ORIGINAL ARTICLE

Development and Internal Validation of a New Predictive Score for Complicated Acute Appendicitis in a Tunisian Population

Développement et validation interne d'un nouveau score prédictif de l'appendicite aiguë compliquée dans une population tunisienne

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Abstract

Background: Distinguishing uncomplicated acute appendicitis (UAA) from complicated acute appendicitis (CAA) remains a major diagnostic challenge even after performing cross-sectional imaging with direct therapeutic implications. This study aimed to develop and validate a predictive score for CAA in a Tunisian clinical setting.

Methods: A retrospective study was conducted on 326 patients who underwent surgery for acute appendicitis. Clinical, biological, and radiological data collected at admission were analyzed using univariate and multivariate logistic regression to identify independent predictive factors for CAA. A predictive score was then constructed and its diagnostic performance assessed using the ROC curve.

Results: The prevalence of CAA was 43.6% (N = 142). Six independent predictive factors were identified: age ≥ 40 years (AOR = 3.1; p = 0.002), fever ≥ 38.5°C (AOR = 2.3; p = 0.02), leukocyte count ≥ 15,000/mm³ (AOR = 3.2; p = 0.002), CRP ≥ 100 mg/L (AOR = 7.4; p < 0.001), free fluid in the right iliac fossa or pelvis (AOR = 2.1; p = 0.039), and a collection in the right iliac fossa on imaging (AOR = 7.5; p < 0.001). The score ranged from 0 to 20, with a median of 4 (IQR 2–12). At the optimal cut-off of ≥ 6, it yielded a sensitivity of 80%, specificity of 90%, positive and negative predictive values of 85% each, and an overall accuracy of 84.9% (AUROC = 0.90).

Conclusion: This new predictive score, incorporating six clinical, biological, and radiological parameters available at admission, provides a reliable and high-performing tool for differentiating CAA from UAA. Its correlation with intraoperative and histopathological findings makes it a promising instrument for guiding therapeutic decisions, particularly in resource-limited settings.

Keywords: Appendicitis, Risk factors, Predictive score, Therapeutic decision, Tunisia

Résumé

Introduction : La distinction entre appendicite aiguë compliquée (AAC) et appendicite aiguë non compliquée (AANC) demeure un défi diagnostique majeur aux implications thérapeutiques importantes. Cette étude visait à identifier les facteurs prédictifs d'AAC et à élaborer un score prédictif adapté à la pratique clinique courante en Tunisie.

Méthodes : Une étude rétrospective a inclus 326 patients opérés d'une appendicite aiguë. Les données cliniques, biologiques et radiologiques recueillies à l'admission ont été analysées par régression logistique univariée et multivariée afin d'identifier les facteurs prédictifs indépendants d'une appendicite aiguë compliquée et d'élaborer un système de score prédictif.

Résultats : ont montré que l'angiopathie amyloïde cérébrale (AAC) représentait 43,6 % des cas (n = 142). Six facteurs prédictifs indépendants ont été identifiés : âge ≥ 40 ans, fièvre ≥ 38,5 °C, numération leucocytaire ≥ 15 000/mm³, CRP ≥ 100 mg/L, présence de liquide libre et collection dans la fosse iliaque droite. Avec un seuil ≥ 6, le score atteignait une sensibilité de 80 %, une spécificité de 90 % et une aire sous la courbe ROC (AUROC) de 0,90.

Conclusion : Ce nouveau score, basé sur six paramètres disponibles à l'admission, permet de différencier avec précision les appendicites aiguës compliquées des appendicites aiguës non compliquées. Ses excellentes performances diagnostiques et sa corrélation avec les constatations opératoires confirment son intérêt en tant qu'outil pratique d'aide à la décision thérapeutique, notamment dans les contextes où les ressources sont limitées.

Mots clés : Appendicite, Facteurs de risque, score prédictif, Décision thérapeutique, Tunisie

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Introduction

Acute appendicitis is one of the most common surgical emergencies worldwide. In Tunisia, with an estimated lifetime incidence of 9% [1], 20-30% of cases progress to complicated forms such as perforation or abscess formation [1]. Urgent appendectomy has long been considered the standard of care, although recent evidence suggests that this practice may not always be warranted [2]. While appendectomy remains prevalent, non-operative management (NOM) with antibiotics, which are known as successful treatment for other intra-abdominal infections like diverticulitis, is increasingly being explored for uncomplicated appendicitis [3]. Nevertheless, appendectomy is not without long-term risks; studies indicated that 21% of patients require rehospitalization for adhesive bowel obstruction within ten years, and 2.7% undergo reoperation [4]. In fact, recent randomized trials and meta-analyses support NOM for uncomplicated appendicitis, showing a 65–75.8% success rate at one year [5].

Conversely, complicated appendicitis such as necrosis and perforation shows high failure rates (34-53.6%) as well as complications (e.g., 27% abscess rate) with medical management [6]. Delayed diagnosis of complicated cases often drives these failures, underscoring the need to distinguish between distinct disease entities (uncomplicated vs. Complicated) for tailored therapy [7]. In Tunisia, data on appendicitis reveal ongoing burdens: for example, in one Tunisian center, appendicitis accounted for a significant proportion of non obstetric surgical emergencies in pregnancy, and a high rate of complicated appendicitis (8 of 33 pregnant patients) was noted [7]. According to WHO data, appendicitis accounted for 0.04 % of total deaths in Tunisia (age adjusted death rate 0.20 per 100,000) in 2020 [7]. These findings underscore that complicated appendicitis remains a significant clinical issue in the Tunisian context, both because of the risk of morbidity and because resource constraints may delay diagnosis and treatment.

Despite the clinical importance of the widespread emergence of complicated appendicitis, few studies have developed decisional models based on risk stratification tools to accurately predict complicated forms in the local setting. Given the challenge of determining a priori which patients will ultimately have complicated appendicitis, we sought to estimate the prevalence complicated appendicitis in Sfax region, Southern Tunisia, to identify their predictive factors, and to develop a reliable, an easy-to-use clinical prediction score for early diagnosis upon hospital admission.

Methods

Study design and settings

This single-center, retrospective observational study was conducted over a two-year period (January 1 to December 31, 2023) at the General Surgery Department of Habib Bourguiba University Hospital in Sfax, Southern Tunisia. This university hospital is the main medical center receiving patients from different governorates of Southern Tunisia.

Inclusion criteria and case definition

All patients aged 16 years or older who underwent surgery for acute appendicitis were included. Diagnosis was based on clinical, biological, and imaging findings and was confirmed by intraoperative and histopathological examination.

Patients with non-exploitable medical records (10.5% of the total population), missing histopathology, age under 16, or pregnancy were not included. Complicated appendicitis was defined by the presence of gangrene, phlegmon, suppuration, perforation, appendiceal abscess, or localized/generalized peritonitis.

Based on an expected prevalence of complicated appendicitis of 30% (8), a 5% margin of error, and a 95% confidence level, and a statistical power of 80%; the minimum required sample size required was 322 subjects.

Data Collection

For each patient included in the study, data were systematically collected using a predefined form, drawing from the operating room registry, operative reports, and histopathological reports, followed by a thorough review of patient records. The form encompassed preoperative variables such as demographic data (age, gender), medical history (duration, location and type of pain; associated symptoms such as vomiting, fever, or intestinal disturbances; comorbidities; American Society of Anesthesiologists (ASA) score; and medication use), clinical data (temperature, abdominal examination findings that include tenderness, guarding, rigidity or mass in the right iliac fossa and digital rectal examination), biological data (leukocytosis, C-reactive protein (CRP) levels, serum electrolytes, and complete blood count), and imaging data (appendiceal diameter, presence of fecalith, fluid collection, peri-appendiceal fat infiltration, or abscess on ultrasound or (CT) scan). Intraoperative variables included surgical approach, findings, appendix location, procedures performed, and complications, while postoperative variables covered postoperative course, medical and surgical complications, reoperation, mortality, and histopathological examination of the surgical specimen. This structured and comprehensive approach ensured robust data collection for detailed analysis.

Statistical analysis

Data were analyzed using SPSS version 20.0, with descriptive statistics summarizing categorical variables such as frequencies and percentages and continuous variables as means ± standard deviations or medians and interquartile ranges (IQR), according to the variable distribution.

For categorical variables, the chi-square test and

Fisher's exact test were used in independent samples. For variables with missing data, the worst-case method was adopted in the odds ratio calculation. Variables statistically associated with complicated appendicitis in the univariate analysis were included in a multivariate logistic regression model, and a backward stepwise approach was used to identify independent predictors of complicated appendicitis (adjusted odds ratio [AOR], 95% Confidence Interval [CI], p). Any variable with a p-value of <0.05 was retained in the final model. Then, the final regression model was converted into a point-based rule, with weighted scores assigned to each variable to generate a clinically applicable and decision-making rule for the prediction of complicated appendicitis. To derive a simple-to-compute risk score, the predictive index (PI) of each clinical variable in the model was defined by relying on the half of the smallest β-coefficients regression and then rounded to the nearest integer (9). For each patient, the individual PIs that corresponded to the predictors were summed together to produce an overall weighted score ranging from 0 to 20 points. Model calibration was assessed using the Hosmer-Lemeshow test for goodness of fit. The discriminatory power of the prediction rule was expressed as the area under the receiver operating characteristic curve (AUROC) on the joint probability of valuable variables to determine the best cutoff point. The sensitivity, specificity, positive and negative predictive values (PPVs, NPVs), diagnostic accuracy of the final score were calculated at different cutoff values.

For the internal validation, bootstrap resampling (1000iterations) was used to test the confirmed model's stability (mean AUROC ;95% CI)

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki. Ethical approval was waived by the Institutional Review Board of Habib Bourguiba University Hospital (Reference: HBUH-2024-APP-01) due to the retrospective nature of the study and use of fully anonymized data. Informed consent was obtained from all participants or their legal guardians.

Funding statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Results

Description of the study population

During the study period, from January 1 to December 31, 2023, 400 patients were admitted to the Sfax General Surgery Department with a diagnosis of acute appendicitis. Among them, 74 patients met the exclusion criteria, including 15 patients under 16 years of age, 25 pregnant women, and 34 patients with non-exploitable medical records. In total, 326 patients were included in the study.

Overall, the median age of the study population was 30 years (IQR = [20–43.2]), and the male/female ratio was 1.14. A total of 141 patients (43.2%) presented within 24 hours of symptom onset. The main comorbidities were diabetes (N=50; 15.3%). Clinically, right iliac fossa pain was present in 94.4% of cases and associated with nausea/vomiting (87.1%) and fever >38.5°C (39.6%). Guarding was noted in 64.7% of patients. Elevated CRP (>6 mg/L) and leukocytosis (>10,000/mm³) were found in 87.7% and 49.1% of cases, respectively. Ultrasound and CT scan confirmed appendicitis in 93% and 97.6% of cases. The most common surgical approach was open appendectomy (56.1%), and the most frequent appendix location was internal latero-cecal (72.2%) (Table 1).

Table 1. Description of the study population (n =326)

Variables	Number	Percentage
Socio-Demographic Factors		
- Male	152	46.6%
- Female	174	53.4%
- Age < 40 years	229	70%
- Age ≥ 40 years	97	29.8%
- Diabetes	50	15.3%
- Obesity	36	11%
Clinical Findings		
- Vomiting	284	87.1%
- Diarrhea	15	4.6%
- Fever ≥ 38.5°C	129	39.6%
- Bowel Obstruction	12	3.6%
- Symptoms ≥ 48 h	112	34.3%
Biological Findings		
- Hemoglobin < 11 g/Dl	147	45.1%
- WBC ≥ 15,000 /mm³	102	31.3%
- CRP ≥ 100 mg/L	102	31.3%
- Neutrophils ≥ 10,000 /mm³	164	50.3%
Radiological Findings		
- RIF Abscess	67	20.5%
- Diffuse Peritoneal Fluid	34	10.4%
- Free Fluid (RIF/Pelvis)	138	42.5%
- Fecalith	27	8.3%
- Fat Stranding	157	93.5%
- Appendix Diameter ≥ 10 mm	**140**	43%

IDF : right iliac fossa ; **CRP :** C-reactive protein

Complicated appendicitis was diagnosed in43.6% of cases, mainly gangrenous appendicitis (50%) and appendiceal abscess (33.8%)

Histologically, 89.8% of specimens confirmed acute appendicitis, with catarrhal (59.8%) and gangrenous forms (21.7%) being most frequent.

The median hospital stay was 2 days (IQR = [3–7]), with postoperative complications occurring in 34.6% of cases.

Factors associated with complicated appendicitis

Univariate analysis

Univariate analysis showed that age >40 years (p<0.001), a history of diabetes (64% vs 39.9%; p = 0.002), and

obesity (63.9% vs 36.1%; p=0.009) were statistically associated with complicated appendicitis.

Furthermore, analysis of clinical factors at admission revealed that the presence of fever and a disease duration of 48 hours or more were significantly associated with complicated appendicitis. Fever was observed in 77.8% of complicated cases versus 22.2% of non-complicated cases (p < 0.001), and a disease duration ≥48 hours was present in 51.6% versus 48,4% (p = 0.001).

Regarding biological factors, leukocytosis ≥15,000/mm³, CRP ≥100 mg/L and neutrophils ≥10,000/mm³ were significantly associated with complicated appendicitis: leukocytosis in 73.5 % vs 26.5% (p < 0.001), CRP ≥100 mg/L in 87.3 % vs 12.7% (p < 0.001), and neutrophils ≥10,000/mm³ in 74.4% vs 25.6% (p < 0.001) .

Radiological factors also demonstrated significant associations: free fluid in the right iliac fossa/pelvis was present in 67.4 % vs 25.7% (p < 0.001), a collection in the right iliac fossa in 97.0 % vs 3% (p < 0.001), diffuse effusion in 88.2 % vs 11.8% (p < 0.001), peri appendiceal fat infiltration in 45.2 % vs 54.8% (p = 0.029), and appendix diameter ≥10 mm in 56.4 % vs 43.6% (p < 0.001) (Table 2) .

Table 2. Univariate analysis of factors associated with complicated acute appendicitis (n=326)

Variables	Complicated Appendicitis (N, %)	Non-Complicated Appendicitis (N, %)	p
Socio-Demographic Factors			
- Male	68 (44.5%)	84 (55.3%)	0.68
- Female	74 (42.5%)	100 (57.5%)	
- Age < 40 years	77 (33.6%)	152 (66.4%)	
- Age ≥ 40 years	65 (67%)	32 (33%)	<0.001
- Diabetes	32 (64%)	18 (36%)	0.002
- Non-diabetic	110 (39.9%)	166 (60.1%)	
- Obesity	23 (63.9%)	13 (36.1%)	0.009
Clinical Findings			
- Vomiting	140 (58.6%)	99 (41.4%)	0.19
- Diarrhea	8 (53.3%)	7 (46.7%)	0.80
- Fever ≥ 38.5°C	107 (77.8%)	22 (22.2%)	<0.001
- Bowel Obstruction	4 (33.3%)	8 (66.7%)	0.10
- Symptoms ≥ 48 h	45 (48.4%)	48 (51.6%)	<0.001
Biological Findings			
- Hemoglobin < 11 g/dL	95 (41.9%)	95 (41.9%)	0.34
- WBC ≥ 15,000 /mm³	75 (73.5%)	27 (26.5%)	<0.001
- CRP ≥ 100 mg/L	89 (87.3%)	13 (12.7%)	<0.001
- Neutrophils ≥ 10,000 /mm³	122 (74.4%)	42 (25.6%)	<0.001
Radiological Findings			
- RIF Abscess	65 (97.0%)	2 (3.0%)	<0.001
- Diffuse Peritoneal Fluid	30 (88.2%)	4 (11.8%)	<0.001
- Free Fluid (RIF/Pelvis)	93 (67.4%)	45 (32.6%)	<0.001
- Fecalith	8 (29.6%)	19 (70.4%)	0.12
- Fat Stranding	135 (45.2%)	164 (54.8%)	0.029
- Appendix Diameter ≥ 10 mm	79 (56.4%)	61 (43.6%)	<0.001

IDF : right iliac fossa ; **CRP :** C-reactive protein

Multivariate analysis

Multivariate logistic regression showed that age ≥40 years (AOR = 3.1; p = 0.002), presence of fever ≥38.5 °C (AOR = 2.3; p = 0.02), leukocyte count ≥15,000/mm³ (AOR = 3.2; p = 0.002), CRP level ≥100 mg/L (AOR = 7.4; p < 0.001), presence of free fluid in the right iliac fossa or pelvis (AOR = 2.1; p = 0.039), and a collection in the right iliac fossa on imaging (AOR = 7.5; p < 0.001) were independent predictive factors for complicated acute appendicitis (Table 3).

Table 3. Multivariate Analysis of Independent Predictors of Complicated Appendicitis

Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Age ≥ 40 years	3.1	[1.5 – 6.4]	0.002
Fever ≥ 38.5°C	2.3	[1.1 – 4.6]	0.02
WBC ≥ 15,000 /mm³	3.2	[1.5 – 6.7]	0.002
CRP ≥ 100 mg/L	7.4	[3.4 – 16.2]	<0.001
Free Fluid in RIF/Pelvis	2.1	[1.1 – 4.1]	0.039
RIF Abscess	7.5	[5.1 – 10.5]	<0.001

AOR: Adjusted Odds Ratio; **CI:** Confidence Interval; **CRP:** C-Reactive Protein; **RIF:** Right Iliac Fossa.

Scoring System for Predicting Complicated Appendicitis

Based on the values of the regression coefficients, a weighted score was assigned to each independent predictor of complicated acute appendicitis. Age ≥ 40 years was assigned 3 points, and Fever (T° ≥ 38.5°C) 2 points (Table 4).

Table 4. Score assigned to independent predictors associated with complicated acute appendicitis

Co-variables	Regression coefficients	AOR	Predictive index (PI)
Age ≥ 40 ans	1,1	3,1	3
Fever (T°≥ 38,5)	0,8	2,3	2
Leukocytes ≥ 15 000	1,1	3,2	3
CRP ≥ 100 mg/L	2	7,4	5
Free effusion at the IDF or pelvic level	0,7	2,1	2
IDF collection	3,1	7,5	5

IDF : right iliac fossa ; **CRP :** C-reactive protein

The final predictive model was converted into a scoring system using the following formula based on β-coefficients:

Final Predictive Score

Patients receive:

- Age ≥40 years = 3 points
- Fever ≥38.5°C = 2 points
- WBC ≥15,000/mm³ = 3 points
- CRP ≥100 mg/L = 5 points
- Free fluid in the RIF/pelvis = 2 points
- RIF collection = 5 points

Total score range: 0–20 points.
The analysis of the summed score showed a median value of 4 (IQR = [2–12]), with extremes ranging from 0 to 20.

Validation of the scoring system

The AUROC of this score was 0.90 (95% CI: 0.80–0.93; $p < 0.001$), indicating an excellent predictive ability for complicated forms of acute appendicitis.
According to the ROC curve (Figure 1), the threshold providing the best sensitivity and specificity was 6, yielding a sensitivity of 80% and a specificity of 90%. At this threshold, the positive and negative predictive values were 85% each. The diagnostic accuracy was 84.9%.
Internal validation using bootstrap resampling (1000 iterations) confirmed the model's stability (mean AUROC: 0.88, 95% CI: 0.85-0.91). The Hosmer-Lemeshow goodness-of-fit test demonstrated adequate calibration of the model ($p > 0.05$)

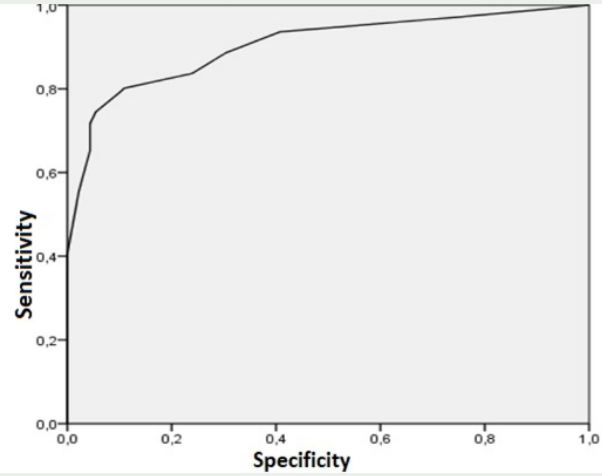


Figure 1. the curve ROC

Discussion

This study developed and validated a novel scoring system that accurately predicts complicated acute appendicitis using six readily available clinical parameters. Our model demonstrated excellent discriminative ability (AUROC: 0.90) and high specificity (90%), making it particularly valuable for avoiding unnecessary surgeries in uncomplicated cases.
Acute appendicitis remains a common condition and a major cause of digestive surgery in Tunisia [1]. Although appendectomy has long been considered the gold standard treatment, the emergence of non-surgical strategies, particularly for uncomplicated cases, has challenged this systematic approach [10]. This evolution underscores the need to better distinguish between complicated and uncomplicated forms in order to tailor management and minimize the risk of complications [11]. In this study, we identified several significant predictive factors for complicated acute appendicitis, encompassing socio-demographic, clinical, biological, and radiological aspects. These findings align with efforts to optimize patient management and reduce complications associated with this surgery.
Among socio-demographic factors, age over 40, a history of diabetes, and obesity were found to be major elements associated with an increased risk of complications [6]. These observations are consistent with the literature, which highlights that advanced age and metabolic comorbidities impair immune response and tissue repair capacity, thereby promoting progression to severe forms of appendicitis [10]. These factors should therefore be considered during the initial evaluation of patients, as they may influence therapeutic decision-making.
On the clinical level, the presence of fever and a disease duration exceeding 48 hours were identified as strong indicators of complications. Fever, in particular, reflects a systemic inflammatory response, often associated with severe infection or appendiceal perforation [4]. Similarly, a prolonged delay before medical management increases the risk of perforation and infection spread, which aligns with current recommendations emphasizing early intervention [11]. These simple yet relevant clinical elements should prompt heightened vigilance in patients presenting with these characteristics.
Biological markers also played a central role in our study. Leukocytosis ≥15,000 and CRP ≥100 mg/L were identified as independent predictors of complications these results are consistent with those found in the literature [10]. These parameters reflect an intense inflammatory response and are often associated with severe infectious processes [3]. Their use in clinical practice could help stratify patients at risk of complications and guide therapeutic management [6,7]. For example, elevated values of these markers might justify rapid surgical intervention, even in the absence of obvious clinical signs of complications.
Radiological criteria confirmed their predictive value in identifying complicated forms [8]. The presence of free fluid, a collection in the right iliac fossa, or an appendiceal diameter ≥10 mm was significantly associated with an increased risk of complications. These elements, combined with clinical and biological data, allow for a more accurate assessment of appendicitis severity and justify a multidisciplinary diagnostic and therapeutic approach. Imaging, particularly ultrasound and CT scans, remains an essential tool to guide management [8].
These results are largely consistent with the literature. Several studies have already emphasized the importance of age, comorbidities, biological markers, and radiological criteria in predicting complicated appendicitis[5,8–11]. However, our study provides additional validation of these factors in a Tunisian context, while proposing an integrated approach combining multiple aspects for a comprehensive evaluation. This multidisciplinary approach could serve as a basis for developing decision-making algorithms aimed at optimizing patient management. Clinically, these findings have direct implications. The combination of identified factors could enable better patient stratification and adaptation of therapeutic strategies based on the risk of complications. For example, in patients with multiple risk factors (age > 40, fever, marked hyperleukocytosis, suggestive radiological criteria), rapid surgical intervention might be prioritized. Conversely, in low-risk patients, a

non-surgical approach could be considered under close monitoring. This personalized management could help reduce complications and improve patient outcomes [12]. Diagnostic scores have been developed to distinguish between uncomplicated acute appendicitis and complicated acute appendicitis. Clinical-biological scores play a key role in evaluating acute appendicitis and distinguishing between its complicated (perforation, abscess, peritonitis) and uncomplicated forms. The Alvarado score, widely used, combines clinical criteria (migratory pain, anorexia, nausea, right iliac fossa tenderness, rebound sign, fever) and biological markers (leukocytosis, neutrophilia) to stratify risk, but its ability to differentiate complicated forms is limited [13]. The Appendicitis Inflammatory Response (AIR) score, more recent, incorporates markers such as CRP and marked neutrophilia, offering better accuracy for identifying complications [14]. The RIPASA score, adapted for Asian populations, includes additional demographic and clinical criteria, with high sensitivity but variable specificity [15]. The Tzanakis score combines clinical, biological, and ultrasound data, making it particularly useful for detecting complications through imaging [16]. Finally, scores like Ohmann [17] and the Appendicitis Acuta Score (AAS) [18] are also used, though less frequently, with a focus on inflammatory markers like CRP. These tools, though imperfect, guide management alongside imaging (ultrasound, CT) for an accurate assessment of complicated forms.

These studies and scores provide valuable tools for differentiating between complicated and uncomplicated acute appendicitis, enabling more targeted and effective therapeutic management. However, some scores may be challenging to use due to subjective criteria that may not always correlate with intraoperative and histopathological findings.

Strengths of Our study

Our score stands out for two key aspects that make it particularly robust and reliable in diagnosing complicated acute appendicitis: Firstly, score boasts the highest specificity among existing scores, with a value of 80%. This high specificity minimizes false positives, which is critical for avoiding unnecessary surgical interventions in patients with uncomplicated acute appendicitis. This performance makes it a particularly useful tool for clinicians seeking to avoid overdiagnosis and ensure optimal patient management. Secondly, it has a unique Anatomopathologique and Perioperative Correlation. In fact, unlike other studies, our score was developed by incorporating real anatomopathologique findings and perioperative observations in patients with complicated acute appendicitis. This unique approach validates the clinical, biological, and radiological criteria by directly correlating them with histopathological results and surgical findings. This direct correlation enhances the score's reliability and ensures that it accurately reflects the characteristics of complicated acute appendicitis as seen in clinical practice.

In summary, our score distinguishes itself not only through its high specificity but also by its ability to rely on anatomopathologique and perioperative correlation, making it an unprecedented and highly relevant diagnostic tool for the management of patients with acute appendicitis. This makes it particularly suitable for resource-limited settings where advanced imaging may not be readily available (Table 5).

Tableau 5. Comparison of Predictive Performance Between Different Appendicitis Scoring Systems in literature

Scoring System	Variables Included	AUROC	Sensitivity	Specificity	Complexity
Our Score	6	0.90	80	90	Low
Alvarado [13]	8	0.72	82%	65%	Low
AIR [14]	8	0.85	88%	79%	Medium
RIPASA [15]	10	0.87	90%	75%	High

Study limitation

However, this study has several limitations. First, it was a retrospective study, which may introduce selection or measurement biases. Additionally, it was a single- center study, which might limit the generalizability of the results at a national level. Larger and multi-center prospective studies are needed to better validate these conclusions and to explore other potential predictive factors, such as innovative biological markers or integrated clinical scores.

Perspective implementation

The proposed score can be easily integrated into clinical practice at Habib Bourguiba University Hospital and similar institutions in southern Tunisia. Its simplicity allows for rapid calculation at patient admission, potentially guiding early surgical decision-making. However, multicenter validation across different Tunisian regions is necessary to confirm its generalizability. Moreover, external validation of this score is mandatory to use it in authentic clinical situations.

Conclusion

This study led to the development of a simple predictive score based on six readily available clinical, biological, and radiological variables for the early identification of complicated acute appendicitis. The score demonstrated excellent discrimination and good internal validity and may assist clinicians in therapeutic decision-making. External validation in multicenter prospective cohorts is warranted before widespread implementation.

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