CASE REPORT

Clinicopathological Characteristics of Three Cases with Recurrent Orbital Solitary Fibrous Tumors: A Retrospective Study and Literature Review

Jinlong Cui, BM; Xiawei Wang, MD; Yan Long, MD; Dongyu Guo, MD; Hongguang Cui, MM

ABSTRACT

Objective • Solitary fibrous tumor (SFT) is a spindle cell neoplasm that rarely occurs in orbit. This study aimed to report the clinical, imaging, and pathological features of three patients with recurrent orbital SFTs.

Methods • Clinical, imaging, and pathological data of the three patients were retrospectively reviewed, and the results were compared with those of previously reported cases with recurrent orbital SFT.

Results • One female and two male patients (mean age, 54 years old) were included in this study. The present cases and literature review showed that the average time to recurrence in patients who aged under 50 years old was shorter than that in those who aged over 50 years old. The most common site for recurrent orbital SFT was the retrobulbar area of the orbit (23.8%). Imaging examinations showed consistent intensity of MRI signals before and after recurrence. Immunohistochemical results of all cases revealed the expressions of CD34. The mitotic rate increased in 4/8 cases, and the percentage of Ki-67-positive cells was elevated in 5/16 cases.

Conclusion • These results suggested that young patients were more likely subjected to recurrent orbital SFT. The postoperative pathological diagnosis revealed that patients with recurrent orbital SFT had more nuclear abnormalities and mitotic activity, as well as a higher percentage of Ki-67-positive cells, indicating that orbital recurrent SFT tended to be malignant according to both morphological features and immunohistochemistry results. (*Altern Ther Health Med.* [E-pub ahead of print.])

Jinlong Cui, BM; Resident doctor; Department of Pathology, The First Affiliated Hospital, Zhejiang University School of Medicine, Hangzhou, China. **Xiawei Wang, MD**; Associate chief physician; **Yan Long, MD**; Attending doctor; **Dongyu Guo, MD**; Attending doctor; **Hongguang Cui, MM**; Chief physician; Department of Ophthalmology, The First Affiliated Hospital, Zhejiang University School of Medicine, Hangzhou, China.

Corresponding author: Xiawei Wang, MD
E-mail: 1314003@zju.edu.cn

INTRODUCTION

Solitary fibrous tumor (SFT) is a spindle cell neoplasm that was first presented in 1931 by Klemperer and Rabin, who reported it as a primary neoplasm of the visceral pleura.[1,2] Although its exact incidence rate is unknown due to its rarity, SFTs account for less than 2% of all adult soft tissue tumors. The age of onset for SFT varies, but it primarily affects adults between the ages of 20 and 70. It has been reported in individuals as young as 6 months and as old as 94 years, but the majority of cases are diagnosed in middle-aged adults. Regarding gender distribution, SFTs exhibit a slight female predominance, with a female-to-male ratio of around 2:1. However, this ratio may vary depending on the specific location of the tumor. It's important to note that these characteristics are based on the available scientific literature, but individual cases may vary. It's always recommended to consult with a healthcare professional for precise information and guidance. SFT demonstrates a different cellular proliferation of bland spindle-shaped cells lacking any pattern of growth, with associated 'ropey' keloidal collagen bundles and characteristic 'staghorn' blood vessels.[3] The hemosiderotic fibrolipomatous tumor is histologically characterized by the presence of mature adipose tissue and spindle cell component accompanied by hemosiderin pigment deposition within macrophages, in the cytoplasm of some of the spindle cells and also within the extracellular stroma. The spindle cell component of these lesions is generally positive for CD34 and negative for CD68, S100, SMA, and desmin.[4,5] SFT presents as a proliferation of bland spindle-shaped cells, often accompanied by distinctive histological features. While typically benign, there have been reports of recurrent and malignant cases. This retrospective analysis and literature review focus on recurrent orbital SFT, aiming to provide insights into its clinical characteristics and management.

The study focuses on the clinical and pathological features of recurrent orbital solitary fibrous tumors (SFT) and aims to fill the existing knowledge gap regarding this uncommon condition. Specifically, the research retrospectively analyzes the clinical data of three patients with confirmed recurrent orbital SFT, comparing the clinical, imaging, and pathological data of patients with two or more episodes. Furthermore, a literature review of clinicopathological manifestations of cases with recurrent orbital SFT, including tumor necrosis, mitotic rate, and the percentage of Ki-67-positive cells, was conducted through the PubMed database. Recurrent orbital SFT is a rare occurrence, and the absence of large sample-sized controlled trials on its pathological features underscores the need for dedicated research in this area. Understanding the clinical and pathological characteristics of recurrent orbital SFT is crucial for improving diagnostic accuracy, treatment strategies, and prognostic assessments. By addressing this knowledge gap, the study aims to contribute valuable insights that can advance the management of recurrent orbital SFT and potentially inform future research directions in this field. The retrospective analysis of clinical data involving human subjects requires adherence to ethical standards. Accordingly, ethical approvals were obtained for this research, ensuring that patient privacy and confidentiality were upheld throughout the study.

MATERIALS AND METHODS

Case Series

The retrospective study selected three patients with recurrent orbital solitary fibrous tumors (SFT) based on specific inclusion and exclusion criteria. The inclusion criteria may encompass factors such as histopathologically confirmed SFT, previous treatment at the Ophthalmology Department of the First Affiliated Hospital of Zhejiang University School of Medicine between 2015 and 2020, and availability of complete clinical and pathological data. Explicitly defining these criteria ensures transparency in patient selection and facilitates readers' comprehension of the case series.. The study employed rigorous data collection procedures, including standardized methods for gathering clinical information such as sex, age at diagnosis, recurrence time, symptoms, tumor location, size, and treatment history. Imaging examinations mainly included orbital magnetic resonance imaging (MRI) and computed tomography (CT) data. Only Case #1 and Case #2 underwent MRI in our hospital. Pathological examination was conducted using collected specimens, and paraffin-embedded sections were analyzed by histopathology and immunohistochemistry (IHC). IHC results included the expressions of CD34, CD99, CK, SMA, EMA, S-100, and the percentage of Ki-67-positive cells.

The retrospective study involving patients' clinical data and literature review adhered to rigorous ethical standards and received approvals from the institutional review board (IRB) at the First Affiliated Hospital of Zhejiang University School of Medicine. All aspects of the study, including data collection, patient confidentiality, and utilization of clinical information, were conducted in accordance with the ethical guidelines outlined in the Declaration of Helsinki. To ensure the protection of patients' rights and privacy, informed consent was obtained for the use of clinical data in the research. Patient identities were carefully anonymized to maintain confidentiality throughout the study. The ethical approvals and adherence to ethical guidelines underscore the commitment to upholding the highest ethical standards in conducting research involving human subjects. By incorporating this information, the article demonstrates a clear commitment to ethical considerations and adherence to established guidelines, thereby enhancing the credibility and transparency of the research.

Literature Review

The PubMed database was used to search for the related literature on the recurrent orbital SFT published from January 1990 to April 2021. The search terms were ("recurrent") AND ("orbital SFT" OR "orbital solitary fibrous tumor"). A total of 21 articles, which included 45 cases, were retrieved.[3,4,6-23]

RESULTS

Clinical Features

Two male patients and one female patient were included in the current study. The median age at the time of their first diagnosis was 54 (range, 48-60) years old. Their clinical manifestations included exophthalmos (n = 3), ptosis (n = 2), incomplete closure of the eyelids (n = 2), abnormal eye position (n = 1), and blurred vision (n = 2). On the results of the physical examination revealed that the three patients involved in the present study exhibited a huge and incompressible mass behind the eyeball, making the eyeball protrude forward, with a protrusion degree of 22-23 mm compared with a degree of 15 mm for the other eye. The best corrected visual acuity (BCVA) was reduced to 1/20 in Case #1 and 2/20 in Case #2. The dilated conjunctival blood vessels of the involved eye were apparent (n=3), while on fundus examination, the optic disc edema was raised with an unclear boundary and dilated blood vessels (n=2), and bleeding could be observed around the optic disc (n=1). The recurrence time after the first surgery ranged from 9 to 120 months. Two patients did not relapse during a follow-up period of 2 years after the second surgery. Case #3 had 6 relapses in total, he underwent surgery for 4 relapses, and in 2015, he received gamma knife radiosurgery three times, however, the tumor recurred again in 2016. The patient died of systemic metastasis one year later.

Table 1 summarizes the clinical characteristics of 38 cases with recurrent orbital SFT collected from 18 previously published articles. The patients' mean age was 47 (range of age, 9-86) years old, and 17 (47.2%) patients aged under 50 years old. There were 18 male and 19 female patients, except for one case whose sex could not be determined, and no significant difference (P = .33) was noted between male and female patients. The position of the lesion included superolateral or lacrimal gland fossa (n = 3), superomedial or

upper eyelid (n = 4), inferotemporal (n = 3), medial canthal region or lacrimal sac (n = 3), postero-lateral (n = 2), retrobulbar (n = 5), and entire orbit (n = 1). Meanwhile, the duration of recurrence after initial surgery ranged from 2 to 240 months. The average time to recurrence after the first surgery for patients who aged ≤ 50 and > 50 years old was 34.4 and 57.1 months, respectively, which showed no significant difference (P = .19) between the two groups. In addition, 7 (21.2%) patients with SFT had multiple recurrences, and 4 (12.9%) patients had distant metastasis.

Radiology

Orbital MRI of Case #1 before and after recurrence revealed that there was a mass above the optic nerve in the posterior muscular cone of the left orbit, which was indistinguishable from the optic nerve. The internal signal was uneven, in which a slightly lower value of signal intensity was noted in T1-weighted image (T1WI) (Figure 1a), a slightly higher value of signal intensity was found in T2-weighted image (T2WI) (Figure 1b), and an irregular enhancement could be observed after intravenous gadolinium administration (Figure 1c). These results were consistent after recurrence (Figure 1d-f).

In Case #2, the MRI revealed a huge heterogeneous multi-cystic mass occupied the entire posterior orbit, with a size of about 3.4 cm × 3.2 cm. In T1WIs, the intensity of signals was almost equal, while in T2WIs, the intensity of signals was slightly higher. The signals were diffusely and unevenly enhanced on contrast-enhanced MR images. These results were consistent with those observed 9 years before her admission to our hospital.

Besides, Case #3 underwent CT scan for two times in our hospital, and in 2016, the secondary CT scan showed soft tissue masses in the right-sided orbit, maxillary sinus, ethmoid sinus, and frontal sinus.

Pathological Characteristics

Gross pathology showed that the specimens were gray-white or gray-red oval-shaped tissues. Cystic cavities with different sizes were found inside the tumor in Case #2 before and after relapse, and the cystic fluid was yellow-green.

Histopathology, in all cases before relapse, revealed that well-arranged spindle cells with oval-to-spindle nuclei and eosinophilic cytoplasm (Figure 2a) were distributed in the dense collagen fibers with a great number of blood vessels in the background. Blood vessels occasionally showed a staghorn appearance (Figure 2b). No obvious mitotic activity or necrotic areas were found. After relapse, the spindle cells were arranged irregularly with a higher frequency of chromosomal heteromorphism (Figure 2c). The number of mitotic figures was > 4/10 high-power fields (HPFs) in the three cases (Figure 2d). Besides, tumor necrosis was found after recurrence in Case #3.

Results of IHC in Case #1 and Case #3 showed the expressions of CD34, but no expressions of CD99, BcL-2, CK, SMA, EMA, and S-100. IHC of Case #2 revealed that the tumor cells were positive for CD34 (Figure 2e), CD99 (Figure

Figure 1. Magnetic resonance imaging (MRI) of the orbit before and after recurrence in case 1 showed retrobulbar tumor in the left orbit. (a) T1-weighted image. (b) T2-weighted image. (c), contrast-enhanced T1-weighted image. (d), T1-weighted image. (e), T2-weighted image. (f), contrast-enhanced T1-weighted image.

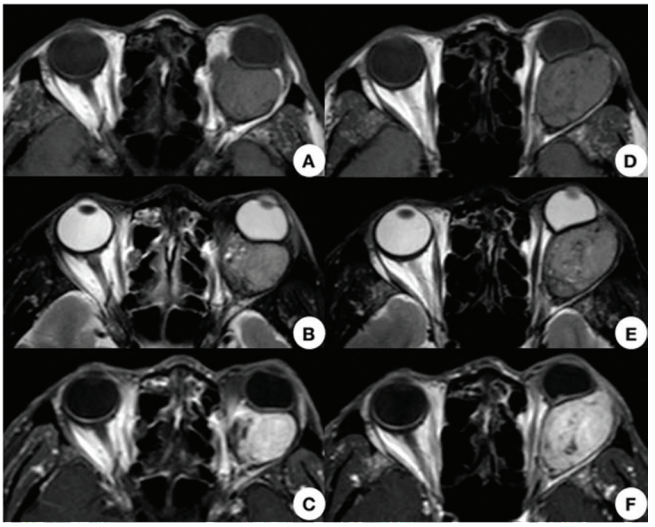

Figure 2. Results of histopathology and immunohistochemistry of the tumors before and after recurrence in case #2. (a) tumor with spindle-shaped cells with oval-to-spindle nuclei. (H&E staining; original magnification, ×100 times). (b) typical 'spinal cord'-like antlers (H&E staining; original magnification, ×400 times). (c) irregularly arranged spindle-shaped cells are more heterogeneous than those reported in 2010 (H&E staining; original magnification, ×100 times). (d) > 4 mitotic images (shown in black circle) were found under high power field. (e) tumor cells were positive for CD34 (original magnification, ×200 times). (f) tumor cells were positive for CD99 positive (original magnification, ×200 times). (g) tumor cells were positive for Bcl-2 (×200 times). (h) tumor cells were negative for SMA (original magnification, ×200 times). (i) tumor cells were positive for Ki-67 (about 15%; original magnification, ×200 times).

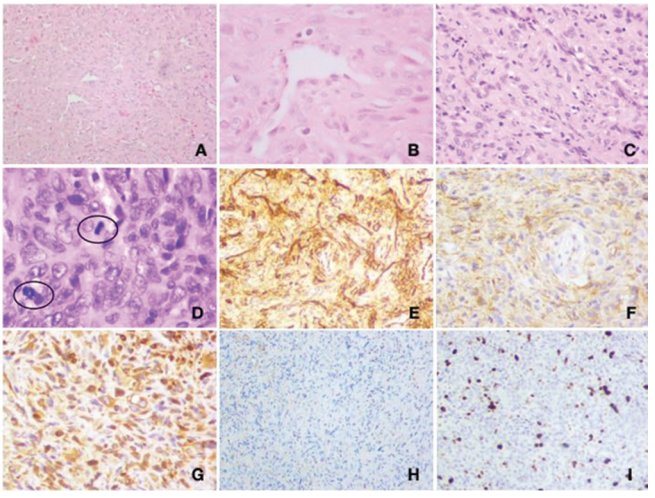

Table 1. Clinical manifestations of recurrent orbital SFT cases[3-22]

	Age	Gender	Position	Recurrence time(m)	Multiple recurrences	Transfer
Dorfman et al. (1994)	69	F	NM	48	Y	NM
Ing et al. (1998)	62	M	Entire orbit	240	N	Y
N de Saint Aubain et al. (1999)	68	M	NM	3	N	N
Hasegawa et al. (1999)	48	F	Upper eyelid	84	N	Y
Woo et al. (1999)	23	M	Right medial canthal region	4	N	N
	34	F	Right medial canthal region	84	N	N
Alexandrakis et al. (2000)	14	F	Superomedial	4	N	N
Carrera et al. (2001)	61	M	Superolateral	38	Y	N
Hayashi et al. (2001)	54	M	Inferolateral and intracranial	6	N	N
Polito et al. (2002)	24	M	Lacrimal gland fossa	48	N	N
	70	M	Retrobulbar	48	N	N
Bernardini et al. (2003)	59	F	Between the lacrimal sac and medial rectus muscle	24	N	N
Ness et al. (2005)	36	NM	Upper postero-lateral	24	N	NM
Tam et al. (2008)	20	F	Superomedial	3	N	N
Thomas et al. (2011)	62	F	Retrobulbar	36	N	N
Griepentrog et al. (2013)	9	F	Inferotemporal extraconal and intraconal	120	Y	N
Wang et al. (2013)	31	M	Postero-lateral	72	Y	N
Vu et al. (2016)	12	M	Superolateral	4	N	N
Krishnamurthy et al. (2016)	12	F	Superomedial	36	N	N
Smith et al. (2017)	41	F	NM	12	NM	NM
	58	M	NM	9	NM	NM
	58	M	NM	120	NM	NM
	39	M	NM	27	NM	NM
	15	F	NM	6	NM	NM
Sagiv et al. (2019)	36	F	NM	36	N	N
	64	M	Inferotemporal	6	N	Y
	72	M	NM	60	Y	Y
	57	F	NM	72	N	N
	86	F	NM	12	N	N
	59	F	NM	120	N	N
	48	M	NM	NM	N	N
	66	M	NM	108	Y	N
Lester et al. (2020)	37	F	NM	12	N	N
	55	F	NM	NM	N	Y
	64	F	NM	2	N	N
The present report	60	M	Retrobulbar	12	N	N
	48	F	Retrobulbar	9	N	N
	54	M	Retrobulbar	120	Y	Y

Abbreviations: M, male; F, female; NM, not mentioned; Y, yes; N no

Table 2. Pathological manifestations of recurrent orbital SFT cases[3,4,10,14,17,23]

	Starting			After relapse		
	Necrosis focus	Mitosis /10hpf	Ki-67 (%)	Necrosis focus	Mitosis /10hpf	Ki-67 (%)
Hayashi et al. (2001)	NA	5-6	NA	NA	5	NA
Ness et al. (2005)	NA	10%	5-10	NA	10%	5-10
Wang et al. (2013)	NA	NA	<5	NA	NA	5-10
Sagiv et al. (2019)	NA	NA	NA	NA	NA	NA
	NA	30	65	NA	93	40
	NA	5	1	NA	5	15.5
	NA	NA	NA	NA	10	20
	NA	5	3	NA	NA	NA
	NA	8	5	NA	10	10
	NA	2	10	NA	1	NA
	NA	NA	NA	NA	6	5.5
Yang et al. (2021)	NA	NA	< 10	NA	NA	< 10
	NA	NA	< 10	NA	NA	< 10
	NA	NA	< 10	NA	NA	< 10
	NA	NA	< 10	NA	NA	< 20
	NA	NA	< 10	NA	NA	< 10
	NA	NA	< 10	NA	NA	< 10
	NA	NA	< 10	NA	NA	< 10
	NA	NA	< 10	NA	NA	< 10
	NA	NA	< 10	NA	NA	< 10
The present report	N	N	3	N	>4	>10
	N	N	NA	N	>4	15
	NA	NA	NA	Y	A lot of	50

Abbreviations: Y, yes; N, no; NA, not available

2f), and BcL-2 (Figure 2g), while those were negative for CK, SMA (Figure 2h), EMA, and S-100. The percentage of Ki-67-positive cells was 3% in Case #1 before recurrence. After relapse, the percentage of Ki-67-positive cells was higher than 10% in Case #1, 15% in Case #2 (Figure 2i), and 50% in Case #3 after his third surgery.

The pathological manifestations of 5 previously conducted researches and the present study with recurrent orbital SFT before and after recurrence, including tumor necrosis, mitotic rate, and the percentage of Ki-67-positive cells are shown in Table 2. The mitotic rate decreased in only one case, while it remained stable in 3 cases and increased in 4 cases; besides, the percentage of Ki-67-positive cells slightly decreased after recurrence in only one case, while it stably maintained in 10 patients and increased in 5 patients. Tumor necrosis was found in 1 case after recurrence.

DISCUSSION

SFT is an anatomically ubiquitous mesenchymal neoplasm with an equal gender distribution that often presents as a large, deep-seated soft tissue or visceral mass. It may occur in various extrapleural sites, such as the respiratory tract, nose and paranasal sinuses, parotid gland and salivary gland, thyroid, lung, etc.[2,3] However, since this disease is rare, few cases (within 100) with orbital SFT have been reported, especially recurrent orbital SFT.

In the present research, clinical, imaging, and pathological features of 3 patients with recurrent orbital SFT were retrospectively compared. We also used the PubMed database to search for recurrent orbital SFT, and 21 related literature were selected to explore their clinical and pathological features.[3,4,6-23] To our knowledge, the current study involved the majority of previous research on recurrent orbital SFT published in English in the recent two decades.

Clinical Manifestations

SFT was originally thought to occur exclusively in the intrathoracic region, while it has been recently described in extrapleural sites (e.g., orbit). SFT of the orbit is a rare lesion, which can be misdiagnosed as hemangioendothelioma, fibrous histiocytoma, meningioma, or neurofibroma. Its main clinical manifestations are painless protrusion of the eyeball, ptosis, diplopia, and limited eye movement. Painless, non-pulsating, incompressible masses can be touched by physical examination.[24] The patients involved in the current study had a mean age of 54 years old, and their clinical manifestations included exophthalmos, ptosis, abnormal eye position, and blurred vision, which were consistent with those reported previously.[24-27]

Recurrence time was also counted through literature analysis and the current cases (see Table 1), although the duration of recurrence after the first surgery for patients who aged ≤ 50 and > 50 years old showed no significant difference (P = .19). The average time to recurrence in patients who aged under 50 years old was shorter than that in those who aged over 50 years old,

suggesting that young patients were more likely subjected to recurrent orbital SFT. Moreover, 21.2% of patients with SFT had multiple recurrences, including Case #3 presented herein and those reported previously. A number of scholars have shown that the failure of radical resection is a high risk-factor for tumor recurrence.[19] The tumors of 3 patients reported in the current study were located in the posterior muscular cone of the eyeball, which caused difficulty in their surgical removal. After reviewing the literatures, we found that orbital SFT can originate from any part of the orbit, mainly from the superomedial orbital quadrant (20%), medial orbit (15%), and superotemporal area (13%). Lacrimal sac area and the inferotemporal area also account for 9.5% and 7%, respectively.[3,28] However, after comparing the clinical characteristics of the previously conducted researches and the cases herein presented (Table 1), the most common site for recurrent orbital SFT was the retrobulbar area of the orbit (23.8%). This site is the most difficult area of orbital surgery, and the surgical approach, surgical method, and surgical field exposure may all affect the prognosis.[29] The fact that the tumor was in almost the same place before and after recurrence suggested that the failure of the first surgery to completely remove the tumor, which left a residual tumor, could be responsible for the recurrence. In addition to the local recurrence, orbital SFT is also associated with distant metastasis. In the present research, among the 4 cases, only Case #3 had a history of multiple recurrences. As distant metastases scarcely occur, further study needs to be conducted.

Imaging Manifestations

The MRI findings of orbital SFT showed that lesions had equal density with the gray matter on T1WI, and values of signal intensity on T2WIs were controversial.[30-33] Previous studies reported that orbital SFT is rich in fibrous matrix and T2WI should be dominated by a low signal intensity, however, in several reported cases of malignant orbital SFT, cystic degeneration could be detected with a high signal intensity, suggesting that cystic degeneration could be related to malignant transformation.[4,34] In addition, the contrast-enhanced MRI showed enhanced SFT, while the enhancement can be uniform or uneven, and it may be associated with the distribution of blood vessels and capillary permeability.[35-37] In the current research, 2 patients underwent an MRI of the orbit, and the values of signal intensity on T1WI and T2WI before and after the recurrence of SFT were consistent, indicating that MRI signals did not significantly change before and after recurrence. Changes in cystic lesions were both observed before and after recurrence in Case #2. According to the results of IHC, the patient was diagnosed as benign orbital SFT before recurrence and malignant SFT after recurrence, demonstrating that change in cystic lesion may not be the specific marker for differentiating benign SFT from malignant SFT.

Pathological Manifestations

Orbital SFTs are largely benign tumors with few instances of recurrence. Grossly, they could be round- or long oval-shaped specimens. The masses of three cases in the current study were elliptical, all of which were behind the eyeball and confined by the orbital wall. Yang et al pointed out that although a tumor is mainly benign, it may involve the orbital bone and occasionally penetrate the orbital wall and invade the intracranial structure.[23] During the second surgery on Case #1 and Case #2, surgeons found an adhesion between the masses and the orbital bone. In Case #3, the tumor not only involved the right-sided orbit, but also the maxillary sinus, ethmoid sinus, and frontal sinus. However, after recurrence, the tumor may inevitably adhere to the bone wall due to the previous surgery, thus, destruction of the tumor on the orbital bony fissure before and after recurrence still needs further observation and verification.

In the review of subjects of previous studies, it was found that SFTs shared a histopathologic morphology, which was recognized for spindle cells, remarkably characteristic 'staghorn' blood vessels, and a matrix with a numbers of collagen bundles.[24] The results of IHC showed that CD34 is a useful marker in the diagnosis of SFT. Previous studies reported that SFT expressed CD34 in 90% of cases, CD99 in 70% of cases, and Bcl-2 in only 30% of cases.[26,27] In 2016, the World Health Organization (WHO) classified tumors with a classic SFT phenotype as grade I, tumors with intermediate or HPC phenotype as grade II, and tumors with five or more mitoses (× 10 HPFs) as grade III.[38] A number of scholars demonstrated that the presence of mitosis is a poor prognostic indicator, and, Sagiv et al. emphasized that the number of mitotic figures higher than 4/10 HPFs can be a predictor of malignant SFT.[4] In addition, nuclear atypia, cell proliferation, and necrosis were also considered as manifestations of malignant SFT.[35] It has been reported that the percentage of Ki-67-positive cells tends to increase correspondingly in SFT with an invasive tendency, which is clinically significant for the selection of postoperative treatment plans and assessment of tumor prognosis.[37,39-41] In three cases reported herein, tumor cells were spindle-shaped and densely distributed in collagen fibers. The nuclei were oval, round or spindle-shaped, the cytoplasm was pale and eosinophilic and branched or antlers-shaped blood vessels could be observed. IHC showed CD34 positive, while S-100 and CK negative, which were consistent with the diagnosis of orbital SFT. In cases #1 and #2, nuclear abnormalities were found for the first time after recurrence, and those cases were diagnosed as malignant SFT with mitotic activity of ≥ 4/10 HPFs. To date, few reports have concentrated on recurrent orbital SFT, and there is currently no large sample-sized controlled trial related to the pathological manifestations of recurrent orbital SFT before and after recurrence. In the present study, we compared the pathological manifestations of 24 orbital SFT patients before and after recurrence, including tumor necrosis, mitotic rate, and the percentage of Ki-67-positive cells. As shown in Table 2, the rate of SFT mitosis was elevated in the relapsed eyes, and the proportion of Ki-67 positive cells remained stable in some cases, while it increased in a large proportion after recurrence, indicating that recurrent orbital SFTs tend to increase in malignancy in terms of both morphological features and IHC results. In addition, the pathology testing of Case #3 after repeated recurrences revealed new occurred necrosis, and the percentage of Ki-67-positive cells was about 50%, suggesting that the degree of malignancy

may be higher after several recurrences, while the above-mentioned results should be verified by further case-control studies with a larger sample size.

In conclusion, recurrent orbital solitary fibrous tumors (SFT) represent a rare and complex neoplasm characterized by NAB2-STAT6 gene fusion. The time to recurrence of orbital SFT in the reported patients ranged from 3 months to 20 years, with a notably shorter average time to recurrence observed in patients under 50 years old. Moreover, the values of signal intensity on MRI before and after recurrence remained consistent, indicating minimal changes in MRI signals pre- and post-recurrence. Notably, recurrent orbital SFTs tend to exhibit malignant characteristics, with the degree of malignancy potentially increasing with the frequency of recurrence. Radical resection is crucial to prevent tumor recurrence and mitigate the progression towards malignancy, with risk factors for recurrence including incomplete resection and high mitotic rate. Clinical Recommendations: Emphasize the significance of complete resection and close postoperative surveillance to monitor for recurrence. Highlight the importance of multidisciplinary collaboration involving ophthalmologists, oncologists, and pathologists in the management of recurrent orbital SFT. Consider the potential role of adjuvant therapies and tyrosine kinase inhibitors in the comprehensive management of recurrent orbital SFT. Caveats and Uncertainties: It is important to note that these findings are based on a retrospective study, and as such, potential biases and limitations exist. The retrospective nature of the study may introduce inherent limitations in data collection and analysis, thus impacting the robustness of the conclusions drawn. Additionally, the sample size of the study may limit the generalizability of the findings to a broader population of patients with recurrent orbital SFT. By addressing these areas for improvement and providing a balanced view of the results, practitioners and researchers can better understand the complexities of managing this rare and challenging disease.

ETHICAL COMPLIANCE

The current study was approved by the Ethics Committee of the First Affiliated Hospital of Zhejiang University School of Medicine, and was performed in accordance with the Declaration of Helsinki. Besides, all participants signed the written informed consent form prior to commencing the study.

CONFLICT OF INTEREST

The authors have no potential conflicts of interest to report relevant to this article.

AUTHOR CONTRIBUTIONS

JC and XW designed the study and performed the experiments, YL and DG collected the data, YL, DG and HC analyzed the data, JC and XW prepared the manuscript. All authors read and approved the final manuscript. JC and XW contributed equally to this work

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