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Anatomic-size determinants drive therapeutic decisions in inflammatory fibroid polyps: a retrospective study

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Abstract

Objective Inflammatory fibroid polyps (IFPs), uncommon benign growths in the gastrointestinal tract, currently lack standardized treatment protocols. Our investigation sought to determine crucial clinical indicators for therapeutic decision-making in IFP management.

Methods We conducted a retrospective analysis of 114 hospitalized patients from The First Affiliated Hospital of Fujian Medical University and Fuzhou University Affiliated Provincial Hospital between January 2015 and April 2025. Comprehensive evaluation included patient demographics, lesion features (anatomical distribution, dimensions, pathological characteristics), and therapeutic outcomes. Statistical approaches incorporated independent sample *t*-tests, χ^2analyses, and generalized estimating equations (GEE) to adjust for clustered lesions. The threshold for surgical consideration based on lesion size was established through receiver operating characteristic (ROC) evaluation.

Results The study cohort demonstrated a significant female predominance (male-to-female ratio 1:2.2), with gender showing a significant association with IFP surface morphology ($p = 0.023$), median patient age of 57.92 years with the majority asymptomatic (69.3%), anatomical distribution: gastric (73.8%), colorectal (15.6%), and small intestinal (10.7%). Absolute surgical indication for small intestinal IFPs (vs stomach, OR = 20.624, $p < 0.001$). Markedly increased surgical likelihood for lesions exceeding 1.65 cm (area under curve 0.859; 82.6% sensitivity, 74.7% specificity). Differential complication rates: surgery cohort 30.4% vs endoscopy 7.7% ($p = 0.008$).

Conclusions Our research establishes a novel dual-parameter decision framework for IFP treatment: anatomic-driven, lesions in the jejunum and ileum warrant primary surgical resection; size-dependent, 1.65 cm cutoff optimizes endoscopic safety for gastric/colorectal lesions. This discovery provides an evidence-based basis for individualized diagnosis and treatment of IFP.

Keywords Inflammatory fibroid polyps, Gastrointestinal tract, Surgery, Endoscopy

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Introduction

The seminal description of inflammatory fibroid polyps (IFPs) traces back to Vanek's 1949 report of six distinctive gastric submucosal lesions characterized by loose collagen stroma, fibroblast proliferation, and eosinophil infiltration, termed "gastric submucosal granuloma with eosinophilic infiltration" [1]. Helwig and Ranier subsequently established the current nomenclature of "inflammatory fibroid polyp" (IFP) in 1953 [2], which has since been universally adopted.

As a rare clinicopathological entity, IFPs constitute approximately 0.09% of all gastric polyps [3]. Contemporary epidemiological evidence demonstrates that these lesions may arise throughout the gastrointestinal tract, typically presenting as solitary polypoid masses with benign biological behavior. Histopathologically, IFPs exhibit three hallmark features: spindle cell proliferation, CD34+/CD117− immunophenotype, and PDGFRA gene mutations in 70% of cases [4]. The precise pathogenesis remains debated. It may be reactive lesions caused by allergic reactions, HP infections, autoimmune processes or excessive responses of the body to unknown stimuli, etc. [5, 6]; it is also possible that it is a neoplastic lesion driven by PDGFRA gene mutations, showing a certain degree of familial aggregation [7, 8].

Patients with IFP usually have no symptoms. When uncomfortable symptoms occur, they are mainly related to the location of the disease. Esophageal lesions can cause progressive dysphagia [9]. Gastric lesions are usually manifested as abdominal pain, but the situation of latent gastrointestinal bleeding needs to be vigilant [10, 11]. Small intestinal lesions are mainly manifested as abdominal pain, abdominal distension, vomiting, and intestinal obstruction [12, 13]. Colonic lesions are also mainly manifested by intestinal obstruction [14]. Diagnosis integrates endoscopic visualization with histopathological confirmation. Current management strategies emphasize complete resection, either endoscopically or surgically, with generally favorable outcomes [15].

Nevertheless, existing evidence derives predominantly from case reports and small series [16, 17], resulting in the absence of standardized treatment algorithms. This study intends to explore the lesion characteristics of IFP and its relationship with treatment methods through the largest retrospective cohort study at present, provide constructive suggestions for the diagnosis and treatment decisions of IFP, and provide sufficient data for the writing of clinical guidelines.

Patients and methods

Study population and data collection

Hospitalized patients who underwent IFP lesion resection between January 2015 and April 2025. Patients were sourced from: The First Affiliated Hospital of Fujian Medical University (Main and Binhai Campuses); Fuzhou University Affiliated Provincial Hospital (Main and Jinshan Campuses). Comprehensive clinical data were extracted, including: demographics (age, sex, presenting symptoms, documented underlying medical conditions, etc.), lesion characteristics (anatomic location, maximum diameter, etc.), endoscopic examination and related surgical records, follow-up records. Exclude cases with unanalyzable incomplete data or histopathologically ambiguous diagnoses, including lesions exhibiting atypical features inconsistent with classic IFP with patient-declined immunohistochemical confirmation. The final cohort included 114 patients with a total of 122 IFP lesions.

Data analysis

Statistical analysis was performed using SPSS 26.0 (IBM Corp.). Continuous variables: mean ± SD (normal distribution) or median [IQR] (non-normal); compared via *t*-tests or Mann–Whitney *U* tests. Categorical variables: *n* (%); analyzed by χ^2 or Fisher's exact tests. To control the clustering effect among multiple lesions in the same patient, the correlations among the lesions were corrected by the generalized estimating equations (GEE). The predictive value of lesion size for the selection of treatment methods was evaluated through receiver operating characteristic (ROC) curve analysis. All tests were bilateral. Significance: $p < 0.05$ (two-tailed).

Results

Baseline data analysis of patients with IFP

A total of 114 patients meeting the inclusion criteria were enrolled in the study. The median age of the cohort was 57.92 years (range: 25–87 years), with a female predominance (78 females vs. 36 males). The majority of patients (69.3%) were asymptomatic, with IFP lesions incidentally detected during routine gastroscopy or colonoscopy. Among symptomatic patients, abdominal pain was the most common complaint (23.7%), followed by gastrointestinal bleeding (3.5%), acid reflux and belching (1.8%), dysphagia (0.9%), and discomfort in defecation (0.9%). Comorbidities included hypertension (30.7%), diabetes (17.5%), and malignant tumors (13.2%). *Helicobacter pylori* (*H. pylori*) testing was performed in 47 patients, with a positivity rate of 34.0%. Three patients exhibited multiple IFP lesions (Table 1).

Morphological and anatomical features of IFP lesions

The study analyzed 122 IFP lesions, with a median long diameter of 1.25 cm (range: 0.2–4.5 cm). The gastric antrum was the most frequent site of occurrence (61.5%), accounting for 83.3% of all gastric lesions. Other common

Table 1 Baseline data analysis of patients with IFP

Baseline data	Total (*n*)	Percent (%)/mean ± SD
Age	114	57.92 ± 10.74
Sex		
Male	36	31.6
Female	78	68.4
Symptoms		
Abdominal pain	27	23.7
GI bleeding	4	3.5
Reflux and belching	2	1.8
Dysphagia	1	0.9
Discomfort in defecation	1	0.9
Asymptomatic	79	69.3
Hypertension	35	30.7
Diabetes mellitus	20	17.5
Malignant tumor	15	13.2
H. pylori infection	47	
Negative	31	66.0
Positive	16	34.0
Lesion number		
Single	111	97.4
Multiple	3	2.6

GI: gastrointestinal

Table 2 Morphological and anatomical features of IFP lesions

Characteristics	Total (*n*)	Percent (%)/M(P25, P75)
Lesion size (cm)	122	1.25 (0.80, 2.03)
Lesion site	122	
Esophagus	0	0
Cardia	1	0.8
Gastric fundus	0	0
Gastric body	5	4.1
Gastric angle	2	1.6
Gastric antrum	75	61.5
Pylorus	7	5.7
Duodenum	2	1.6
Jejunum/ileum	11	9.0
Ileocecal region	1	0.8
Ascending colon	5	4.1
Liver curve	1	0.8
Transverse colon	4	3.3
Spleen curve	0	0
Descending colon	1	0.8
Sigmoid colon	1	0.8
Rectum	6	4.9
Surface morphology	105	
Smooth	75	71.4
Rough and rotten	30	28.6
Treatment		
Surgery	23	18.9
ESD + ESE	59	48.4
EMR	21	17.2
HSP	9	7.4
CSP	10	8.2

ESD: endoscopic submucosal dissection; ESE: endoscopic submucosal excavation; EMR: endoscopic mucosal resection; HSP: hot snare polypectomy; CSP: cold snare polypectomy

locations included the colon and rectum (15.6%) and the small intestine (10.7%). Endoscopically, the majority of lesions appeared as smooth, raised polyps (71.4%), while a subset exhibited surface roughness or erosion (28.6%). Surgical resection was performed for 18.9% of the lesions, whereas endoscopic resection—such as submucosal resection, mucosal resection, and snare resection—was employed for the remaining cases (Table 2).

Pathological and immunohistochemical findings

The diagnosis of IFP was confirmed through histopathological examination or immunohistochemistry. Immunohistochemical analysis of 92 lesions revealed a CD34 positivity rate of 98.9%. PDGFRA gene testing was conducted in 3 lesions, with only 1 positive result. The median Ki67 proliferation index was 2% (Table 3).

Postoperative related indicators of patients with IFP

All 114 patients underwent complete resection of IFP lesions, either surgically or endoscopically. A total of 14 patients (12.3%) had postoperative complications. Among these, 9 patients developed postoperative infections, manifested as abdominal pain and fever. One patient experienced postoperative gastrointestinal bleeding with melena and progressive hemoglobin decline. Four patients presented with combined complications, including concurrent infections with bleeding or intestinal obstruction. All cases of postoperative infection resolved with antibiotic therapy alone. The gastrointestinal bleeding case was managed by urgent endoscopic hemostasis, while intestinal obstruction was treated with nasoenteric decompression tube placement and endoscopic anastomotic dilation. All patients achieved full recovery with symptomatic management. As of now, only 1 female patient experienced IFP recurrence in the transverse colon during colonoscopy in the second year after

Table 3 Pathological and immunohistochemical findings

Characteristics		Percent (%)/M (P25, P75)
CD34 +	91/92	98.9
PDGFRA	1/3	33.3%
Ki67 (%)	68	2.00 (1.00, 5.00)

the operation, which was subsequently removed endoscopically (Table 4).

Gender-specific analysis

Given the uneven gender distribution, potential gender-associated differences in IFP characteristics were evaluated. Fisher's exact test revealed no significant correlation between gender and symptomatic presentation (e.g., discomfort, multifocal lesions; $p > 0.05$). Employing surface morphology as the dependent variable in GEE, female gender demonstrated a significant inverse association with rough and rotten lesion surface [95% CI (confidence interval): 0.122–0.855; $p = 0.023$]. Female patients exhibited a higher prevalence of smooth morphology (77.9 vs 53.6% in males). However, GEE analysis revealed no significant gender-based disparities in lesion site or lesion size ($p > 0.05$, Table 5).

Table 4 Postoperative related indicators of patients with IFP

Indicators	Total (*n*)	Percent (%)
Postoperative complications	114	
None	100	87.7
Infection	9	7.9
Bleeding	1	0.9
Infection and bleeding	2	1.8
Infection and obstruction	2	1.8
Recurrence	1	0.9

Treatment outcomes and predictive factors in IFP management

Given the limited sample sizes in certain therapeutic categories, we performed a comparative analysis between two primary treatment modalities: endoscopic resection versus surgical resection. Notably, all cases with multiple lesions underwent endoscopic management exclusively. As treatment assignments were determined independently for each case, we deemed GEE adjustments unnecessary for patient-level characteristic analyses.

There were significant differences in the discomfort symptoms of patients among different treatment groups ($p < 0.001$, Cramer's $V = 0.579$). The proportion of patients with abdominal pain was the highest in the surgical group (16/23, 69.6%), while most patients in the endoscopic resection group had no discomfort symptoms (74/91, 81.3%). Complication rates were significantly elevated in the surgical cohort (30.4 vs 7.7%; $p = 0.008$, Cramer's $V = 0.278$). However, the treatment selection showed no correlation with gender distribution, age, hypertension, diabetes status, malignancy history, *H. pylori* infection, or multifocal lesion presentation ($p > 0.05$, Table 6).

Table 5 Gender-specific analysis

	Male	Female	*P*	*OR (95%CI)*
Symptoms			0.888[F]	
Abdominal pain	8	19		
GI bleeding	2	2		
Reflux and belching	0	2		
Dysphagia	0	1		
Discomfort in defecation	0	1		
Asymptomatic	26	53		
Lesion number			0.550[F]	
Single	36	75		
Multiple	0	3		
Lesion size (cm)	1.83 ± 1.23	1.20 (0.78, 1.80)	0.082	0.674 (0.432, 1.051)
Lesion site			0.129	0.492 (0.196, 1.230)
Stomach	25	65		
Small intestine	7	6		
Colon/rectum	4	15		
Surface morphology			0.023[*]	0.323 (0.122, 0.855)
Smooth	15	60		
Rough and rotten	13	17		

GI: gastrointestinal

[F] Fisher's exact tests

[*] $P < 0.05$

Table 6 Treatment outcomes and predictive factors in IFP management

	Treatment		*P*	Cramer's V	OR (95%CI)
	Endoscopy	Surgery			
Age	58.56 ± 10.13	55.39 ± 12.85	0.208	–	
Sex			0.061	–	
Male	25	11			
Female	66	12			
Symptoms			< 0.001[*F]	0.579	
Abdominal pain	11	16			
GI bleeding	2	2			
Reflux and belching	2	0			
Dysphagia	1	0			
Discomfort in defecation	1	0			
Asymptomatic	74	5			
Hypertension	25	10	0.137	–	
Diabetes mellitus	17	3	0.760[F]	–	
Malignant tumor	10	5	0.180[F]	–	
H. pylori infection	15	1	1.000[F]	–	
Lesion number			1.000[F]	–	
Single	88	23			
Multiple	3	0			
Postoperative complications			0.008[*F]	0.278	
Yes	7	7			
None	84	16			
Lesion size (cm)	1.10 (0.70, 1.70)	2.79 ± 1.36	< 0.001[*]		3.980 (2.122, 7.467)
Lesion site			0.001[*]		
Stomach	80	10	–		1.00
Small intestine	2	11	< 0.001[*]		20.624 (4.181, 101.728)
Colon/rectum	17	2	0.855		1.200 (0.169, 8.498)

GI: gastrointestinal

[F] Fisher's exact tests

[*] $P < 0.05$

For the comparison of lesion characteristics and treatment methods, in order to control the clustering effect among multiple lesions in the same patient, GEE was used for correction analysis. GEE modeling demonstrated a strong positive association between lesion size and surgical intervention (OR = 3.980, 95% CI 2.122–7.467, $p < 0.001$), indicating larger lesions were more likely to require surgical resection. ROC analysis indicated lesion size was a strong predictor of surgical necessity, with an area under the curve of 0.859 (95%CI 0.779–0.939, $p < 0.001$). When 1.65 cm was selected as the critical value, the optimal diagnostic efficacy (Youden index = 0.573) could be obtained, with a sensitivity of 82.6% and a specificity of 74.7% (Fig. 1). There were significant differences in the lesion site among patients in different treatment groups ($p = 0.001$). For small intestinal lesions, duodenal lesions underwent endoscopic therapy, whereas jejunal and ileal lesions were managed exclusively by surgical resection. This approach contrasts sharply with gastric lesions, as demonstrated by GEE analysis showing a 20-fold higher likelihood of surgical intervention for small intestinal lesions (95%CI 4.181–101.728, $p < 0.001$). Conversely, the probability of surgical management for colorectal lesions was similar to that for gastric lesions (95%CI 0.169–8.498, $p = 0.855$, Table 6).

Discussion

With 114 enrolled cases, our series constitutes the largest reported cohort of IFPs to date in the medical literature. The substantial sample size enhances the statistical power of our analyses and increases the external validity of the conclusions drawn.

Our demographic analysis confirmed a striking female predominance, corroborating previous epidemiological reports [4, 18]. The possible reason is the difference in genetic susceptibility. Hodan et al. documented a

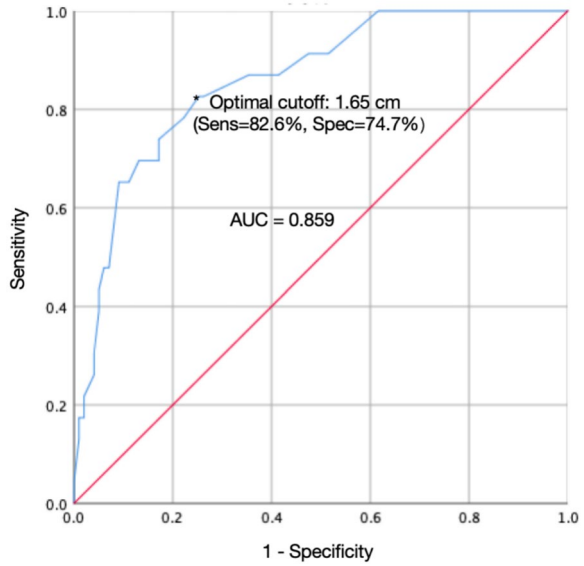

Fig. 1 ROC curve of lesion size for predicting surgical treatment

familial IFP cluster associated with germline PDGFRA mutations, wherein 83% (5/6) of affected members were female [8]. This observation raises important questions about X-linked inheritance patterns or sex hormone-mediated modulation of PDGFRA expression. While our PDGFRA mutation analysis was limited ($n=3$), the potential interaction between estrogen signaling pathways and PDGFRA-mediated mesenchymal proliferation warrants further investigation. This study intends to further explore whether there is a relationship between gender and the characteristics of IFP lesions. Notably, our analysis revealed no statistically significant associations between gender and key clinical parameters including discomfort symptoms, multifocal lesions, anatomical distribution, or lesion dimensions. However, a distinct exception was observed in surface morphology characteristics, where female gender demonstrated a significant predisposition toward smoother lesion surfaces. This selective pattern suggests that while gender may contribute to fundamental disease susceptibility, its influence on phenotypic expression appears largely confined to surface features rather than broader clinicopathological manifestations. This mechanistic dichotomy suggests that divergent biological pathways may govern IFP initiation versus progression, warranting further in-depth investigation.

In terms of age distribution, the median of the study group was 57.92 years old, which was also similar to previous research reports [4, 17]. The latest study verified through whole-genome sequencing and deep targeted gene sequencing that the degree of chronic inflammation and the number of somatic mutations in gastric epithelial cells show a trend of increasing with age [19]. Therefore, the high incidence trend of IFP in the middle-aged and elderly population may be related to accumulated gene mutations or chronic inflammatory stimulation, which is verified by the previous theory of local inflammation of IFP. The *H. pylori* infection rate in our cohort (30.7%) was significantly lower than global prevalence estimates (approximately 50%) [20]. This discrepancy suggests that while *H. pylori* may contribute to the inflammatory milieu, it is unlikely to be a primary etiologic agent in IFP pathogenesis. Alternative sources of chronic inflammation (e.g., mechanical irritation, autoimmune processes) may play more substantial roles.

A substantial majority of patients (69.3%) were entirely asymptomatic, with lesions detected incidentally during endoscopic examination for unrelated indications. This high rate of asymptomatic discovery highlights the indolent nature of most IFPs and the importance of careful endoscopic inspection. Among symptomatic patients, we observed abdominal pain as the predominant complaint (23.7% of cohort). Unlike the Sanchez's study, the symptoms of gastrointestinal bleeding are not rare (3.5%) [17]. Therefore, in the discussion of the etiology of gastrointestinal bleeding in clinical diagnosis, IFP also needs to be included in the discussion [10].

Our comprehensive analysis of IFP localization patterns revealed involvement throughout the gastrointestinal tract, with documented cases in gastric, colorectal, and small intestinal sites. Notably, one esophageal IFP case was excluded due to incomplete data, nevertheless supporting the established understanding that IFPs may potentially arise anywhere along the digestive tract. According to the statistical results, the common sites of IFP in sequence are the stomach, colorectal, and small intestine. And it was mainly manifested as isolated lesions (97.4%). Some previous studies have shown that the second most common site of IFP is the small intestine [16, 21]. The different reasons may be as follows: with the development of endoscopic technology and the improvement of the quality control level of colonoscopy [22], the detection rate of colorectal lesions, including IFP, has increased compared with before; small intestinal lesions are more prone to acute abdominal symptoms such as intestinal obstruction and are more likely to be reported by clinical attention, affecting the previous literature statistics results.

Limited by the limitations of retrospective analysis, the follow-up data of this study were limited. Only some patients underwent gastroscopy, colonoscopy, or imaging reexaminations, and only 1 patient was found to have recurrence after treatment. IFP, which is more in line with previous cognition, has a good prognosis and rarely recurs after local resection [4, 15].

IFP treatment is mainly achieved through complete resection under endoscopy or surgical resection. The treatment approach shows a trend that is significantly correlated with two objective indicators: the lesion location and the size of lesion. Compared with gastric IFP, small intestinal IFP shows a clear surgical tendency. This is primarily due to the inability of conventional gastrointestinal endoscopy to access jejunoileal segments, coupled with the technical complexity of small intestinal endoscopy, which limits its widespread adoption. Consequently, jejunoileal IFPs are frequently missed during routine endoscopic examination. Small intestinal endoscopy is mainly used as an examination method when suspecting small intestinal lesions, such as unexplained gastrointestinal bleeding [23]; when symptoms occur in small intestinal IFP, they are mainly manifested as intestinal obstruction, making it difficult to complete the intestinal preparation conditions required for enteroscopy [24], resulting in missing the opportunity for enteroscopy diagnosis and treatment. However, there was no significant difference in the surgical rate between colonic IFP and gastric IFP, suggesting that the two might share similar treatment decisions.

The difference in the size of the lesion often implies the difference in the treatment method [25]. Larger lesions may indicate either prolonged growth duration or heightened PDGFRA pathway activation. While generally benign, certain IFP variants may exhibit locally aggressive behavior necessitating complete excision [5, 26]. Our comparative analysis revealed a statistically significant disparity in lesion size between treatment cohorts, with surgically resected IFPs demonstrating markedly greater diameters compared to endoscopically managed lesions. ROC curve analysis established excellent predictive value of lesion size for surgical necessity (AUC = 0.859, 95%CI 0.779–0.939, $p < 0.001$). When 1.65 cm was selected as the critical value, the optimal diagnostic efficacy (Youden index = 0.573) could be obtained, with a sensitivity of 82.6% and a specificity of 74.7% at this time.

Since patients with small intestinal IFP lesions have no endoscopic reports to describe the surface characteristics of the lesions, and nearly half (48%, 11/23) of surgical cases involved small intestinal IFP, the relationship between the surface characteristics of the lesions under the endoscopy and the treatment methods is not discussed in this study for the time being. If conditions permit, the application of double-balloon enteroscopy can be strengthened to enhance the exploration of small intestinal lesions.

Postoperative complications occurred more frequently following surgical versus endoscopic resection, mainly involving: the risk of infection is higher. Among the 13 cases of infection, 7 patients were from the surgical group, which might be related to the larger surgical wounds. Both of the 2 cases with intestinal obstruction after the operation were surgical patients. It is worth noting that all the patients with postoperative bleeding in this study were from the endoscopic group (ESD treatment), suggesting that for IFP lesions, more careful management of the wound blood vessels is needed to avoid the occurrence of postoperative bleeding.

While this investigation provides valuable insights into IFP management, several limitations warrant careful consideration. The retrospective design inherently carries risks of recall bias and selection bias and limited capacity for causal inference. There were only 23 cases in the surgical group and only 13 cases of small intestinal IFP. The relatively small cohort sizes may affect statistical power. The limited sample size for PDGFRA mutation testing precluded subgroup analysis of mutation-driven phenotypes. Insufficient follow-up may cause the long-term recurrence rate of IFP to be underestimated. Future multicenter prospective cohort studies are required to validate the clinical applicability of the 1.65 cm threshold, while incorporating genomic features such as PDGFRA mutation burden to develop risk prediction models, thereby providing evidence-based foundations for establishing international consensus guidelines.

Conclusion

This study has established two fundamental pillars guiding clinical decision-making for IFP management: anatomical location and lesion size. Our findings demonstrate that anatomic-driven, lesions in the jejunum and ileum warrant primary surgical resection; size-dependent, 1.65 cm cutoff optimizes endoscopic safety for gastric/colorectal lesions. This discovery provides an evidence-based basis for individualized diagnosis and treatment of IFP.

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Author contributions

Xintong Chi: drafted the manuscript, undertook the statistical. Jiexin Zhao: collected data and manuscript revision. Jiaxin Shen: obtained funding and manuscript revision. Xiongfeng Lin, Yuping Wang and Guijun Lu: collected data. Chengchao Zheng: assisted with data analysis. Yanwei Lai and Shuping Jiang: provide assistance for pathological diagnosis. Wenming Liu: obtained funding and designed the project.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
The study was conducted in accordance with the Declaration of Helsinki. The Ethics Committee of the First Affiliated Hospital of Fujian Medical University reviewed and approved this study (No. MTCA, ECFAH of FMU [2015]084-3).

Competing interests
The authors declare no competing interests.

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