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Original Article

Predicting postoperative recurrence of auricular pseudocyst: key factors and risk models

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Abstract: Objective: To investigate the factors influencing postoperative recurrence of auricular pseudocysts and to develop recurrence risk prediction models using logistic regression and Cox regression analyses. Methods: This retrospective study analyzed clinical data from 215 patients who underwent surgical treatment for auricular pseudocysts between January 2015 and December 2022. Univariate analysis identified factors associated with recurrence, which were further assessed using multivariate logistic regression and Cox regression. Recurrence prediction models were constructed, and their predictive performance was evaluated using receiver operating characteristic (ROC) curves and area under the curve (AUC) values. Results: Univariate analysis identified age, cyst size, surgical approach, and postoperative adjuvant therapy as significant factors associated with postoperative recurrence ($P<0.05$). Multivariate logistic regression and Cox regression identified age <53.5 years, cyst size <2.5 cm, fenestration surgery, and absence of postoperative adjuvant therapy as protective factors against recurrence ($P<0.05$). The constructed models showed stable AUC values for 90-day and 120-day predictions (AUC = 0.718). No significant difference in predictive performance was observed between logistic regression and Cox regression models for 6-month recurrence risk ($P = 0.934$). Conclusion: Age, cyst size, surgical approach, and postoperative adjuvant therapy are critical factors influencing postoperative recurrence of auricular pseudocysts. The recurrence prediction models based on logistic regression and Cox regression demonstrate high efficiency in predicting short-term recurrence and can guide postoperative management strategies.

Keywords: Auricular pseudocyst, postoperative recurrence, logistic regression, cox regression, prediction model, influencing factors

Introduction

Auricular pseudocyst is a common benign ear condition characterized by localized swelling, painless elevation, and cystic fluid accumulation [1]. It primarily affects middle-aged and young adult males. While its exact etiology remains unclear, potential triggers include external trauma, chronic inflammatory responses, and serous fluid formation following local tissue damage [2]. Involvement of the auricular cartilage can lead to morphological alterations and eventual deformity if left untreated. Although the condition is not life-threatening, its aesthetic impact, high recurrence rate, and associated psychological and economic burdens significantly affect patients' quality of life [3]. This highlights the need for improved clinical treatment and management strategies.

Surgical intervention remains the primary treatment for auricular pseudocysts, with methods including through-and-through suturing and fenestration techniques. However, high post-surgical recurrence rates pose significant challenges [4, 5]. Recent innovations, such as negative pressure drainage and dental silicone mold fixation, have shown promise in reducing recurrence while preserving ear aesthetics [6, 7]. Recurrence may be influenced by multiple factors, including patient age, cyst size, surgical technique, and postoperative management [8, 9]. Despite advancements in surgical and non-surgical treatments emerging, further optimization remains necessary.

Previous research has primarily focused on improving surgical techniques and analyzing individual variables related to recurrence, lack-

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ing a systematic assessment of recurrence risks [10]. Notably, studies employing comprehensive approaches to predict recurrence risk of auricular pseudocysts remain scarce. For clinicians, predicting post-surgical recurrence and establishing individualized postoperative management strategies are crucial [11]. Presently, recurrence predictions rely largely on clinical experience rather than scientifically robust quantitative methods or predictive models. Therefore, a systematic investigation of influencing factors and the development of an effective risk prediction model would not only optimize treatment strategies and also provide essential guidance for managing high-risk patients.

In this study, we integrated multiple factors influencing post-surgical recurrence of auricular pseudocysts using statistical methods. We evaluated factors such as age, cyst size, surgical approach, and postoperative auxiliary treatments, and constructed recurrence risk prediction models using both logistic and Cox regression analyses. Additionally, we explored time-dependent recurrence patterns and compared the predictive performance of different models, thereby providing a new theoretical foundation for early intervention and postoperative management.

Methods and materials

Clinical data

A retrospective analysis was conducted on data from 215 patients who underwent surgical treatment for auricular pseudocysts at Ankang Central Hospital and Xi'an People's Hospital between January 2015 and December 2022. This study was approved by the Medical Ethics Committee of Xi'an People's Hospital.

Inclusion and exclusion criteria

Inclusion criteria: (1) Patients diagnosed with auricular pseudocysts [2] and treated surgically. (2) Complete clinical and laboratory records available before and after surgery. (3) A minimum postoperative follow-up of six months. (4) No other severe auricular conditions (e.g., auricular trauma or malignant tumors).

Exclusion criteria: (1) Patients with severe systemic diseases (e.g., malignant tumors or immune system disorders). (2) Patients lost to follow-up or with incomplete records during the follow-up period. (3) Patients who underwent additional auricular surgeries for reasons other than the pseudocyst.

Data collection

Clinical and laboratory data were extracted from the hospital's electronic medical record system and follow-up records. The data comprised:

(1) *Demographic Data:* Age, sex, height, weight, and body mass index (BMI). (2) *Medical History:* Smoking history, alcohol consumption, diabetes, and hypertension. (3) *Surgical Information:* Details of the surgical approach (e.g., transfixion suture, fenestration), duration of surgery, cyst size, and cyst location (e.g., scaphoid fossa or triangular fossa). (4) *Postoperative Management:* Adjuvant therapy information (e.g., local drainage, antibiotic use) and postoperative complications (e.g., infection, hematoma).

Follow-up

Patients underwent regular outpatient follow-ups starting immediately after surgery and continuing until June 2023. The follow-up protocol included a mandatory 6-month postoperative examination.

Outcome measures

Primary outcome: Development and evaluation of a predictive model for the recurrence risk of auricular pseudocysts, assessed via ROC curves and AUC values.

Secondary outcomes: Comparison of baseline characteristics between patients with and without recurrence, correlation analysis among variables (using Spearman's test), and evaluation of predictive variables through cumulative incidence curves.

Statistical analysis

Data analysis was performed using SPSS 26.0 (IBM Corporation, USA). Normally distributed continuous variables were expressed as mean ± standard deviation (Mean ± SD) and compared between groups using the indepen-

dent-samples t-test. Non-normally distributed variables were presented as median (interquartile range) and compared using the Mann-Whitney U test. Categorical variables were expressed as frequencies and percentages, and comparisons were made using the chi-square test or Fisher's exact test. Variables showing statistical significance in univariate analysis were subsequently entered into a multivariate logistic regression model to identify independent risk factors for auricular pseudocyst recurrence. Additionally, Cox regression analysis was performed to assess long-term recurrence risk. ROC curves were generated to evaluate the predictive performance of the recurrence risk models, with the DeLong test used to compare AUC values. Figures were produced using the ggplot2 package in R version 4.3.3, and statistical significance was defined as $P<0.05$.

Results

Comparison of clinical characteristics between recurrence and non-recurrence groups

The recurrence group exhibited a significantly higher mean age compared to the non-recurrence group ($P<0.001$). Cyst size was also significantly larger in the recurrence group ($P = 0.006$). Regarding surgical technique, transfixion suturing was more frequently performed in the recurrence group, whereas fenestration surgery predominated in the non-recurrence group ($P<0.001$). Additionally, a higher proportion of patients in the recurrence group received postoperative adjuvant therapy (37.04% vs. 21.12%, $P = 0.020$) and experienced postoperative complications (18.52% vs. 6.21%, $P = 0.007$). No significant differences were found between the groups in terms of gender distribution, diabetes history, hypertension, smoking, alcohol consumption, affected side, or cyst location ($P>0.05$) (**Table 1**).

Correlation analysis of significant variables

Correlation analysis revealed a weak positive correlation between cyst size and surgical approach (correlation coefficient: 0.185, $P = 0.006$) and between postoperative complications and surgical approach (correlation coefficient: 0.247, $P<0.001$). Correlations among the remaining variables were weak ($|R|<0.1$) and not statistically significant ($P>0.05$) (**Figure 1**).

Multivariate logistic regression analysis of recurrence-related factors

Multivariate logistic regression identified *age* (OR = 0.269, 95% CI: 0.132-0.533, $P<0.001$), *cyst size* (OR = 0.439, 95% CI: 0.215-0.877, $P = 0.021$), *surgical approach* (OR = 0.385, 95% CI: 0.183-0.788, $P = 0.010$), *postoperative adjuvant therapy* (OR = 0.364, 95% CI: 0.170-0.770, $P = 0.008$) as significant variables that associated with recurrence. However, postoperative complications were not significantly associated with recurrence (OR = 0.421, 95% CI: 0.144-1.233, $P = 0.112$) (**Table 2**).

ROC curve analysis and prediction model construction

ROC curves were generated for the four significant variables (age, cyst size, surgical approach, and postoperative adjuvant therapy) to evaluate their predictive performance. The surgical approach demonstrated the highest discriminative ability (AUC = 0.835), followed by cyst size (AUC = 0.607) and age (AUC = 0.647), whereas postoperative Adjuvant therapy exhibited low predictive performance (AUC = 0.582). A comprehensive prediction model was developed based on the logistic regression model:

Risk = Age × (-1.314) + Cyst Size × (-0.823) + Surgical Method × (-0.954) + Postoperative Adjuvant Therapy × (-1.010).

This model achieved an overall AUC of 0.787. The DeLong test confirmed that the AUC of the comprehensive model was significantly higher than that of the individual variables (**Figure 2**).

Univariate cox regression analysis and cumulative incidence curve analysis

Univariate Cox regression analysis identified age ($P<0.001$), cyst size ($P = 0.006$), surgical approach ($P = 0.001$), postoperative adjuvant therapy ($P = 0.021$), and postoperative complications ($P = 0.002$) as factors significantly associated with recurrence risk. Specifically:

(1) Patients aged <53.5 years had a significantly lower recurrence risk compared to those

Table 1. Comparison of clinical characteristics between recurrence and non-recurrence groups

Variable	Recurrence Group (n = 54)	Non-Recurrence Group (n = 161)	t/Z/χ^2	*P*-value
Age (years)	54.80±6.17	51.35±4.51	-4.398	<0.001
BMI (kg/m^2)	23.14±2.63	23.39±2.83	0.576	0.565
Disease duration (months)	10.00 [9.00, 11.00]	10.00 [9.00, 11.00]	0.15	0.881
Surgery duration (min)	53.17±9.36	53.53±9.84	0.236	0.813
Gender			0.772	0.38
Male	40 (74.07%)	109 (67.70%)		
Female	14 (25.93%)	52 (32.30%)		
Diabetes history			0.095	0.758
Yes	4 (7.41%)	10 (6.21%)		
No	50 (92.59%)	151 (93.79%)		
Hypertension history			0.334	0.563
Yes	8 (14.81%)	19 (11.80%)		
No	46 (85.19%)	142 (88.20%)		
Smoking history			0.159	0.69
Yes	43 (79.63%)	124 (77.02%)		
No	11 (20.37%)	37 (22.98%)		
Alcohol consumption history			0.97	0.325
Yes	8 (14.81%)	16 (9.94%)		
No	46 (85.19%)	145 (90.06%)		
Affected side			0.186	0.666
Left side	29 (53.70%)	81 (50.31%)		
Right side	25 (46.30%)	80 (49.69%)		
Cyst location			0.557	0.757
Scaphoid fossa	23 (42.59%)	78 (48.45%)		
Triangle fossa	15 (27.78%)	40 (24.84%)		
Others	16 (29.63%)	43 (26.71%)		
Cyst size			7.451	0.006
≥2.5 cm	33 (61.11%)	64 (39.75%)		
<2.5 cm	21 (38.89%)	97 (60.25%)		
Surgical method			11.775	<0.001
Suturing	36 (66.67%)	64 (39.75%)		
Fenestration	18 (33.33%)	97 (60.25%)		
Postoperative adjuvant therapy			5.448	0.02
Yes	20 (37.04%)	34 (21.12%)		
No	34 (62.96%)	127 (78.88%)		
Postoperative complications			7.26	0.007
Yes	10 (18.52%)	10 (6.21%)		
No	44 (81.48%)	151 (93.79%)		

Note: BMI: Body Mass Index.

aged ≥53.5 years (HR = 0.349, 95% CI: 0.202-0.604). (2) Cysts <2.5 cm were associated with a significantly lower recurrence risk compared to larger cysts (HR = 0.463, 95% CI: 0.268-0.800). (3) Fenestration surgery resulted in a significantly lower recurrence risk compared to transfixion suture (HR = 0.374, 95% CI: 0.213-0.659). (4) Patients not receiving postoperative adjuvant therapy exhibited a significantly lower recurrence risk than those who did (HR = 0.522, 95% CI: 0.300-0.908). (5) Patients without postoperative complications had a significantly lower recurrence risk compared to those with complications (HR = 0.343, 95% CI: 0.172-0.682). Cumulative incidence curves further confirmed significant differences in recurren-

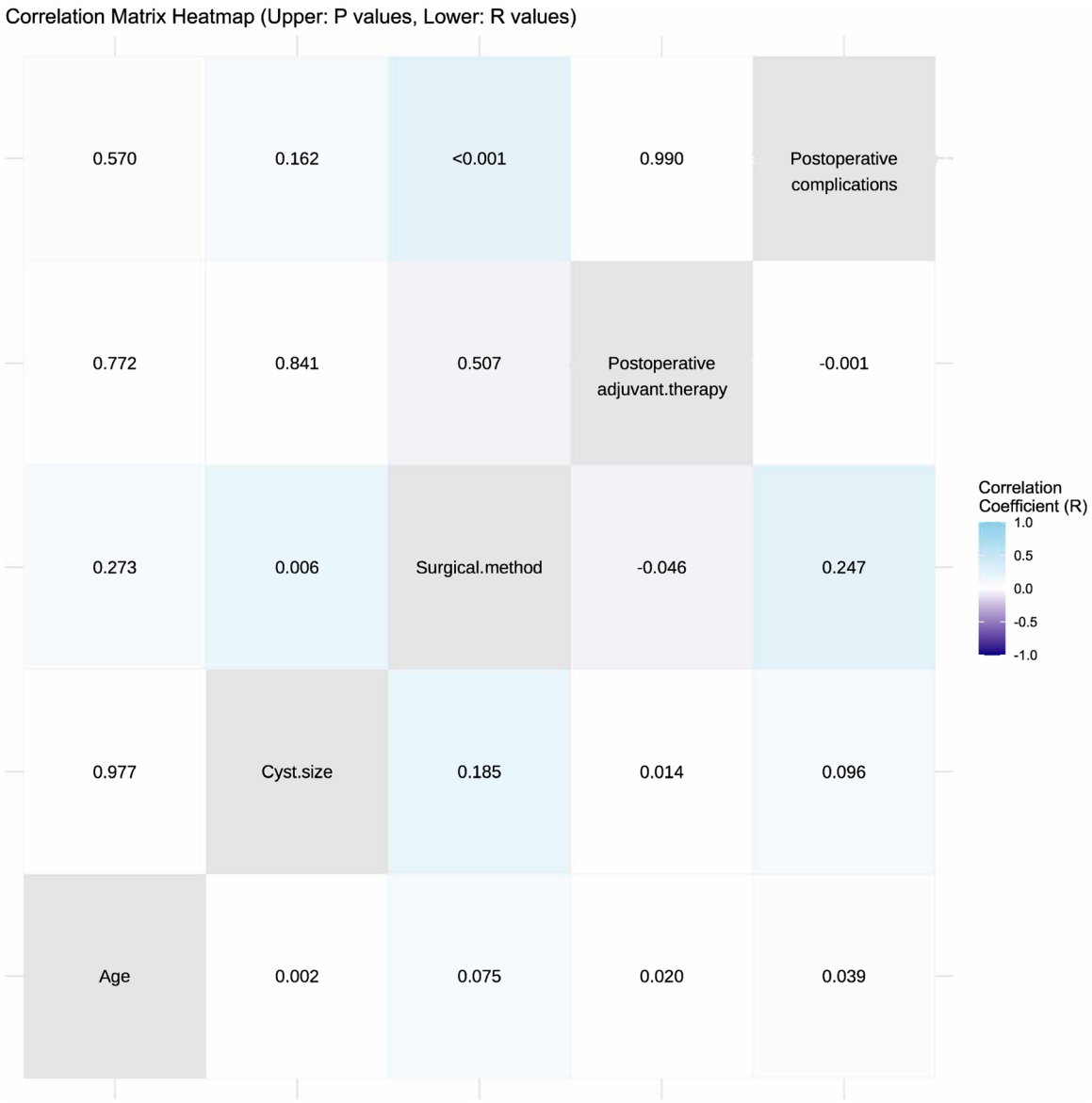

Figure 1. Correlation heatmap of variables with differential significance (Upper Triangle: *P*-values, Lower Triangle: Correlation Coefficient R-values).

ce rates across the various subgroups (**Table 3**; **Figure 3**).

Multivariate cox regression analysis of recurrence-related factors

Multivariate Cox regression analysis reaffirmed that age, cyst size, surgical approach, and postoperative adjuvant therapy were significantly associated with recurrence risk, whereas postoperative complications were not statistically significant (P = 0.075). Specifically:

(1) Patients aged <53.5 years exhibited a lower recurrence risk than those aged ≥53.5 years (HR = 0.359, 95% CI: 0.207-0.621, P<0.001). (2) Cysts <2.5 cm were linked to a lower recurrence risk relative to larger cysts (HR = 0.558, 95% CI: 0.320-0.973, P = 0.040). (3) Fenestration surgery was associated with a lower recurrence risk compared to transfixion suture (HR = 0.470, 95% CI: 0.259-0.853, P = 0.013). (4) Absence of postoperative adjuvant therapy correlated with a reduced recurrence risk (HR = 0.527, 95% CI: 0.302-0.920, P = 0.024).

Although postoperative complications showed an HR of 0.517 (95% CI: 0.250-1.069), the result did not reach statistical significance (P =

Table 2. Results of multivariate logistic regression analysis

Variable	Estimate	Std Error	*P* Value	OR	Lower	Upper
Age (≥53.5 vs. <53.5)	-1.314	0.355	<0.001	0.269	0.132	0.533
Cyst size (≥2.5 vs. <2.5)	-0.823	0.357	0.021	0.439	0.215	0.877
Surgical method (≥53.5 vs. <53.5)	-0.954	0.37	0.010	0.385	0.183	0.788
Postoperative adjuvant therapy (Yes vs. No)	-1.01	0.383	0.008	0.364	0.17	0.77
Postoperative complications (Yes vs. No)	-0.865	0.543	0.112	0.421	0.144	1.233

Note: OR: Odds Ratio, Std Error: Standard Error, CI: Confidence Interval; The measurement data are classified according to the calculation of Cut-off value, and the counting data are assigned according to the original classification type.

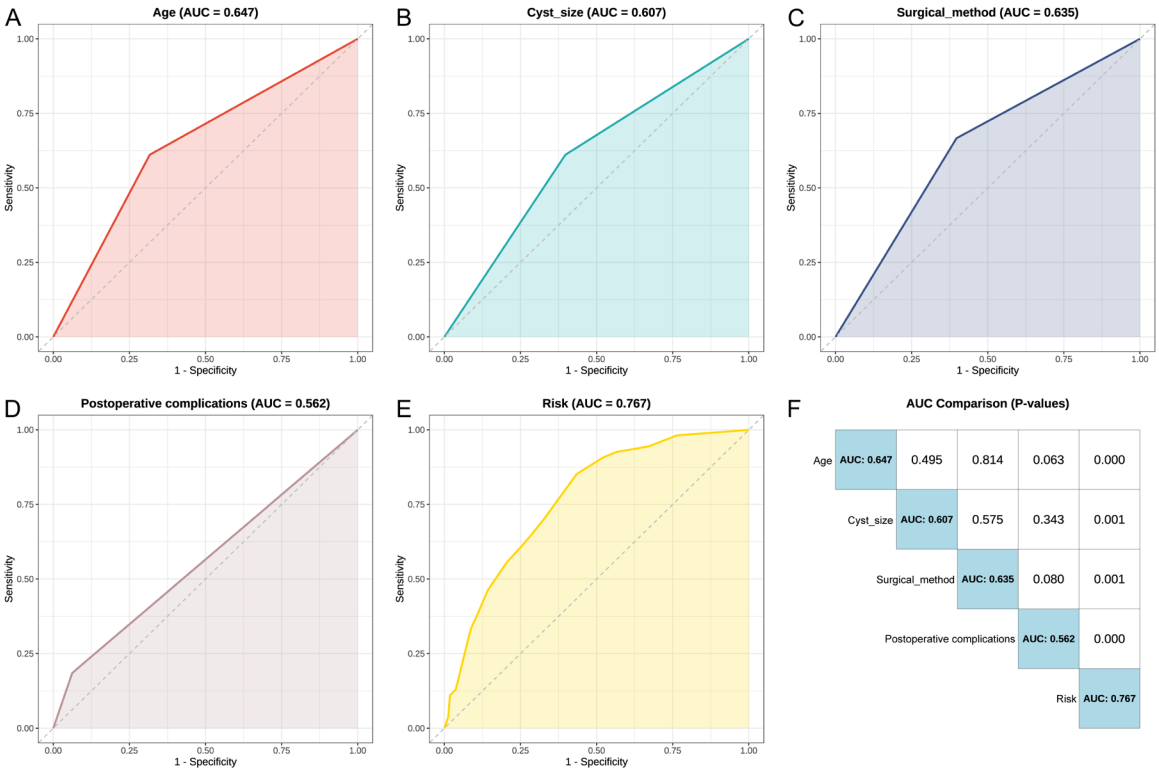

Figure 2. ROC curves of recurrence-related variables and predictive model performance comparison. A. ROC curve of age in predicting patient recurrence (AUC = 0.647); B. ROC curve of cyst size in predicting patient recurrence (AUC = 0.607); C. ROC curve of surgical method in predicting patient recurrence (AUC = 0.835); D. ROC curve of postoperative auxiliary treatment in predicting patient recurrence (AUC = 0.582); E. ROC curve of comprehensive risk prediction model constructed by multi-factor Logistic regression (AUC = 0.787); F. Delong test showing AUC value comparisons between variables and corresponding *P*-values. Note: ROC: Receiver Operating Characteristic, AUC: Area Under Curve.

0.075) (**Table 4**). These findings align with the logistic regression analysis, thereby reinforcing the relevance of these factors in predicting recurrence risk.

Construction of cox regression prediction model and comparison with logistic regression

A recurrence risk prediction model was constructed using coefficients derived from Cox regression (incorporating age, cyst size, surgical approach, and postoperative adjuvant therapy). ROC curves for 90-day and 120-day predictions demonstrated stable predictive performance, with both time points achieving an AUC of 0.718. Comparison of the Cox regression and logistic regression models for predicting 6-month recurrence risk revealed no significant difference in their ROC curves (Z = -0.083, P = 0.934). The difference in AUC val-

Table 3. Results of univariate cox regression analysis

Variable	Beta	Std Err	*P* Value	HR	Lower	Upper
Age						
≥53.5						
<53.5	-1.052	0.28	<0.001	0.349	0.202	0.604
Cyst size						
≥2.5 cm						
<2.5 cm	-0.77	0.279	0.006	0.463	0.268	0.8
Surgical method						
Suturing						
Fenestration	-0.983	0.289	0.001	0.374	0.213	0.659
Postoperative adjuvant therapy						
Yes						
No	-0.649	0.282	0.021	0.522	0.3	0.908
Postoperative complications						
Yes						
No	-1.07	0.351	0.002	0.343	0.172	0.682

Note: HR: Hazard Ratio, Std Err: Standard Error, CI: Confidence Interval; The measurement data are classified according to the calculation of Cut-off value, and the counting data are assigned according to the original classification type.

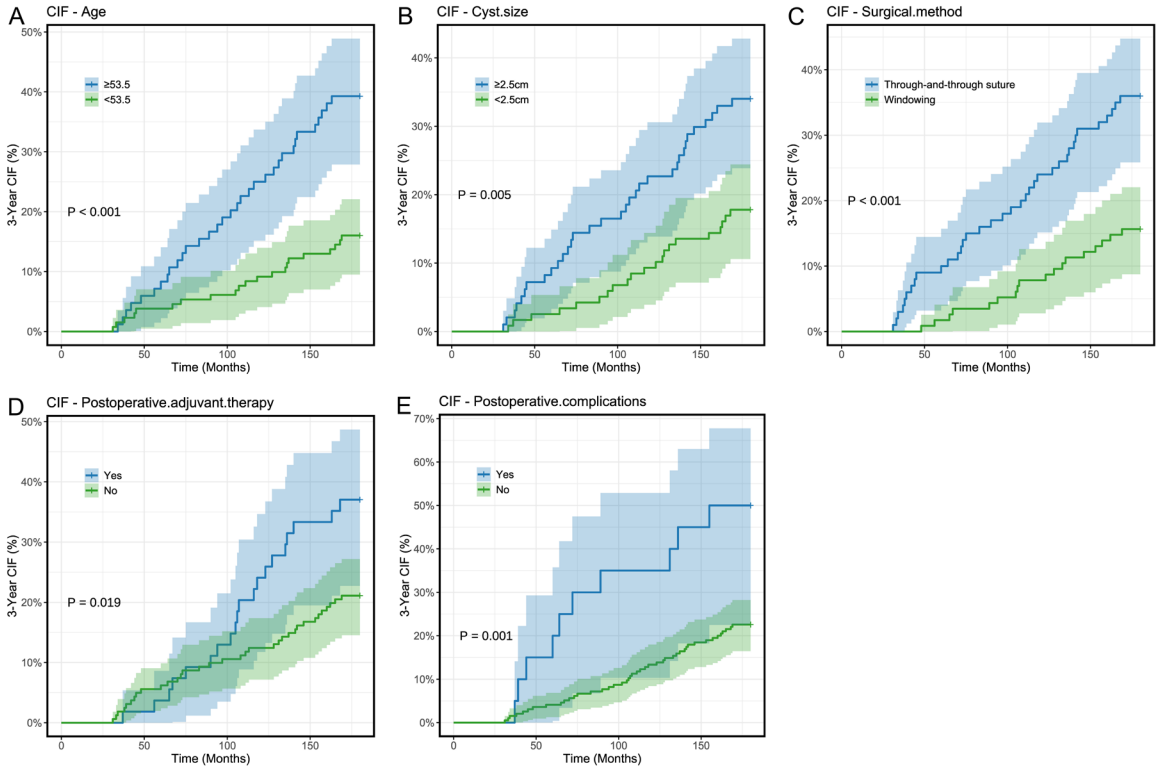

Figure 3. Cumulative incidence curves for univariate significant indicators. A. Cumulative incidence curves for patients in different age groups (P<0.001); B. Cumulative incidence curves for patients in different cyst size groups (P = 0.006); C. Cumulative incidence curves for patients in different surgical method groups (P = 0.001); D. Cumulative incidence curves for patients in different postoperative auxiliary treatment groups (P = 0.021); E. Cumulative incidence curves for patients in different postoperative complication groups (P = 0.002). Note: Cumulative Incidence Function, HR: Hazard Ratio, CI: Confidence Interval.

Table 4. Results of multivariate cox regression analysis for recurrence-related factors

Variable	Beta	Std Err	*P* Value	HR	Lower	Upper
Age						
≥53.5						
<53.5	-1.025	0.28	0	0.359	0.207	0.621
Cyst size						
≥2.5 cm						
<2.5 cm	-0.583	0.283	0.04	0.558	0.32	0.973
Surgical method						
Suturing						
Fenestration	-0.756	0.304	0.013	0.47	0.259	0.853
Postoperative adjuvant therapy						
Yes						
No	-0.641	0.284	0.024	0.527	0.302	0.92
Postoperative complications						
Yes						
No	-0.66	0.371	0.075	0.517	0.25	1.069

Note: HR: Hazard Ratio, Std Err: Standard Error, CI: Confidence Interval.

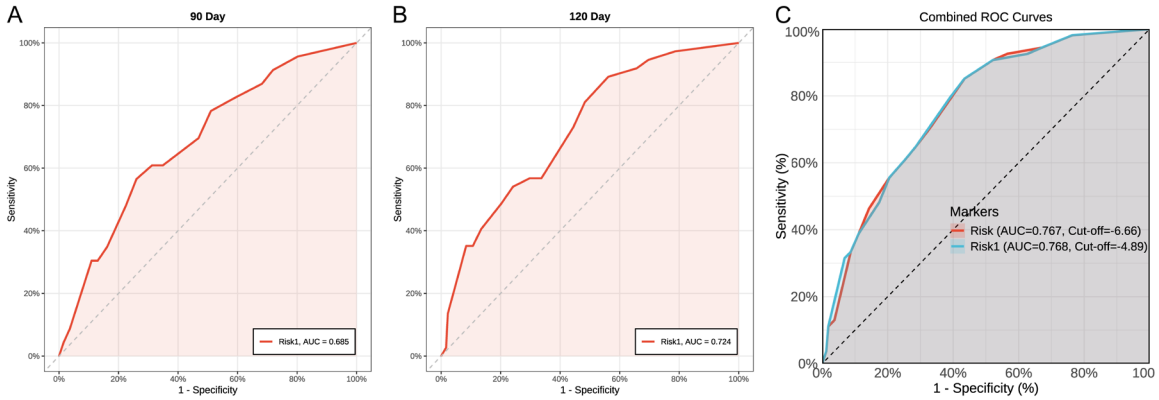

Figure 4. ROC curves of cox regression prediction model and comparison with logistic regression model. A. ROC curve of Cox regression prediction model for recurrence at 90 days (AUC = 0.718); B. ROC curve of Cox regression prediction model for recurrence at 120 days (AUC = 0.718); C. Comparison of ROC curves for Cox and Logistic regression prediction models within 6 months (Z = -0.083, P = 0.934). Note: ROC: Receiver Operating Characteristic, AUC: Area Under Curve, Risk: Logistic Regression Prediction Model, Risk1: Cox Regression Prediction Model.

ues was -0.001 (95% CI: -0.014 to 0.013), indicating that both models performed similarly in short-term risk prediction (**Figure 4**).

Discussion

This study systematically analyzed factors influencing postoperative recurrence of auricular pseudocysts, identifying age, cyst size, surgical approach, and postoperative adjuvant therapy as significant protective factors. Both logistic and Cox regression analyses consistently confirmed these variables, and the predictive models demonstrated high efficacy in short-term recurrence prediction (AUC = 0.718 for both 90-day and 120-day forecasts), underscoring their clinical utility.

Age and recurrence risk

Patients younger than 53.5 years exhibited a significantly lower recurrence risk compared to older patients (HR = 0.359, OR = 0.269, P< 0.001). This may be attributable to reduced metabolic activity and regenerative capacity in older auricular cartilage, as well as increased

systemic chronic inflammation. Previous studies have similarly reported higher recurrence risks in older patients, suggesting that age-related changes in tissue repair mechanisms are crucial determinants [12, 13].

Cyst size and recurrence risk

Smaller cysts (<2.5 cm) were associated with a lower recurrence risk compared to larger cysts (HR = 0.558, OR = 0.439, P = 0.021). Larger cysts may increase local pressure, impair blood supply, and hinder tissue repair, in addition to complicating complete surgical excision. These findings are consistent with previous studies that emphasize the role of lesion size in recurrence risk [14, 15].

Surgical approach and recurrence risk

Fenestration surgery significantly reduced recurrence risk compared to transfixion suturing (HR = 0.470, OR = 0.385, P = 0.010). Improved drainage and reduced local tissue tension associated with fenestration likely contribute to this effect. Supporting evidence from studies by Lee et al. [16], Ungar et al. [17], and a systematic review by Ballan et al. [18] further corroborates the benefits of this surgical approach. Additionally, Tian et al. [1] demonstrated that combining transfixion suture with anterior cartilage excision may further reduce recurrence risk by addressing local tissue characteristics.

Postoperative adjuvant therapy and recurrence risk

Patients who did not receive postoperative adjuvant therapy showed a lower recurrence risk (HR = 0.527, OR = 0.364, P = 0.008). Although this finding may partially reflect selection bias (with more complex cases receiving adjuvant therapy), it emphasizes the need for optimizing postoperative protocols. Recent studies have explored various approaches - ranging from compression dressings and daily flushing [9] to corrugated drainage splints [19, 20] and enhanced negative-pressure drainage [21, 22] - all aiming at reducing recurrence while preserving auricular aesthetics. Further research is needed to determine the long-term efficacy of these therapies.

Logistic regression vs. cox regression

While logistic regression models are useful for predicting recurrence at a fixed time point, Cox regression models offer a dynamic evaluation of risk over time [23, 24]. In our study, both methods yielded comparable short-term predictive performance. However, the Cox regression model's ability to evaluate risk at multiple time points offers a more comprehensive understanding of disease progression.

Clinical application of the models

The predictive models developed in this study can assist clinicians in preoperative risk stratification and formulating individualized treatment plans for high-risk patients [25, 26]. For instance, high-risk patients might be preferentially managed with fenestration surgery and receive enhanced postoperative follow-up. Additionally, quantifying recurrence risk can improve patient education and postoperative compliance.

This study provides a scientific basis for preoperative risk assessment and postoperative management by identifying key factors influencing auricular pseudocyst recurrence. The developed prediction models enable quantification of recurrence risk, optimization of surgical strategies, and individualized postoperative care.

Study limitations and future directions

Several limitations should be noted. The sample size was relatively small, and the single-center design may introduce selection bias. The follow-up period was relatively short, leaving some long-term outcomes uncertain. Moreover, pathological and molecular biological characteristics of the cyst tissue were not assessed, potentially omitting important mechanistic insights. Finally, the prediction models have not been externally validated, and their generalizability requires further exploration. Future studies should involve larger, multicenter cohorts, integrate molecular and imaging analyses, and explore advanced postoperative therapies and artificial intelligence applications in patient management.

Conclusion

This study systematically analyzed factors influencing postoperative recurrence of auricular pseudocysts and developed predictive models based on logistic and Cox regression analyses. Both models demonstrated high efficacy in short-term recurrence prediction, providing valuable insights for preoperative evaluation, postoperative follow-up, and individualized management. These findings lay a robust foundation for future research and clinical practice in the management of auricular pseudocysts.

Disclosure of conflict of interest

None.

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References

[1] Tian C, Xie W, Chen L, Liu X and Hao Z. Application effect of modified through and through suture in anterior chondrectomy of auricular pseudocyst. Clin Cosmet Investig Dermatol 2023; 16: 537-543.

[2] Agrawal PU, Patel KB, Chauhan VF and Nagani SM. Pseudocyst of auricle-an uncommon condition and novel approach for management. Indian Dermatol Online J 2020; 11: 789-791.

[3] Mane BS and Gavali RM. Our experience at Tertiary Medical College: comparative study between surgical deroofing with buttoning technique and posterior cartilage window with pressure gauze dressing technique in patients with pseudocyst of Pinna. Indian J Otolaryngol Head Neck Surg 2023; 75: 1454-1460.

[4] Liu L, Gao T and Wang Z. Anterior wall resection plus radiofrequency ablation versus simple aspiration in the treatment of auricular pseudocyst: a retrospective study. J Int Med Res 2020; 48: 300060520950930.

[5] Yu J, Lu Y, Yu Q, Guan B, Chen C and Yu S. Comparison and evaluation of three techniques for treating auricular pseudocyst. J Dermatolog Treat 2022; 33: 494-497.

[6] Dong Z, Gao Q, Xu L and Zhou M. A novel negative pressure drainage treatment of auricular pseudocyst. Am J Otolaryngol 2021; 42: 102863.

[7] Yoshioka Y, Namiki T, Ugajin T, Yokozeki H and Tanaka A. Recurrent auricular pseudocyst: successful treatment using a dental silicon cast. Case Rep Dermatol 2021; 13: 352-355.

[8] Rai S and Shetty D. Aspiration and steroid injection-an effective approach for auricular seroma. Iran J Otorhinolaryngol 2019; 31: 267-271.

[9] Abdel Tawab HM and Tabook SMS. Incision and drainage with daily irrigation for the treatment of auricular pseudocyst. Int Arch Otorhinolaryngol 2019; 23: 178-183.

[10] Jang S, Yu J, Park S, Lim H, Koh H and Park YR. Development of time-aggregated machine learning model for relapse prediction in pediatric Crohn's disease. Clin Transl Gastroenterol 2025; 16: e00794.

[11] Othmani A, Zeghina AO and Muzammel M. A model of normality inspired deep learning framework for depression relapse prediction using audiovisual data. Comput Methods Programs Biomed 2022; 226: 107132.

[12] Mizuno K, Takeuchi M, Kishimoto Y, Omori K and Kawakami K. Risk factors for recurrence of peritonsillar abscess. Laryngoscope 2023; 133: 1846-1852.

[13] Yoshida T, Yoshifuji H, Shirakashi M, Nakakura A, Murakami K, Kitagori K, Akizuki S, Nakashima R, Ohmura K and Morinobu A. Risk factors for the recurrence of relapsing polychondritis. Arthritis Res Ther 2022; 24: 127.

[14] Denwood H, Gonzalez MR, Sodhi A, Werenski J, Clunk M, Newman ET and Lozano-Calderón SA. Risk factors for local recurrence of upper extremity desmoid tumors. J Surg Oncol 2024; 129: 813-819.

[15] Delaine E, Gorostidi F, Guilcher P, Lambercy K, Litzistorf Y, Bron L and Reinhard A. Risk factors for recurrence after surgical resection of sinonasal inverted papilloma. Int Arch Otorhinolaryngol 2024; 28: e568-e573.

[16] Lee YJ, Kwon JG and Han HH. Surgical deroofing in the treatment of patients with auricular pseudocyst. Auris Nasus Larynx 2019; 46: 576-582.

[17] Ungar OJ, Oron Y, Cavel O, Handzel O, Warshavsky A, Horowitz G and Matot S. Case series and systematic review of treatment outcomes for auricular pseudocysts. Otol Neurotol 2021; 42: 774-782.

[18] Ballan A, Zogheib S, Hanna C, Daou B, Nasr M and Jabbour S. Auricular pseudocysts: a systematic review of the literature. Int J Dermatol 2022; 61: 109-117.

[19] Rao K, Jagade M, Kale V, Kumar D and Hekare A. An economical method of auricular splinting in management of auricular pseudocyst. World J Plast Surg 2018; 7: 220-225.

[20] Parajuli R and Kshetry J. Treatment of auricular pseudocyst with intralesional steroid: a study with short-term follow-up. Clin Cosmet Investig Dermatol 2020; 13: 579-585.

[21] Wang G, Luo D, Song F, Sun Z, Dong P and Zhu Z. Treatment of auricular pseudocysts using

enhanced negative drainage: a prospective study of 21 cases. J Laryngol Otol 2024; 138: 349-352.
[22] Sinha V, Parmar BD, Chaudhary N, Jha SG and Yadav SKJIJoO. A study on clinical presentation of pseudocyst, dermoid cyst, and sebaceous cyst of pinna and its management at a tertiary care center. Indian J Otol 2021; 27: 140-143.
[23] Hu X and Qiu T. Logistic regression analysis of risk factors influencing postoperative keloid scar recurrence. Am J Transl Res 2024; 16: 4849-4857.
[24] Wang Z, Xia Q, Li A and Lv Q. Comparison of the effects of endoscopic submucosal dissection and laparoscopic distal radical surgery on the rehabilitation and quality of life of patients with early gastric cancer. Am J Transl Res 2023; 15: 2183-2190.
[25] Tanwar M, Chakrabarty S, Chowdhury G and Kim U. Mapping prognostic factors for globe survival in panophthalmitis using logistic regression and Cox proportional hazard models: a retrospective study. Indian J Ophthalmol 2023; 71: 2812-2817.
[26] Li S, Xiao Y, Wang Y, Bai M, Du F and Zhang H. Exploration of influencing factors for postoperative recurrence in patients with Madelung's disease on the basis of multivariate stepwise cox regression analysis. Clin Cosmet Investig Dermatol 2023; 16: 103-110.