Brief Report

Follicular mycosis fungoides: Clinicohistopathologic features and outcomes in a series of 12 Chinese cases

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Abstract

Background: Follicular mycosis fungoides is a distinct variant of mycosis fungoides with a broad clinical spectrum. Recently, many studies have indicated that follicular mycosis fungoides should be divided into different subtypes with disparate prognoses.

Objectives: To define the clinicohistopathologic features and outcomes of follicular mycosis fungoides and to identify risk factors that may be related to the prognosis of Chinese patients with follicular mycosis fungoides.

Materials and methods: We conducted a single-centre retrospective study and reviewed the clinical, histopathologic and immunophenotypic data of 12 patients diagnosed with follicular mycosis fungoides between 2009 and 2020 in the Department of Dermatology of West China Hospital of Sichuan university.

Results: A total of 12 patients (seven males and five females) with a mean age of 30 ± 14 years (age range 16–55 years) were included. Scalp and face were the most common involved sites (100%). Follicular papules, acneiform lesions, plaques, and nodules, were the main clinical presentations. Histopathological findings were consistent with the classic manifestations of follicular mycosis fungoides, including folliculotropism, perifollicular and intrafollicular lymphocytic infiltrates and mucinous degeneration. Interferon α-1b was the most common treatment. Four patients died of follicular mycosis fungoides in three years. Notably, immunohistochemical analysis revealed a decreased number of $CD20^{+}$ cells in the deceased patients.

Conclusion: Our patients were much younger than in previous studies. The observed difference in this cohort may be explained by race, in addition to the limited number of cases. A decreased number of B cells might be associated with a poor prognosis, and more studies are necessary to discover the role of B cells in follicular mycosis fungoides as well as in mycosis fungoides.

Limitations: This is a retrospective evaluation with a small number of cases; further prospective studies are warranted to support our inferences.

Key words: Clinicopathology, cutaneous T-cell lymphoma, folliculotropic mycosis fungoides, mycosis fungoides, prognosis

Plain Language Summary

Follicular mycosis fungoides (FMF) is a variant of mycosis fungoides (MF) with diverse clinical features and prognosis. This study aimed to define the clinicohistopathologic features and outcomes of FMF and identify prognostic risk factors for Chinese patients. The study analysed 12 patients with FMF, with the head and face being the most commonly involved sites. The most common treatment was Interferon α-1b, and four patients died of FMF in three years. Immunohistochemical analysis revealed that decreased numbers of CD20+ cells were associated with poor prognosis. However, due to the small number of cases and retrospective nature of the study, further prospective studies are needed to confirm the findings. Nonetheless, the

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study sheds light on the clinical heterogeneity and prognosis of FMF, indicating the need for personalized management and prognostic evaluation.

Introduction

Follicular mycosis fungoides has been recognised as a variant of mycosis fungoides by the World Health Organization-European Organization for Research and Treatment of Cancer since 2005 based on its special clinical and histopathological features.[1] Follicular mycosis fungoides is characterised by various types of skin lesions. Besides the characteristic manifestations of classic mycosis fungoides like patches, plaques and tumours, follicular mycosis fungoides patients frequently present with follicular lesions, acneiform eruptions, along with alopecia.[2,3] The head, face and neck are generally affected sites in follicular mycosis fungoides, while the trunk and extremities are the commonly involved sites in classic mycosis fungoides.[3,4] The histologic hallmark of follicular mycosis fungoides is the presence of neoplastic lymphocytes infiltrating the follicular epithelium and sparing the epidermis (folliculotropism), while the neoplastic lymphocytes in classic mycosis fungoides always infiltrate into the epidermis (epidermotropism).[5,6] Follicular mycosis fungoides had once been recognised as a distinct variant of mycosis fungoides with an unfavourable prognosis.[4,7] However, recent studies have reported that not all patients with follicular mycosis fungoides present with aggressive clinical behaviour, a subtype of patients have an indolent clinical course with 5-year survival similar to that of patch-stage classic mycosis fungoides.[8–10] Also, the tumour-node-metastasis-blood staging system for classic mycosis fungoides cannot estimate the prognosis of follicular mycosis fungoides accurately. Therefore, a follicular mycosis fungoides-specific staging system should be proposed.[11,12] The aim of this study was to assess the clinical features, histopathologic characteristics and prognostic aspects of Chinese follicular mycosis fungoides patients. The study also aimed to explore the potential risk factors influencing the prognosis of follicular mycosis fungoides patients. We hope our work may be helpful in devising a better staging system for follicular mycosis fungoides in future.

Materials and methods

Patient recruitment

All patients with follicular mycosis fungoides diagnosed at the Department of Dermatology of West China Hospital of Sichuan University, during the period April 2009–October 2020, were included. The diagnosis of follicular mycosis fungoides was based on clinical and pathological findings according to the criteria of the World Health Organization-European Organization for Research and Treatment of Cancer classification.[1] The criteria emphasise the presence of folliculotropic infiltrates as well as the preferential localisation of skin lesions in the head and neck region. A total of 12 cases with complete clinical records and 14 available histopathologic materials (there were two biopsy specimens each from patients nine and eleven) were included. The haematoxylin and eosin-stained sections were reviewed by at least two pathologists. A diagnosis of follicular mycosis fungoides was made when principally perifollicular or intrafollicular infiltrates of atypical T cells with twisted nuclei were seen. All these patients were followed up until August 2021. At the end of the follow-up, four patients died within three years, and eight survived without progression. A distinction was made between dead patients (D-follicular mycosis fungoides) and alive cases (A-follicular mycosis fungoides). Clinical parameters evaluated included age at diagnosis, sex, lesion distribution and morphology (patch, plaque, tumour, follicular lesions, etc.). Histopathologic parameters included the extent and density of the infiltrate (sparse, moderate, or marked), size of tumour cells (small, medium or large), presence of follicular mucinosis (no or minimal vs prominent) and presence of eosinophils (no or few vs prominent). In this retrospective study, 3-year overall survival and progression-free survival were used as prognostic indicators.

Alcian blue stains were used to demonstrate mucin accumulation. Immunohistochemical staining was performed in every specimen with antibodies against CD2, CD3, CD5, CD7, CD4, CD8, CD20, CD30, CD56, CD68 (PGM-1), PCK, TIA-1, granzyme B and Ki-67.

Result

Clinical findings

Among the twelve patients in the study [Table 1], seven were men, and five were women. The age at the time of diagnosis ranged from 16 to 55 years, and the mean age was 30 ±14 years. The median disease duration before diagnosis was 72 months (6–240 m). All patients had lesions on the head/neck or face region. Patients presented with patches and/or plaques along with various follicular lesions such as follicular papules, Keratosis pilaris-like and acneiform lesions (pustules and comedones). In addition, nodules and tumours could be found in five cases [Figure 1]. All patients in D-follicular mycosis fungoides presented with infiltrated plaques, nodules or tumours. Hair loss was observed in eight subjects, two of them with infiltrated plaques in the eyebrows. Six patients suffered from severe pruritus.

All patients were treated with intramuscular interferon α-1b; topical corticosteroids were the second most frequently used therapy in our patients (10/12), followed by narrow-band ultraviolet B radiation (4/12), local radiotherapy (3/12) or chemotherapy (3/12), as shown in Table 2. The median time of patients' follow-up was 43 months (6–108 m). At the last follow-up visit, six patients were alive with partial remission, two patients were in complete remission and four patients had died due to follicular mycosis fungoides. Among these, patient four developed peripheral blood and bone

Table 1: Clinical characteristics of follicular mycosis fungoides patients

Gender/age at diagnosis	Clinical presentation	Localisation	Outcome (until last follow-up)	Follow-up (months)	Stage at diagnosis
1. F/32	Acne, cyst, nodule	Face	PR	12	A-S
2. F/28	Plaque, acneiform	Face, extremities, trunk	PR	30	E-S
3. M/55	Plaque, follicular papule	Head	CR	34	E-S
4. M/25	Plaque, follicular papule, tumour	Face, head, extremities, trunk	Died of follicular mycosis fungoides	42	EX
5. M/42	Plaque, follicular papule tumour	Face, head, extremities, trunk	Died of follicular mycosis fungoides	23	EX
6. M/16	Plaque, follicular papule	Head	PR	60	E-S
7. M/50	Plaque, follicular papule, tumour	Head, face	PR	60	A-S
8. F/21	Follicular papule, acneiform	Head, neck, lower extremities	PR	96	E-S
9. M/49	Plaque, follicular papule, keratosis pilaris, keratosis pilaris-like	Face, neck, trunk, upper extremities	CR	108	E-S
10. F/24	Plaque, follicular papule, nodule, tumour	Face, head, extremities, trunk	Died of follicular mycosis fungoides	12	A-S
11. F/32	Plaque, follicular papule, nodule	Head, face	Died of follicular mycosis fungoides	36	A-S
12. M/28	Acneiform, follicular papule	Face, head, extremities, trunk	PR	6	E-S

CR: complete response, clearance of almost all skin symptoms >90%, PR: partial response, 50% clearance of skin symptoms, A-S: advanced cutaneous stage, E-S: early cutaneous stage, EX: follicular mycosis fungoides with extracutaneous disease, no patient was lost

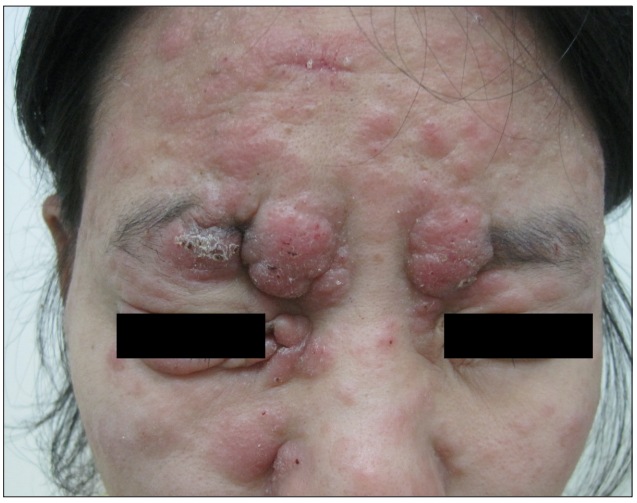

Figure 1a: Multiple nodules and infiltrated plaques on the face.

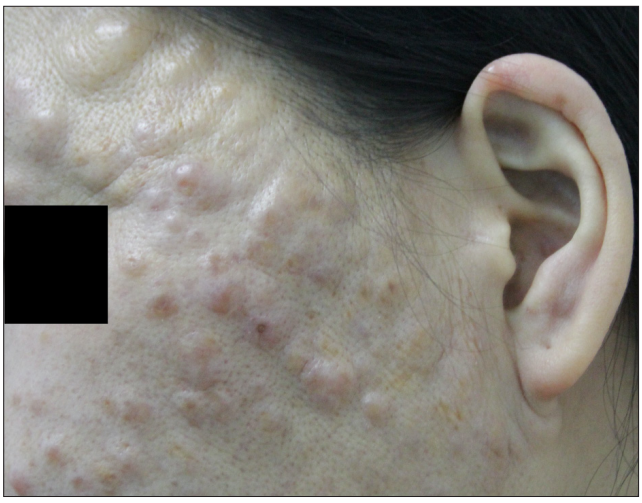

Figure 1b: Pustules and nodulocystic lesions limited to the face.

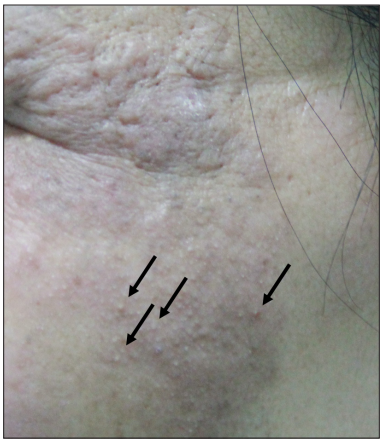

Figure 1c: Erythematous plaques with follicular hyperkeratosis ("comedones") on the left face (arrows).

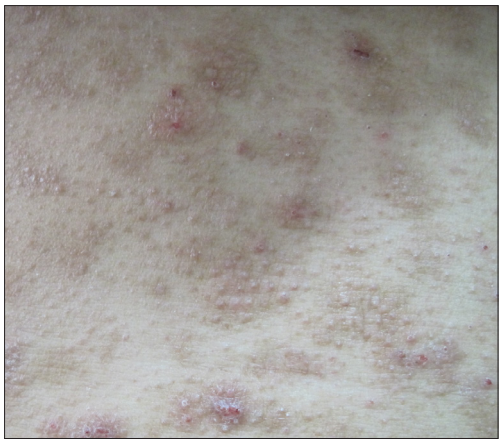

Figure 1d: Follicular papules on chest.

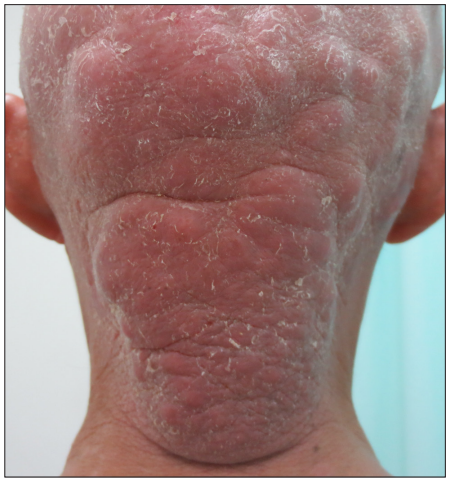

Figure 1e: A huge tumour on the head and neck.

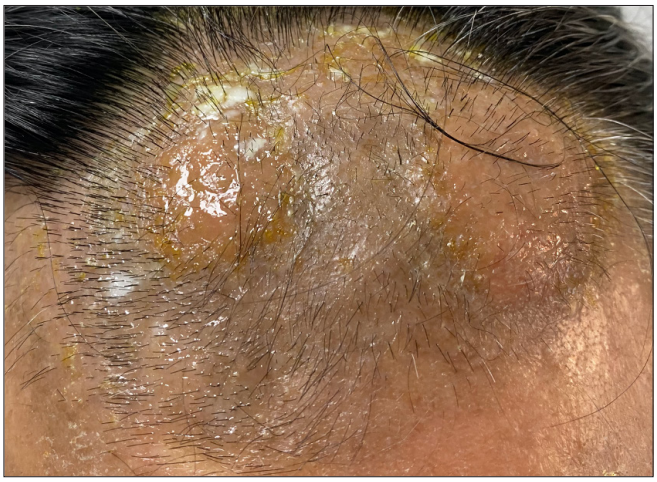

Figure 1f: An infiltrated plaque on the forehead before treatment.

Table 2: Details of therapy and associated adverse events

Patients	Treatment	Dose and duration	Adverse events
1	INFα Topical steroids	500 MU three times weekly × 12 m	None
2	NB-UVB INFα Topical steroids	8–10J three times weekly × 12 m 500 MU three times weekly × 20 m	None
3	INFα	500 MU three times weekly × 24 m	None
4	NB-UVB INFα Topical steroids Local radiation Chemical therapy	8 J three times weekly × 24 m 500 MU daily ×24 m CHOP	Fever, nausea, hypocytosis, alopecia and infection (skin and lung)
5	NB-UVB INFα Topical steroids Chemical therapy	8 J three times weekly × 12 m 500 MU daily × 12 m Doxorubicin 30 mg biweekly × 10 m	Nausea, alopecia, hypocytosis and thrombosis
6	NB-UVB INFα Thymosin	8 J three times weekly × 10 m 500 MU three times weekly × 60 m 10 mg twice weekly × 12 m	Fever and fatigue
7	NB-UVB INFα Topical steroids Local radiation	8 J three times weekly ×12 m 500 MU daily × 12 m	None
8	INFα	500 MU three times weekly ×12 m	None
9	NB-UVB INFα Thymosin Chemotherapy	8–12 J three times weekly × 6 m 500 MU daily × 12 m 10 mg twice weekly × 8 m Gemcitabine 1000 mg/m^2 weekly ×1 m	Nausea and alopecia
10	INFα Topical steroids Themotherapy	500 MU daily × 4 m	Alopecia and fatigue
11	INFα Topical steroids Chemotherapy	500 MU daily × 6 m Gemcitabine 1000 mg/m^2 weekly × 1 m	Nausea, diarrhea hypocytosis and pneumonia
12	NB-UVB INFα	8 J three times weekly × 6 m 500 MU daily × 6 m	None

MU: million units, m: month, NB-UVB: narrow band ultraviolet B radiation, INFα: interferon α-1b, CHOP: cyclophosphamide-hydroxydaunorubicin-oncovin-prednisone

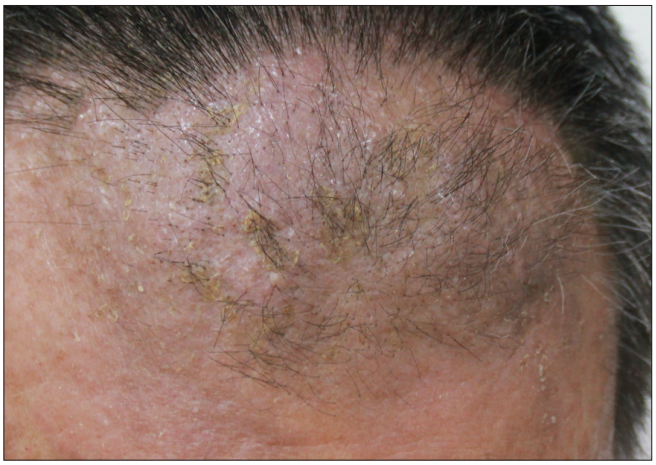

Figure 1g: An infiltrated plaque on the forehead after treatment.

marrow involvement, proven by bone marrow biopsy (haematological involvement), and patient five developed nodal disease, which was proven by lymph node biopsy.

Two patients had a history of hypertension (patients three and seven), for 1 and 6 years, respectively, before the diagnosis of follicular mycosis fungoides was made. Patient nine was diagnosed with hypothyroidism 2 years after the diagnosis of follicular mycosis fungoides.

Histopathological findings

All cases showed perifollicular and/or intrafollicular infiltration with atypical lymphocytes. The main histological characteristics are summarised in Table 2. The suprabulbar region of the follicles was invaded in all samples [Figure 2a], and the external root sheath was heavily involved in all cases excepting patient eight [Figure 2b].

The atypical cells in the majority of cases (8/12, 66.7%) were small to medium-sized [Figure 2c], while the rest (4/12, 33.3%) had predominantly medium to large-sized cells. In three patients of the D- follicular mycosis fungoides group, large cells made up to 10–25% of the lymphoid infiltrate [Figure 2d], showing large cell transformation. We did not find large cell transformation in any patient of the A- follicular mycosis fungoides group. Eosinophils were observed in all cases, and considerable numbers of eosinophils (20–30/high power field) were observed in four cases of the A-follicular mycosis fungoides group.

Immunohistochemical and genotypic features **[Table 4]**

Immunophenotypically, the classic T-cell phenotype CD2+, CD3+ of folliculotropic lymphoid cells with deletion of CD7 was observed in all cases [Table 3]. Expression of CD30 by more than 10% of neoplastic T-cells was observed in 2 patients in the D-follicular mycosis fungoides group, while none in the A-follicular mycosis fungoides group exhibited

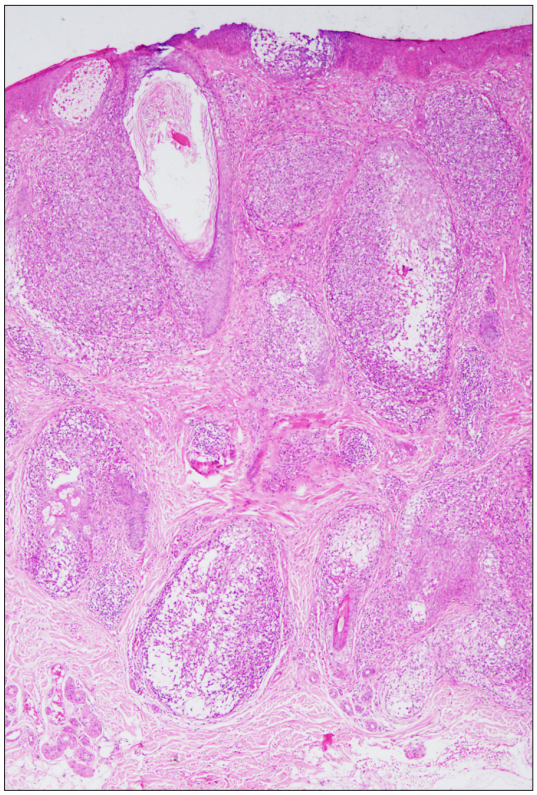

Figure 2a: Dense intrafollicular and perifollicular infiltrates and extensive follicular mucinosis (haematoxylin-eosin, original magnification ×40).

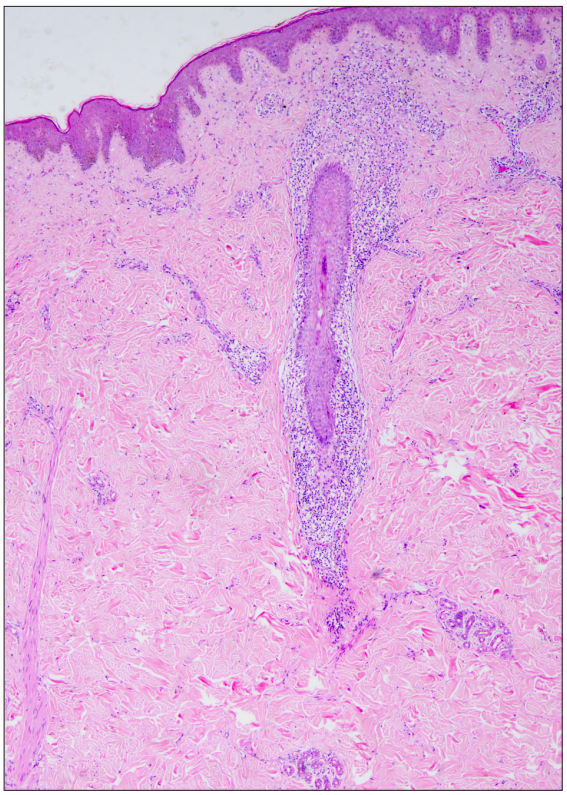

Figure 2b: Sparse perifollicular infiltrates (haematoxylin-eosin, original magnification ×40).

Table 3: Histological characteristics of follicular mycosis fungoides (12 patients)

Histological findings	Frequency
Perifollicular lymphoid infiltration, and folliculotropism	12/12
Sparse infiltration	2/12
Moderate infiltration	2/12
Marked infiltration	8/12
No mucinosis	1/12
Limited follicular mucinosis	7/12
Prominent mucinous degeneration	4/12
Mild epidermotropism	3/12

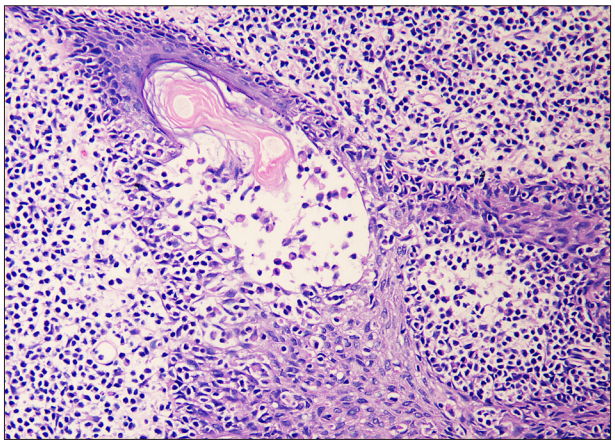

Figure 2c: Infiltration of follicular epithelium by small sized atypical lymphocytes with mucin deposition.

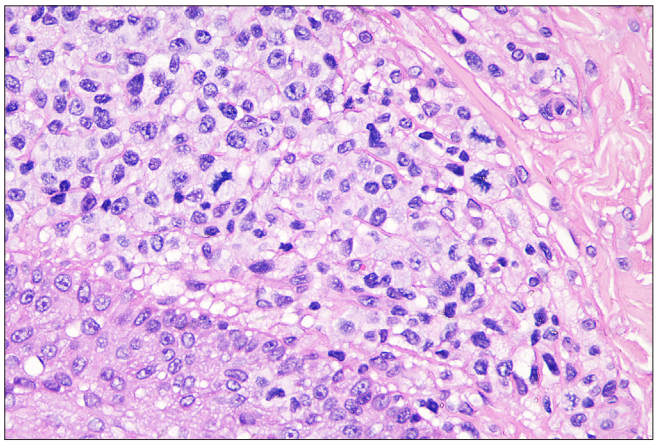

Figure 2d: The blast cells made up more than 25% of the infiltrate (haematoxylin-eosin, original magnification ×200).

Table 4: Immunohistochemical features of follicular mycosis fungoides (12 patients)

Immunohistochemical features (envision ×200)	Frequency
$CD4^+$, $CD8^+$	10/12
$CD4^-$, $CD8^+$	1/12
$CD4^-$, $CD8^-$	1/12
CD30 > 10%	2/12
CD20 > 10%	8/12
CD20 < 1%	4/12
CD68 > 10%	6/12
CD56	0/12

this. All patients of the D-follicular mycosis fungoides group (100%) had <1% positivity of CD20, while seven patients of the A-follicular mycosis fungoides group (87.5%) had up to 10% positivity Figure 3. There was no significant difference in the Ki-67 proliferative index (ranging from 5 to 50%) between the two groups. Molecular analysis demonstrated the presence of monoclonality of T-cell receptor γ-gene in all cases.

Discussion

We report a Chinese series of 12 patients with follicular mycosis fungoides. Follicular mycosis fungoides mainly occurs in adults, and previous studies have shown that the mean age of onset varies from 46 to 59 years.[3] However, our patients were much younger, with a mean age of 30 years. Besides the limited number of cases and selection bias, race and region may explain this difference. On reviewing the literature, previous cohort studies [Table 5] have been from European or North American institutions,[8,10,13,14] hence most included patients were either white/caucasians or darker skin types. However, all our patients were Chinese. Previous studies have shown a male preponderance with a male-to-female ratio of 2–5:1. However, there was no obvious gender difference in this cohort with the male-to-female ratio being only 1.4:1. This is probably explained by the limited case numbers. Therefore the relationship between age of onset and race needs to be explored further by larger-scale Asian studies.

The head region is commonly reported to be the most favoured site of follicular mycosis fungoides lesions.[9] The scalp and face region was the most affected site in our patients too. In our cohort, the most common presentation was follicular papules, followed by erythematous plaques, nodules and acneiform lesions. Thus the clinical features were in agreement with other series.[8,10]

In 2016, Van Santen *et al*. suggested dividing patients with follicular mycosis fungoides into three groups with different prognoses—early skin-limited follicular mycosis fungoides characterised by patches, follicular papules and acneiform lesions; advanced skin-limited follicular mycosis fungoides characterised by nodules and tumours; and follicular

Table 5: Literature review of cohort studies of follicular mycosis fungoides

Study	*n*	Gender	Age (y)	Clinical stage at diagnosis	Treatment	Outcome	Prognostic factors
Hodak *et al.* 1999/Israel[21]	9	M: 6 F: 3	55	Not reported	PUVA: 6 NB-UVB: 1 TSEB: 1 INF: 1	Not reported: 2 CR: 3 PR: 4	NM
Van Doorn *et al.* 2002/Netherlands[2]	51	M: 42 F: 9	57	Only skin lesions: 45 Lymph node involvement: 5 Visceral involvement: 1	PUVA: 22 TSEBI: 11 Radiotherapy: 7 Other: 11	CR: 5 PR: 20 Died of follicular mycosis fungoides: 20 Died of other cause: 6	NM
Gerami *et al.* 2008/USA[4]	43	M: 31 F: 12	49	≤IIA: 32 ≥IIB: 11	Skin directed[a]: 12 Irradiation alone: 1 PUVA: 30 Retinoids: 26 INFα: 18 Chemotherapy[b]: 14 Alemtuzumab: 3 Allo-HSCT: 4	≤IIB: 87% at 5 years and 82% at 10 years ≥IIIA: 83% at 5 years and 67% at 10 years	NM
Lehman *et al.* 2010/USA[6]	50	M: 32 F: 18	58.8	Only skin lesions: 30 Erythroderma: 4 Lymph node involvement: 7 Visceral involvement: 1 Not reported: 8	PUVA with or without other therapies: 21 radiation therapy: 2 Other[c]: 27	CR: 1 PR: 31 Died of follicular MF: 3 Died of other cause: 12 Lost: 3	NM
Mantaka *et al.* 2013/Norwegian[14]	15	M: 10 F: 5	65	Early-stage (IA-IIA): 8 Intermediate-stage (IIB-III): 3 Advanced-stage (IVA-IVB): 2	PUVA: 6 TSEBI or other radiation: 3 IFNα: 2 Topical steroids: 5 Chemotherapy[d]: 2 Allo-HSCT: 2 Lost: 4	PR: 6 PD: 4 Died of unknown cause: 4 Lost: 1	NM
Marschalkó *et al.* 2014/Hungary[22]	17	M: 13 F: 4	50.7	Not reported	PUVA: 8 IFNα: 5 TSEBI or other radiation: 9 Retinoid: 9 Topical steroids or bexarotene gel: 5	PR: 8 CR: 5 PD: 2 Died of unknown cause: 1 Lost: 1	NM
Deonizio *et al.* 2016/Brazil[23]	33	M: 20 F: 13	46	Early-stage (≤IIA): 14 Advanced-stage (≥IIB): 19	NB-UVB and/or PUVA: 22 TSEBI or other radiation: 13 Chemotherapy[e]:12 IFNα: 9	PR: 22 CR: 6 PD: 7 Died of follicular mycosis fungoides: 2	LCT clinical stage
Hodak *et al.* 2016/Israel[24]	49	M: 35 F: 14	44.1	Early-stage (IA-IB): 34 Advanced-stage (≥IIB): 15	Not reported	PD: 4 Died of follicular mycosis fungoides: 5 Alive: 40	clinical stage
Van Santen *et al.* 2016/Netherlands[8]	203	M: 147 F: 56	59	Early skin-limited disease: 84 Advanced skin-limited disease: 102 Extracutaneous disease: 17	Topical steroids: 21 UVB: 12 PUVA: 61 Retinoids: 19 IFN-α: 10 Local radiotherapy 21 TSBEI: 20 Chemotherapy 14 Other7[3]	PR: 78 CR: 32 Died of follicular mycosis fungoides: 59 Died of other cause: 34	clinical stage older than 60 years LCT extensive secondary bac- terial infection

(Contd...)

Table 5: *Contd...*

Study	*n*	Gender	Age (y)	Clinical stage at diagnosis	Treatment	Outcome	Prognostic factors
Baykal *et al.* 2017/Turkey[25]	27	M: 16 F: 11	46.2	Early-stage (≤IIA): 19 Advanced-stage (≥IIB): 8	PUVA with acitretin or IFN-α, bexarotene: 20 TSEBI: 4 Chemotherapy[f]: 2 Lost: 1	PR: 15 CR: 8 PD: 1 Died of follicular mycosis fungoides: 2 Lost: 1	clinical stage
Wieser *et al.* 2017/USA[10]	114	M: 62 F: 52	57.1	Early-stage (≤IIA): 80 Advanced-stage (≥IIB): 34	Skin directed[a]: 97 TSEBI or other radiation: 58 Oral Bexarotene: 53 IFN-α: 13 Methotrexate: 15 Other: 20	PD: 33 Died of follicular mycosis fungoides: 11 Died of other cause: 15	stage at diagnosis advanced age[65] LCT Leonine facies
Kalay *et al.* 2020/Turkey[13]	53	M: 43 F: 10	56	Early-stage (≤IIA): 29 (54.7%) Advanced-stage (≥IIB): 24 (45.3%)	Skin directed[a]: 49 TSEBI or other radiation: 10 Oral Bexarotene:20 IFN-α: 45 Chemotherapy[g]: 13 Allo-HSCT: 4	PR: 21 CR: 13 PD: 10 Died of follicular mycosis fungoides: 7 Died of other cause:2	stage at diagnosis LCT levels of LDH

M: male, F: female, TSEBI: total skin electron beam irradiation, PUVA: psoralen ultraviolet A, NB-UVB: narrow band-ultraviolet B radiation, PD: progressive disease, allo-HSCT: allogeneic stem cell transplantation, NM: not mentioned, LDH: lactate dehydrogenase, LCT: Large cell transformation, [a]skin-directed therapies included PUVA, NB-UVB: nitrogen mustard, or bexarotene gel in combination with topical steroids, [b]this chemotherapy included CHOP (cyclophosphamide, adriamycin, vincristine and prednisone), liposomal doxorubicin, gemcitabine, or a combination of these drugs, [c]included topical corticosteroids, nitrogen mustard, narrow-band UV-B phototherapy, extracorporeal photopheresis, topical or oral retinoids, and no therapy, [d]chemotherapy was given either as a monotherapy (chlorambucil, gemcitabine or high-dose methotrexate) or combination chemotherapy (CHOP: cyclophosphamide, doxorubicin, vincristine and prednisone), [e]multidrug chemotherapy, including CHOP (cyclophosphamide, doxorubicin, vincristine, and prednisone) and C-MOPP (cyclophosphamide, vincristine, procarbazine, and prednisone), [f]short-term methotrexate and CHOP chemotherapy (cyclophosphamide, adriamycin, vincristine, and prednisone), [g]demcitabine hydrochloride and CHOP (cyclophosphamide, doxorubicin hydrochloride, vincristine sulfate and prednisone)

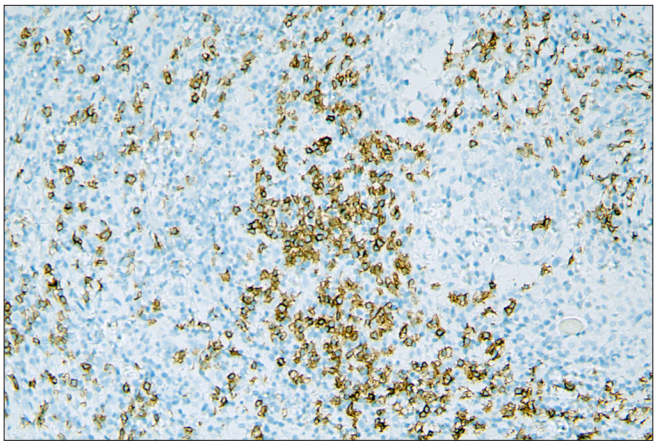

Figure 3a: Increased number of $CD20^+$ B cells in A-follicular mycosis fungoides group.

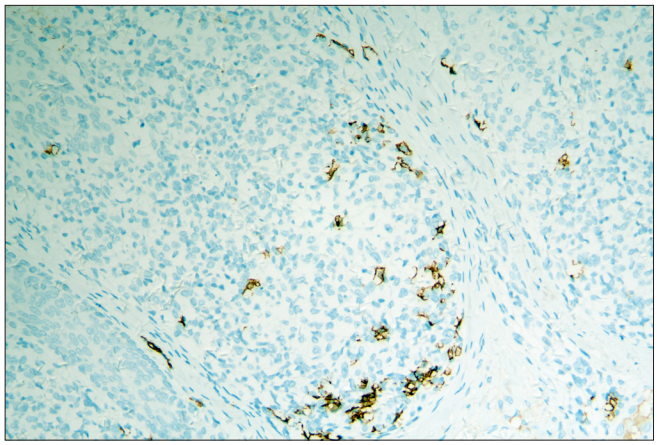

Figure 3b: Decreased number of $CD20^+$ B cells in D-follicular mycosis fungoides group.

mycosis fungoides with extracutaneous disease.[8] The new classification emphasises the type of lesions rather than the involved areas. Patients with plaques represent a heterogeneous group which should be differentiated by histological features.[12] The presence of a dense infiltrate with large lymphocytes confers a prognosis similar to those with advanced disease. On the contrary, the presence of a sparse infiltrate with small lymphocytes indicates a prognosis similar to those with indolent disease. This new staging system has been supported by some other studies.[11,13] In our study, all patients in the D-follicular mycosis fungoides group presented with infiltrated plaques, nodules and/or tumours; two of them met the criteria for lymph node involvement [Table 1], hence they qualified as advanced skin-limited follicular mycosis fungoides or follicular mycosis fungoides with extracutaneous disease based on Van Santen's criteria. Thus, our findings suggest that this new classification is effective in estimating prognosis.

In the available literature, more than one study has indicated that risk factors include clinical stage, large cell transformation, and the presence of more than 10% Ki-67 positive cells.[10,13,15,16] Large cell transformation is related to the presence of CD30-positive large cells and is associated with a poor prognosis. Although large cell transformation and advanced stage (4/4, 100%) were the prominent features in the D-follicular mycosis fungoides group, the prognostic factors above cannot be confirmed statistically due to the limited number of our cases. Their value in the prognosis of patients with follicular mycosis fungoides still warrants further investigation. Compared with classic mycosis fungoides, eosinophils are more conspicuous within the reactive infiltrate. Whether infiltrating eosinophils is responsible for the poor outcome in patients with follicular mycosis fungoides is unknown.

Furthermore, the role of tumour-associated B cells in the tumour microenvironment is still vague. Atzmony *et al*. recently reported that the presence of B cells in follicular mycosis fungoides demonstrates a positive correlation with advanced stages.[15] Moreover, a previous analysis of 33 cases of mycosis fungoides has already shown that increased B-cell numbers might indicate shortened progression-free survival.[17] However, a report of 40 patients of follicular mycosis fungoides showed that the presence of B cells had no effect on prognosis and disease progression.[12] Several studies in solid human tumours suggest improved tumour control in the presence of B cells.[18,19] Schebye *et al*. discovered that it might not be beneficial to attenuate B-cell functions in tumour immunotherapy based on glucocorticoid-induced TNF receptor family-related protein agonism, and mature B cells are critical to T-cell-mediated tumour immunity.[20] In our study, there was a significantly greater number (7/8, 88%) of dermal CD20 positive cells observed in the A-follicular mycosis fungoides group compared with the D-follicular mycosis fungoides group (0/4, 0%). This result suggests that there is a trend towards a good prognosis with the presence of more B cells in follicular mycosis fungoides. However, due to the limited number of cases, larger prospective studies are warranted to discover the impact of tumour-infiltrating B cells in follicular mycosis fungoides, as well as mycosis fungoides.

Limitation

This is a retrospective evaluation of follicular mycosis fungoides in only 12 Chinese patients. The number of cases is small, therefore meaningful statistical analysis was not possible. The average follow-up duration of two patients in the A-follicular mycosis fungoides group was shorter than two years, so the distinction between A-follicular mycosis fungoides and D-follicular mycosis fungoides groups may be less rigorous. Further prospective studies are warranted to assess in more detail the possible risk factors and preferred treatment modalities.

Conclusion

In conclusion, as the first Chinese case series of follicular mycosis fungoides, our study analysed the clinical and histologic features of patients with follicular mycosis fungoides as well as evaluated the risk factors for survival. It is remarkable that our patients are younger than those in foreign studies. What's more, our data suggest that the B cells may play a protective rather than immunosuppressive role in follicular mycosis fungoides. However, more large-scale studies, especially on Asian cases, are required to confirm our conclusion.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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