ORIGINAL ARTICLE

Medical management or surgery for acute cholecystitis: Enhancing treatment selection with decision trees

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ABSTRACT

BACKGROUND: This study aimed to create an algorithm using the decision tree method to classify patients with suspected acute cholecystitis into those who may improve with medical treatment, those who should undergo surgery for acute cholecystitis, and those with complicated cholecystitis, using laboratory parameters alone.

METHODS: A total of 1,352 patients treated for acute cholecystitis at our hospital over four years were retrospectively analyzed. Patients were divided into groups based on whether they received medical treatment or surgery. Various demographic and laboratory parameters were recorded. A decision tree algorithm was used to classify patients based on these parameters. Statistical analyses were performed using SPSS, and the decision tree's performance was evaluated with 10-fold cross-validation. An additional decision tree was created for gangrenous cholecystitis using the same methods.

RESULTS: The decision tree identified the platelet-to-lymphocyte ratio (PLR) as the most critical parameter for distinguishing between patients requiring surgery and those suitable for conservative treatment. The algorithm demonstrated an 82.17% diagnostic accuracy for predicting operative need and a 73.86% accuracy for identifying gangrenous cholecystitis. C-reactive protein (CRP) levels, platelet (PLT) values, white blood cell (WBC) counts, and patient age were also significant factors in the decision-making process. The neutrophil-to-lymphocyte ratio (NLR) was the most useful for diagnosing necrosis.

CONCLUSION: The decision tree algorithm effectively differentiates between uncomplicated and complicated cholecystitis using easily obtainable laboratory parameters. This method offers a cost-effective, rapid alternative to imaging studies, facilitating timely and appropriate treatment decisions, ultimately improving patient outcomes and reducing healthcare costs.

Keywords: Acute cholecystitis; conservative treatment; decision tree; diagnostic algorithm; gallstones; platelet-to-lymphocyte ratio.

INTRODUCTION

Gallstones are one of the most common gastrointestinal issues in the general population. The incidence of asymptomatic gallstones in the general population is between 10% and 20%, and they are the most common cause of gastrointestinal tract-related (GI) hospital admissions in European countries.[1,2] Acute cholecystitis is an inflammatory disease of the gallbladder, most often caused by gallstones, and is one of the most prevalent surgical conditions globally, constituting a major reason for emergency department visits. Current guidelines do not recommend routine surgery for asymptomatic gallstones.[2] However, while the gold standard treatment for symptomatic gallstones is cholecystectomy, some studies suggest that acute, uncomplicated cases can be managed without surgery.[3] Antibiotics, gallbladder drainage, and painkillers are used to treat acute cholecystitis.[4] Limited studies support conservative treatment in patients with uncomplicated acute cholecys-

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titis.[3,5,6] The most common form of complicated cholecystitis is gangrenous cholecystitis or gallbladder perforation, occurring in up to 30% of patients.[7] In cases of complicated cholecystitis, surgery is necessary. Therefore, distinguishing complicated cholecystitis during diagnosis is crucial for selecting the appropriate treatment in patients presenting with gallstones. While scoring systems cannot reliably differentiate between complicated and uncomplicated acute cholecystitis, imaging studies can aid in this distinction but only in limited instances. Recently, various laboratory parameters have been employed to differentiate between acute and gangrenous cholecystitis,[8,9] and these parameters are not only useful for acute cholecystitis but also for the differential diagnosis of numerous diseases.[10,11] In addition, with advancing technology, artificial intelligence-supported computer-based algorithms can assist clinicians in diagnosis by processing various data.[12,13]

In this study, we aimed to create an algorithm to differentiate among patients with suspected acute cholecystitis: those who may improve with medical treatment, those who require surgery for acute cholecystitis, and those with complicated cholecystitis. Using the decision tree method with laboratory parameters alone, this algorithm seeks to facilitate quick and straightforward differentiation, reducing the need for costly and time-consuming additional tests, such as imaging studies. Ultimately, this algorithm will assist in selecting the most appropriate treatment, benefiting both patient quality of life and cost-effectiveness.

MATERIALS AND METHODS

After obtaining ethics committee approval, a total of 1,400 patients treated for gallstones at our hospital over four years were retrospectively analyzed using the hospital automation system. These patients were diagnosed with acute cholecystitis by a general surgeon based on physical examination, radiological examination, and laboratory findings and subsequently treated. Forty-eight patients were excluded from the study due to malignant disease, absence of gallstones in pathological examinations, or a decision not to participate in the study by continuing treatment at another center after visiting our outpatient clinic. Patients were divided into two groups: those who received medical treatment and those who underwent surgery. The group of operated patients (n=467) included cases with inflammatory, gangrenous, and perforated gallbladders, while the medical treatment group comprised the remaining patients (n=885) (Fig. 1). Patients whose physical examination, radiological imaging, and laboratory findings at initial admission indicated perforation were directly included in the operated group. Laboratory findings for these patients were collected at the time of first admission during the diagnostic and treatment process; changes during the course of treatment were not included in the study. Demographic characteristics such as age, gender, length of hospital stay, laboratory results (white blood cell (WBC) count, neutrophil (NE) count, lymphocyte (LY) count, platelet (PLT) count, mean platelet volume (MPV), hemoglobin (HGB) level, albumin (Alb) level, neutrophil-to-lymphocyte ratio (NLR), plate-

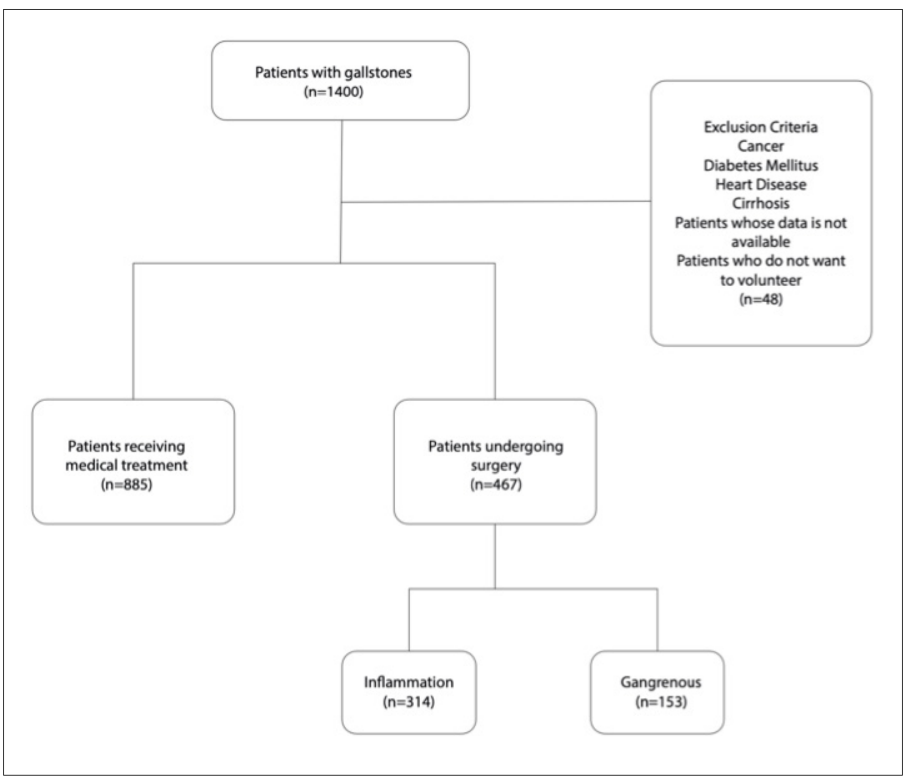

Figure 1. Flowchart of the study population.

let-to-lymphocyte ratio (PLR), and C-reactive protein (CRP)), and physical examination findings were recorded. This study was approved by the Hitit University Clinical Research Ethics Committee (Date: 12. 29. 2021, Decision Number: 2021-88).

The Decision Tree Method

In the medical field, the decision tree algorithm performs effectively in solving nonlinear problems and is widely used due to its straightforward interpretability.[14] The decision tree algorithm is used to assign attributes to the nodes of the tree structure through various statistical calculations.[15] These calculations are intended to determine which parameter is most influential in homogeneously classifying the dataset. For each node, all accessible parameters are evaluated, and the most significant parameter is selected. The test condition is expressed by branches that link the node to sub-nodes based on the values that the current node can assume. An entropy-based information gain rate is employed to calculate the strongest feature for a given node. In medical research, where patient classification into specific medical conditions (referred to as "classes (C)") is essential, the dataset consists of patient data points characterized by a set of attributes denoted as "A," encompassing variables such as age, clinical symptoms, and laboratory test results. The primary objective is to identify the attributes that are most discriminative and informative in the classification process. This goal is achieved using the fundamental metrics of "information (I)" and "entropy (E)," which quantify the degree of inherent uncertainty or disorder within the dataset. An enhanced understanding of patient attributes corresponds to a reduction in uncertainty, thereby facilitating more precise classification. For each attribute contained within the set A, the computation of its associated entropy is conducted. In this context, entropy serves as a quantitative measure of an attribute's efficacy in dividing patients into distinct subsets that predominantly represent specific medical conditions. An attribute that effectively partitions patients into subsets characterized by a high prevalence of a single medical condition will exhibit lower entropy, thus signifying its informational value. Subsequently, an assessment of "information gain" is conducted, representing the difference between the overall informational content within the dataset and the entropy associated with a specific attribute. Attributes with substantial information gain indicate their potential to significantly enhance the classification process. This metric aids in identifying attributes with the highest discriminative power, assuming paramount importance in medical diagnosis and the stratification of treatment approaches.

In summary, the application of these mathematical computations enables the determination of patient attributes that are most relevant and essential for the accurate classification of medical conditions. Attributes with higher information gain emerge as critical factors in the medical decision-making process, facilitating the classification of patients into appropriate diagnostic and therapeutic categories.

The decision tree algorithm has been configured with specific parameters: a maximum tree depth of 10, a minimum leaf size constraint of 2, and a minimum size for node splitting set at 4. To evaluate the decision model's performance, a rigorous 10-fold cross-validation approach has been applied. The selection of examples within each fold has been performed randomly to ensure representativeness. Furthermore, to mitigate potential bias, the binary class ratio of the original dataset has been preserved within each fold. As a result of these comprehensive procedures, the model's accuracy was quantified, achieving 82.17% for distinguishing operative need and 73.86% for identifying gangrenous gallbladder cases.

Statistical Analysis

Statistical analyses of the data obtained in the study were performed using SPSS (Version 22.0, SPSS Inc., Chicago, IL, USA) Continuous variables were presented as median (min-max) with mean ± standard deviation, as the data were not normally distributed. The Shapiro-Wilk test was used to evaluate data normality. The Mann-Whitney U test was employed for comparisons between two independent groups because the data did not meet normality assumptions. To assess the classification success of independent variables, receiver operating characteristic (ROC) analysis and the decision tree method from machine learning algorithms were utilized. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Data from 1,352 patients were analyzed. The mean age of the patients was 61.66±17.15 years. The mean duration of hospitalization was 4 (0-60) days. Of the patients, 41.4% (n=560) were male, and 58.6% (n=792) were female. Statistical findings and ROC analysis results for the comparison of sociodemographic variables and laboratory blood values between the surgery group and the conservative treatment group are presented in Table 1.

ROC analysis identified that the most significant parameter for distinguishing between medical treatment and surgical intervention was PLR (Table 1). According to decision tree findings, in patients with a PLR of 45.77 or less, CRP was the primary parameter to evaluate. PLT value becomes crucial in patients with a CRP level above 88.3 mg/dL; according to the algorithm, patients with a CRP level above 88.3 mg/dL and a PLT value above $71.5 \times 10^3/mm^3$ should undergo surgery, while patients with a PLT value of 71.5 x $103/mm^3$ or below can be managed with medical therapy. For patients with a CRP level of 88.3 mg/dL or lower, the PLR value becomes relevant again; patients with a PLR value above 43.09 should undergo surgery, while those with a lower value should receive medical treatment (Fig. 2). In patients with a PLR value greater than 45.77, medical treatment may be attempted if the CRP level is 198.5 mg/dL or below. In patients with a serum CRP level above 198.5 mg/dL, those with a WBC count of $8.38 \times 10^3/mm^3$ or below can be considered suitable for medical treat-

Table 1. Statistical comparison of sociodemographic variables and laboratory blood values between the operation group and conservative treatment group, along with receiver operating characteristic (ROC) analysis results

	Medical (n=885)	Operated (n=467)	p*	ROC (AUC)
Gender M/F	358 (40.5%) / 527 (59.5%)	202 (43.3%) / 265 (56.7%)	0.320	-
Age (years)	64.05±17.50	57.12±15.50	<0.001	0.624 (0.594-0.654)
Hospitalization Duration (days)	4 (1-15)	4 (0-60)	0.314	-
WBC (10^3/mm^3)	9.97±4.94	12.18±5.85	<0.001	0.623 (0.593-0.654)
Neutrophil (10^3/mm^3)	7.38±4.65	9.17±5.53	<0.001	0.600 (0.568-0.631)
Lymphocyte (10^3/mm^3)	1.67±0.93	1.97±1.03	<0.001	0.592 (0.561-0.624)
Platelet (10^3/mm^3)	228.12±83.32	259.81±86.89	<0.001	0.614 (0.583-0.645)
MPV (fL)	9.62±1.17	9.64±1.17	0.659	-
Hemoglobin (g/dL)	12.58±1.76	12.69±1.94	0.295	-
Albumin (g/dL)	3.68±0.54	3.97±0.64	<0.001	0.644 (0.611-0.678)
CRP (mg/dL)	17.8 (3.02-358)	138 (3.02-349)	<0.001	0.731 (0.71-0.761)
MPR	4400 (1317.72-61511.11)	3860.47 (1334.59-14666.67)	<0.001	0.601 (0.569-0.632)
NLR	3.86 (0.34-71.65)	4 (0.65-180)	0.475	-
PLR	145.41 (9.88-1745.45)	58.11 (2.81-747.62)	<0.001	0.753 (0.723-0.783)

WBC: White Blood Cell; MPV: Mean Platelet Volume; CRP: C-Reactive Protein; MPR: Mean Platelet Volume to Platelet Count Ratio; NLR: Neutrophil-to-Lymphocyte Ratio; PLR: Platelet-to-Lymphocyte Ratio. *Mann-Whitney U test results are presented as median (min-max) and mean ± standard deviation.

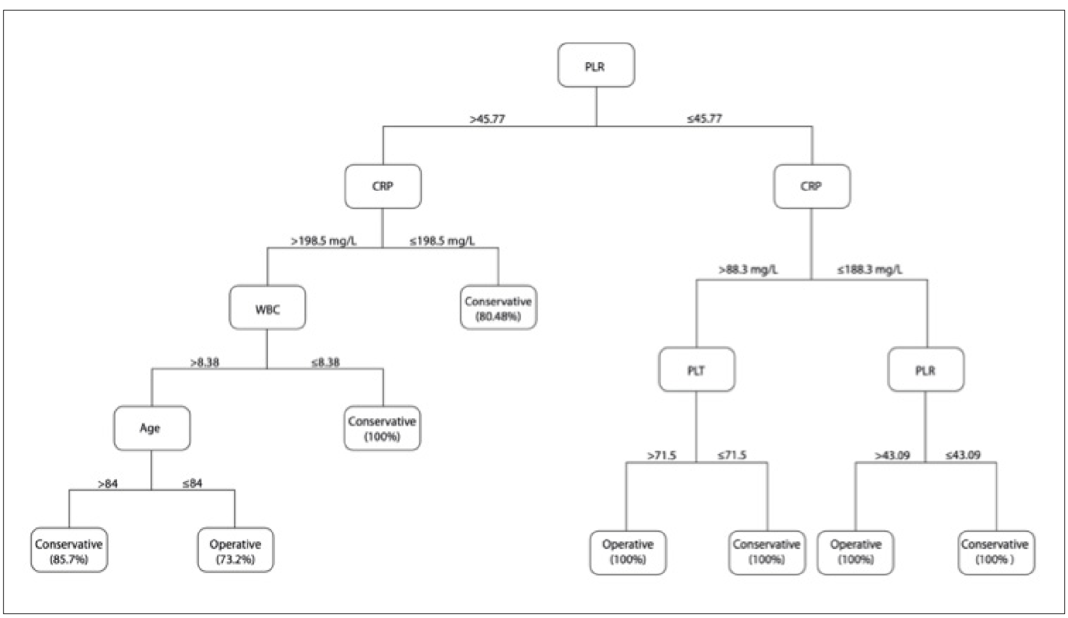

Figure 2. Decision tree for classification of operative versus conservative treatment. PLR: Platelet-to-Lymphocyte Ratio; CRP: C-Reactive Protein; WBC: White Blood Cell; PLT: Platelet.

ment. For patients with a WBC count above 8.38x10^3/mm^3, medical treatment should be attempted in those older than 84 years, while surgical intervention should be considered for those aged 84 years or younger (Fig. 2).

As a result of ROC analysis, we observed that the NLR was the most significant parameter for distinguishing between cholecystitis with only inflammation and cholecystitis progressing to gangrene (Table 2). According to the decision tree findings, the first parameter to evaluate in patients with an NLR of 8.49 or below is the neutrophil count; patients with a

Table 2. Statistical comparison of sociodemographic variables and laboratory blood values between inflammation and gangrenous patient groups, along with receiver operating characteristic (ROC) analysis results

	Group I Inflammation (n=314)	Group 2 Gangrenous (n=153)	p*	ROC (AUC)
Gender (Male/Female)	116 (36.9%) /198 (63.1%)	86 (56.2%) / 67 (43.8%)	<0.001	0.569 (0.541-0.651)
Age (years)	54.37±15.38	62.75±14.19	<0.001	0.659 (0.608–0.711)
Hospitalization Duration (days)	3 (0-30)	4 (1-60)	<0.001	0.665 (0.651-0.714)
WBC (10^3/mm^3)	9.66 (3.4-46.20)	14.33 (2.3-37.81)	<0.001	0.709 (0.655-0.764)
Neutrophil (10^3/mm^3)	6.45 (2.13-31.30)	12.27 (1.8-33.64)	<0.001	0.740 (0.689-0.792)
Lymphocyte (10^3/mm^3)	2.03 (0.2-6.37)	1.34 (0.1-8.6)	<0.001	0.693 (0.641-0.745)
Platelet (10^3/mm^3)	261.35±80.52	256.66±98.88	0.247	-
MPV (fL)	9.75 (6.5-15)	9.8 (7.5-12.9)	0.181	-
Hemoglobin (g/dL)	12.6 (6.7-18.8)	12.9 (6.7-17.40)	0.309	-
Albumin (mg/dL)	4.04±0.58	3.81±0.74	0.004	0.582 (0.525-0.639)
CRP (mg/dL)	114.72±94.17	154.12±99.54	<0.001	0.616 (0.561-0.671)
MPR	4077.72±1623.88	4369.44±1883.42	0.118	-
NLR	4.78±4.73	11.95±16.20	<0.001	0.769 (0.723-0.815)
PLR	55.76 (4.48-684)	66.32 (2.81-747.62)	0.010	0.574 (0.519-0.628)

WBC: White Blood Cell; MPV: Mean Platelet Volume; CRP: C-Reactive Protein; MPR: Mean Platelet Volume to Platelet Count Ratio; NLR: Neutrophil-to-Lymphocyte Ratio; PLR: Platelet-to-Lymphocyte Ratio. *Mann-Whitney U test results are presented as median (min-max) and mean ± standard deviation.

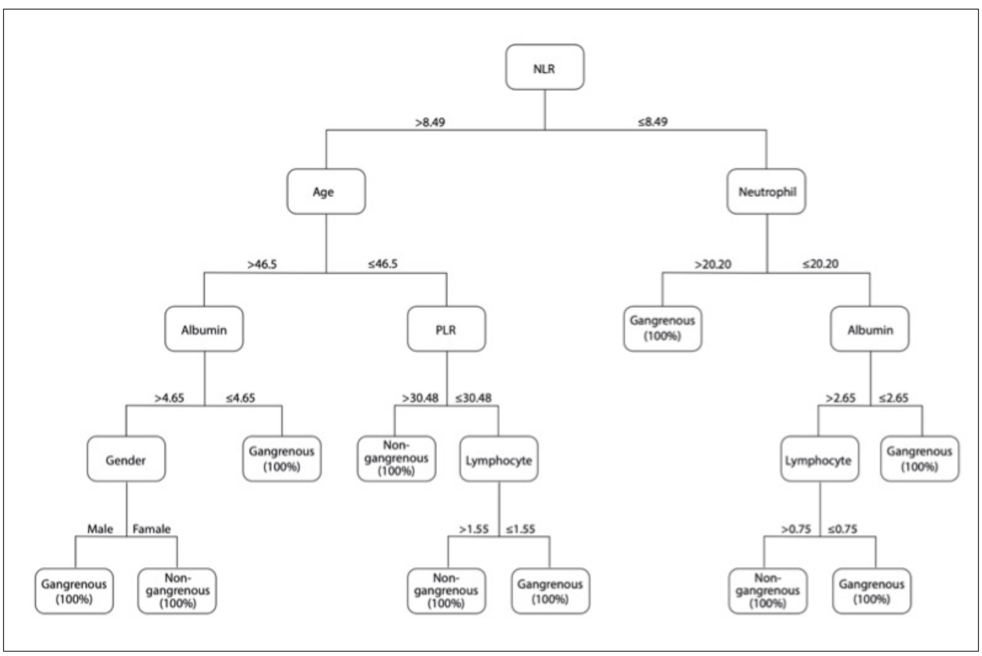

Figure 3. Decision tree for classification differentiating non-gangrenous from gangrenous cases. NLR: Neutrophil-to-Lymphocyte Ratio; PLR: Platelet-to-Lymphocyte Ratio.

neutrophil count above 20.20 were observed to have gangrenous cholecystitis (Fig. 3). In patients with a neutrophil count of 20.20 or below, the albumin level should be assessed; if the albumin level is 2.65 mg/dL or below, gangrenous cholecystitis is more likely. If the albumin level is above 2.65 mg/dL, the lymphocyte count should be evaluated; if it is 0.75 or below, gangrene is more likely in the gallbladder. In patients with an NLR of 8.49, age should be evaluated; if the age is above 46.5 years, the albumin level becomes relevant. If the albumin level is 4.65 mg/dL or below, gangrene is more likely. If the albumin

Table 3. Diagnostic values of the decision tree classification algorithm for distinguishing between operative and medical conservative treatment

	Operated		Medical
Operated	250		24
Medical	217		861
Accuracy	82.17%		
	Estimated Value	**95% Confidence Interval**	
		Lower Limit	**Upper Limit**
Sensitivity	53.5%	48.8%	58.1%
Specificity	97.2%	95.9%	98.2%
Positive predictive value	91.2%	87.0%	94.1%
Negative predictive value	79.8%	77.3%	82.1%
LR +	19.74	13.18	29.55

LR: Likelihood Ratio.

Table 4. Diagnostic values of the decision tree classification algorithm for differentiating between inflammation and gangrenous gallbladder

	Gangrenous		Inflammation
Gangrenous	80		49
Inflammation	73		265
Accuracy	73.86%		
	Estimated Value	**95% Confidence Interval**	
		Lower Limit	**Upper Limit**
Sensitivity	52.2%	44.0%	60.3%
Specificity	84.3%	79.7%	88.1%
Positive Predictive Value	62.0%	53.0%	70.2%
Negative Predictive Value	78.4%	73.5%	82.5%
LR +	3.35	2.48	4.51

LR: Likelihood Ratio.

level is above 4.65 mg/dL, gender should be considered. If the patient is male, gangrene is more likely, whereas if the patient is female, inflammation alone is more likely. When the age is 46.5 years or below, if the PLR is above 30.48, inflammation alone is likely. For values of 30.48 or below, the lymphocyte count should be evaluated; if the lymphocyte count is 1.55 or below, gangrenous cholecystitis is more likely, and if it is above 1.55, inflammation alone is more probable (Fig. 3).

The algorithm developed to distinguish eligibility for surgical versus medical conservative treatment demonstrated 53.5% sensitivity, 97.2% specificity, 91.2% positive predictive value (PPV), 79.8% negative predictive value (NPV), and 82.17% diagnostic accuracy. The algorithm created to differentiate between inflammation alone and gangrenous gallbladder demonstrated 52.2% sensitivity, 84.3% specificity, 62% PPV, 78.4% NPV, and 73.86% diagnostic accuracy (Tables 3 and 4).

DISCUSSION

According to the decision tree algorithm developed in our study, PLR is the most important parameter for distinguishing patients who require surgical intervention from those who can be managed conservatively; however, hemoglobin, MPV, and NLR had no effect on this distinction.

The incidence of acute cholecystitis in the general population can vary based on region and demographic factors. In the United States, for instance, the incidence of acute cholecystitis is estimated to be around 10-20 cases per 100,000 people annually.[16] However, the risk of developing acute cholecystitis increases with age and is more common in women than in men.[1] It is also more prevalent in populations with risk factors such as obesity, rapid weight loss, and a high-fat diet.[1]

The severity of acute cholecystitis is determined by the presence of complications. Uncomplicated cases can often be managed on an outpatient basis, whereas complicated cases may require surgical intervention. Cholecystectomy is considered the gold standard for treating complicated acute cholecystitis within the first 72-96 hours. Additionally, indications for open surgery or percutaneous cholecystostomy include a high risk of iatrogenic biliary tract or vascular injury due to the development of fibrosis and edema in the gallbladder in the later stages.[17,18] Given this information, distinguishing between complicated and uncomplicated cases is essential for predicting both mortality and morbidity and determining the most appropriate treatment approach. As a result, numerous studies have focused on developing scoring systems or identifying predictive factors for evaluating complications.[19,20] However, there are limited decision tree studies capable of such evaluation.

In our decision tree algorithm, the PLR value emerged as a critical factor in differentiating between complicated and uncomplicated cases of cholecystitis. PLR is the ratio between the absolute platelet count and the absolute lymphocyte count. PLR has been used as a marker of inflammation in various diseases, including cardiovascular diseases, cancer, and autoimmune disorders.[21] The affordability of PLR as an inflammation marker, applicable across numerous clinical settings, facilitates straightforward decision-making in decision tree models. This is demonstrated by its convenience in terms of sustainability and accessibility, as evidenced in our study.

Elevated CRP was considered a supportive finding for distinguishing uncomplicated cholecystitis from complicated cholecystitis. In a study by Mok et al., CRP levels in patients with acute cholecystitis were highlighted as an important finding for predicting gangrenous cholecystitis. Monitoring CRP trends was shown to be valuable for early diagnosis and guiding early surgical intervention decisions.[22] In our study, the integration of CRP levels within the algorithm tree alongside PLR values demonstrated that CRP levels exceeding 198.5 mg/dL and 88.3 mg/dL were indicative of complicated cholecystitis. This observation aligns with the conclusions of other studies that have demonstrated an increased risk at values approaching these thresholds. Consequently, the results were found to be consistent with those reported in the literature.

Numerous previous studies have identified an increase in WBC and neutrophil counts in severe inflammatory conditions of the gallbladder as markers of a severe inflammatory response.[23] In this study, these counts were significantly higher in the complicated group compared to the uncomplicated groups, with mean values of 8.66 and 10.5, respectively ($p<0.001$). In a study by Wu et al., the complication rate following cholecystectomy was evaluated, along with the efficacy of various models in predicting complicated cholecystitis. That study found WBC to be an important laboratory marker for the development of gangrenous cholecystitis.[24] In this study, a WBC count greater than 13.0x103/mm^3 was correlated with similar values reported in the literature. This study further demonstrated that leukocytosis may result from an inflammatory response due to gangrene or tissue necrosis and should, therefore, be regarded with caution.

In cases of severe inflammatory conditions, an increase in NLR is observed as a systemic inflammatory response in the patient's body due to increased secretion of proinflammatory cytokines in plasma.[25] Although previous literature indicates that NLR is significantly elevated in determining the necessity for surgery, our study reached a different conclusion, observing no such correlation. Consequently, while NLR is regarded as a pivotal indicator in inflammatory conditions, it did not demonstrate relevance in distinguishing between operative and medical management and was therefore excluded from this decision tree.

Additionally, age was identified as an important parameter in this study. As vascular circulation of the gallbladder wall deteriorates with advancing age due to worsening venous insufficiency, the risk of necrosis and perforation increases.[26] This positions age as a factor that elevates the risk of developing complicated cholecystitis. In the decision tree model, conservative management was determined to be more suitable for patients with WBC count greater than 8.38×10^3/mm^3, particularly for those aged 84 and above.

Given that complete blood count is a simple, rapid, and cost-effective test, parameters such as white blood cell count, neutrophil-to-lymphocyte ratio, and platelet count are commonly used as markers of inflammation and indicators of disease severity.[27] In a prior study assessing the risk of complicated acute cholecystitis in terms of diagnostic value, PLT count alone was found to be insignificant.[28] However, in the present study, PLT value was particularly important in distinguishing between complicated and non-complicated cholecystitis. If the ratio between the absolute platelet count and the absolute lymphocyte count is 45.77 and the CRP value is above 88.3 mg/dL, conservative management is advisable for patients with a platelet cut-off value below 71.5.

In this study, cases of free perforation were directly included in the surgical intervention group, which may limit the ability to distinguish between perforated and non-perforated cases. Including perforation cases in this way could impact the predictive accuracy of the decision tree, as immediate surgical intervention may not be required for all cohorts. Larger, more diverse population-based studies are needed to further refine the parameters that differentiate cases requiring immediate surgery from those that could be managed conservatively, particularly in the context of perforated cholecystitis. Such future research could improve decision-making by fine-tuning the algorithm to provide more specific recommendations, thereby reducing unnecessary surgeries while ensuring patient safety. Similar findings in the literature further underscore the need for continued exploration in this area to enhance clinical outcomes and cost-effectiveness.[29]

The choice of treatment strategy-whether conservative management or surgery-is based on a comprehensive evaluation of the patient's individual clinical circumstances. Factors such as the severity of cholecystitis, the presence of complications, and the patient's overall health and preferences are carefully considered. Timely medical attention is essential for individuals with suspected acute cholecystitis, as early intervention can prevent complications and expedite recovery. Ultimately, treatment decisions should be made in consultation with a healthcare provider to optimize patient outcomes.

CONCLUSION

This study enhances the diagnostic and treatment processes for acute cholecystitis through the use of decision tree algorithms. The algorithm accurately distinguished cases requiring surgery with an accuracy rate of 82.17% and identified gangrenous cholecystitis cases with an accuracy rate of 73.86%. The PLR emerged as the most critical parameter in determining the need for surgery, with a specificity of 97.2%. These findings highlight the potential to significantly reduce healthcare costs by enabling a rapid and cost-effective diagnostic process while improving patient outcomes.

Ethics Committee Approval: This study was approved by the Hitit University Faculty of Medicine Ethics Committee (Date: 29.12.2021, Decision No: 2021-312).

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept: İ.S., R.T.; Design: M.B.Ö., İ.S., K.A., V.B.T.; Supervision: V.B.T., İ.S.; Resource:

M.B.T., İ.S.; Materials: İ.S., V.B.T.; Data collection and/or processing: M.B.T., İ.S.; Analysis and/or interpretation: M.B.T., M.B.Ö.; Literature search: M.B.Ö., V.B.T., R.T.; Writing: R.T., M.B.Ö., B.T.; Critical reviews: R.T., M.B.Ö., V.B.T.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Akut kolesistitte tıbbi yönetim veya cerrahi: Karar ağaçları ile tedavi seçiminin güçlendirilmesi

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AMAÇ: Bu çalışmada, akut kolesistit şüphesi olan hastaları yalnızca laboratuvar parametrelerini kullanarak medikal tedaviye uygun olanlar ve cerrahi müdahale gerektirenler olarak ayırt etmeyi amaçlayan bir karar ağacı algoritması geliştirilmiştir.

GEREÇ VE YÖNTEM: Dört yıl içerisinde hastanemizde akut kolesistit nedeniyle tedavi edilen toplam 1352 hasta retrospektif olarak incelendi. Hastalar medikal tedavi görenler ve operasyon geçirenler olarak iki gruba ayrıldı. Çeşitli demografik ve laboratuvar parametreleri kaydedildi. Hastaları bu parametrelere göre sınıflandırmak için bir karar ağacı algoritması kullanıldı. Algoritmanın performansı 10 katlı çapraz doğrulama ile değerlendirildi.

BULGULAR: Karar ağacı, cerrahi müdahale gereksinimini ayırt etmede en kritik parametre olarak trombosit-lenfosit oranını (PLR) belirledi. Algoritma, operatif ihtiyaç için %82.17 tanısal doğruluk ve gangrenöz kolesistiti ayırt etmede %73.86 doğruluk gösterdi. C-reaktif protein (CRP) seviyeleri, trombosit değerleri, beyaz kan hücresi sayımları ve hasta yaşı da karar verme sürecinde önemli faktörler olarak saptandı. Nekroz teşhisinde en yararlı parametre nötrofil-lenfosit oranı (NLR) oldu.

SONUÇ: Karar ağacı algoritması, komplike olmayan ve komplike kolesistiti, kolaylıkla elde edilebilir laboratuvar parametreleri kullanarak etkili bir şekilde ayırt etmektedir. Bu yöntem, görüntüleme çalışmalarına hızlı ve maliyet etkin bir alternatif sunmakta, zamanında ve uygun tedavi kararları alınmasına yardımcı olarak hasta sonuçlarını iyileştirmekte ve sağlık maliyetlerini azaltmaktadır.

Anahtar sözcükler: Akut kolesistit; karar ağacı; konservatif tedavi; safra kesesi taşları; tanı algoritması; trombosit-lenfosit oranı.

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