conception, data collection, analysis, and writing of this manuscript.

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