PATHOLOGICA 2017;109:120-125

Case report

Follicular dendritic cell sarcoma of the head and neck. Literature review and report of the tonsil occurrence in a Ugandan patient

I. PECORELLA[1], T.R. OKELLO[2], G. CIARDI[1], E. OCHOLA[3], M.D. OGWANG[2]
[1] Department of Radiological, Oncological and Anatomic Pathology Sciences University of Rome "Sapienza", Rome (Italy);
[2] Department of Surgery of Gulu University Medical School, St. Mary's Hospital Lacor, Gulu (Uganda);
[3] HIV Research Department, St. Mary's Hospital Lacor, Gulu (Uganda)

Key words

Palatine tonsil • Follicular dendritic cell sarcoma • Extranodal haematological malignancy • Immunohistochemistry

Summary

We report a case of follicular dendritic cell sarcoma (FDCS) in a 60-year-old Ugandan female who presented with a 6-year history of a progressive left sided tonsillary mass. General systemic examination was unrevealing and the patient underwent left tonsillectomy. She was subsequently lost to follow-up.
Grossly, the mass measured 6 cm in diameter and had a mottled appearance due to tissue microhaemorrhages. Markers specific for follicular dendritic cell differentiation (CD21, CD35 and CD23), p53 and EGFR were expressed on immunohistochemical analysis.
Review of all of the 49 published reports of tonsil FDCS showed that this entity tended to occur at younger age (mean: 44.5 yrs) in women than in men (mean: 49.4 yrs). Tumour size ranged from 0.8 to 5 cm in maximum dimension (mean 2.9 cm). Only 12.2% of the patients presented with metastatic disease at initial diagnosis, all localised in the cervical lymph nodes. Local or distant recurrences occurred after a mean period of 72.5 months.
In conclusion, although the pertinent literature suggests that FDCS should be considered at least of intermediate grade, our review indicates that FDCS of the tonsil region behaves as a low-grade sarcoma.

Introduction

Recently discovered follicular dendritic cell (FDC) precursors in the lymph node are sessile cells originating from the vascular wall stroma and expressing platelet-derived growth factor receptor beta [1]. Follicular dendritic cells are nonphagocytic, antigen-presenting immune accessory cells, located in the germinal centres of primary and secondary follicles, which may undergo sarcomatous changes. Follicular dendritic cell sarcoma (FDCS) accounts for only 0.4% of soft tissue sarcomas, with only 400 cases reported in the English literature [2], but has significant recurrent and metastatic potential and is considered by most authors an intermediate grade malignancy [3]. The tumour usually occurs in the lymph nodes of the neck, mediastinum, and axilla. In approximately 30% of cases, the tumour develops in extranodal sites, preferentially in the head and neck area. In 1996, Nayler et al. reported the first case of FDCS of tonsil [4].

The lack of awareness of this entity causes a high rate of misdiagnoses in extranodal cases [5 6], especially in the head and neck region. Head and neck FDCS have occurred in soft palate, retromolar trigone, nasopharynx and parapharyngeal space, parotid gland [6]. FDCS of tonsil is extremely rare and so far only a total of 49 cases (35 cases in the English literature and 12 in the Chinese literature) were reported (see Tab. I).
To date, no such cases occurring in Uganda are described in the literature. Therefore, we herein present our case, with a review of the pertinent literature.

Case report

A 60-year-old Ugandan female patient presented to Gulu Regional Referral Hospital (north Uganda) with a fungating, painless left tonsillar tumour of 6-year-duration. The mass had caused difficulty in swallowing for the

Correspondence
Irene Pecorella, Department of Radiological, Oncological and Anatomic Pathology Sciences University of Rome "Sapienza", viale Regina Elena 324, 00161 Rome - Tel. +39 0649974561 - Fax +39 064940896 - E-mail: irene.pecorella@uniroma1.it

Tab. I. Summary data of FCDS of the tonsil reported in the English literature. Data of cases reported in the Chinese literature were retrieved from the article by Lu et al. [26].

Ref	Pt's gender	Pt's age	Side	Max size (cm)	Metastases at diagnosis	PO treatment	Tobacco use	Follow-up (months)
16	F	76	L	3.5	/	RT	NA	NED (48)
8	F	48	L	3.5	1/44 cervical LN	Radical neck dissection	NA	NED (6)
8	M	48	R	3.5	/	None	NA	NED (8)
17	M	40	L	NA	/	None	NA	NED (12)
17	M	45	R	NA	/	None	NA	NED (12)
17	M	34	R	NA	/	None	NA	Recurrence (120)
18	M	44	L	1.5	/	None	NA	NED 36
37	F	18	R&L	2	/	CHT (CHOP)	NA	NA
Chen (26)	NA	NA	NA	NA	na	None	NA	NED (12)
Chen (26)	F	21	R	2.5	na	None	NA	na
9	F	27	R	4	1 cervical LN	Neck dissection + RT	Yes	NED (6)
19	M	48	L	1.5	Cervical LN	Neck dissection + RT	NA	NED (36)
5	M	41	L	3	/	None	NA	NED (9)
20	M	65	R	3	/	RT	NA	NED (24)
21	F	48	R	NA	/	CHT + RT	NA	REC (180) CHT
15	F	57	NA	NA	Cervical & axillary LN	None	NA	AWD (8)
22	F F	36 59	L L	3 4.5	/ / None	None None	NA NA	Cervical LN (6) CHT (CHOP) + RT AWD (15) REC (17) DOD (24)
23	F	77	NA	NA	/	Pre-operative RT + radical neck dissection	NA	Lung and ilar LN metastases (96)
14	M	72	R	5	NA	CHT (only 1 dose)	NA	Dead (12)
24	F	30	L	2.2	/	None	NA	NED (6)
25	M M	60 55	NA NA	5 2	/	RT RT	NA	NED (86) REC (18) AWD (21)
Liu (26)	F	47	R	NA	/	None	NA	NED 10
26	M	59	R	4.6	/	RT	Yes	NED (44)
27	F	47	L	NA	NA	CHT at 3rd recurrence	NA	REC (132)
Ma (26)	F M F	19 60 40	NA R L	1 1 0.8	NA NA NA	None None None	NA NA NA	NA NA NA
28	F	59	R	4	/	RT	NA	NED (18)
6	M	27	L	2.8	/	RT	NA	NED (6)
4	F	18	R&L	4	NA	CHT (CHOP)	NA	Lost to FU
2	M	32	L	3.3	Cervical LN	Neck dissection CHT + RT	NA	Lung & liver metastases (48)
29	F	62	NA	NA	/	None	NA	NED (36)
30	M	80	L	1.9		Partial pharingectomy	Yes	Died of cardiac arrest 1 wk PO
Shi (26)	M	37	R	1.5	/	CHT	NA	NED (36)

continues

Tab. I. *follows.*

Ref	Pt's gender	Pt's age	Side	Max size (cm)	Metastases at diagnosis	PO treatment	Tobacco use	Follow-up (months)
38	F	69	NA	na	/	Preoperative RT +radical neck dissection	NA	Lung and ilar LN metastases (96) AWD (108)
31	M	63	L	4.2		No treatment	NA	AWD (8)
32	F	52	R	2.5	/	CHT	NA	NED (12)
33	M	51	L	NA	/	RT	NA	NED (60)
34	M	50	L	2.5	/	None	Yes	NED (48)
35	F	54	L	3	Cervical LN	Radical neck dissection	Yes	NED (8)
36	M	24	L	2.5	/	CO2 laser tonsillectomy	NA	NED
Wang (26)	M	80	R	4.6	/	None	NA	NED (24)
Wu (26)	F	55	L	NA	/	None	NA	NED (4)
Yang (26)	F	49	R	5	/	CHT	NA	NED (22)
Yin (26)	M	35	R	5	/	None	NA	LN metastasis (12) bilateral neck dissection + RT NED (39)
Zhan (26)	M	36	R	NA	/	None	NA	NED (48)
Zhan (26)	F	43	R	3	NA	None	NA	NA

Abbrevations: NA: not available; M: male; F: female; CHT: chemotherapy; LN: lymph node; NED: no evidence of disease; DOD: died of disease; REC: recurrence; AWD: alive with disease

last three months. Intraoral examination revealed a red mass with an irregular surface over the left tonsil. Tonsil of the opposite side was normal and a neck examination revealed no enlarged lymph nodes. General systemic examination was unrevealing. The patient underwent tonsillectomy under general anaesthesia.

Grossly, the resected solid mass measured 6 cm in diameter and showed a bosselated outer surface. Cut section revealed a whitish firm tumour with numerous tiny areas of haemorrhage and smooth surface.

Microscopically, the tumour was situated underneath the squamous epithelial lining of the tonsil (Fig. 1a). It had a diffuse growth pattern and pushing borders. There were focal storiform areas arranged in centripetal whorls reminiscent of meningioma, and focal multinucleate giant cells. Individual cells tended to be ovoid, with central nuclei, slightly eosinophilic, fibrillary cytoplasm and indistinct cell borders. The nuclei had fine chromatin, small but distinct nucleoli and a delicate nuclear membrane. Small lymphocytes were scattered throughout the tumour and often clustered around blood vessels (Fig. 1b-c).

On immunohistochemistry, the tumour cells expressed strong membrane positivity for all the three markers specific for follicular dendritic cell differentiation e.g. CD21, CD35 and CD23 (Fig. 1a) and for EGFR (Fig. 2a). Nuclear positivity for p53 was also observed (Fig. 2b). It was negative for cytokeratins, CD45, S-100, CD68, TTF1 and EBV-latent membrane protein-1. The Ki-67 labeling index was about 25% (Fig. 2c).

Patient received no further treatment and was subsequently lost to follow-up.

Discussion

We reviewed all of the 49 published reports of tonsil FDCS (Tab. I). Twenty-four cases occurred in women and 24 in men (gender not available in 1 instance). Patient's age at diagnosis ranged from 80 to 18 years (mean: 47.8 yrs). FDCS in women tended to occur at younger age (mean: 44.5 yrs) than in men (mean: 49.4 yrs). The age difference between males and females is not statistically significant. A total of 20 tumours were located in the left tonsil, while 19 were located in the right tonsil; 2 were bilateral. The affected tonsil was not reported in eight cases. Tumour size ranged from 0.8 to 5 cm in maximum dimension (mean 2.9 cm). In approximately half of the instances (24 cases) tonsillectomy was the only treatment. Seven had additional radical neck dissection. Fourteen cases received pre- or postoperative radiotherapy, including five cases with concomitant neck dissection. Two cases received combined chemotherapy and radiotherapy and 7 chemotherapy alone. One patient received no treatment at all. Six patients (12.2%) presented with metastatic disease at initial diagnosis, all localised in the cervical lymph nodes.

Follow up information was present from 4 to 180 months with an average of 38.2 months. A minimum follow-up of 12 months was available for 28 patients. Of them, 25 cases were alive with no evidence of disease after this period of time, indicating a rate of approximately 50% disease-free survivals at 1-year.

According to Pang et al, oropharyngeal FDCS are significantly more likely to present with regional metastases compared to non-oropharyngeal lesions, including FDCS of the

Fig. 1 a. Histology shows tumour cells staining strongly for CD23 underneath the squamous epithelial lining of the tonsil (×100). **b.** Diffuse sheet of plump neoplastic cells with indistinct cellular outlines, often showing whorled or storiform patterns. Numerous lymphocytes and plasmacells are also visible (H&E, ×200). **c.** Higher magnification of the sarcomatous follicular dendritic cells (H&E 400x).

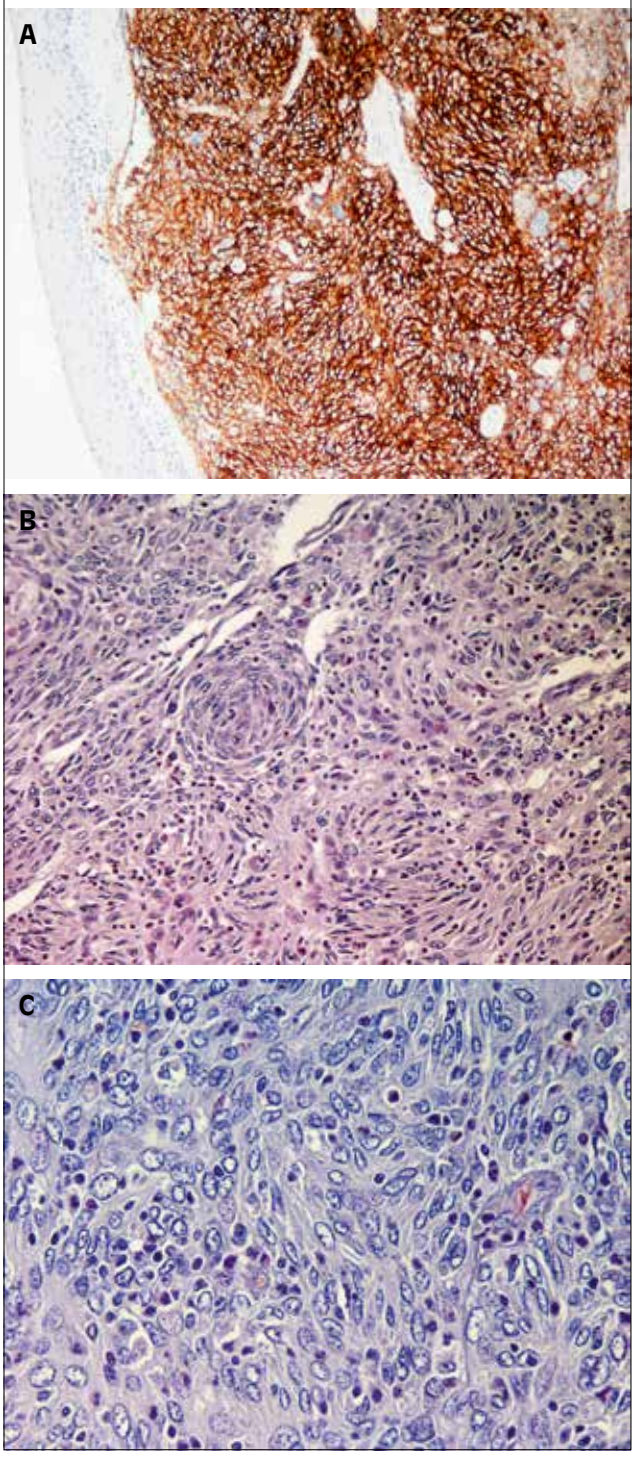
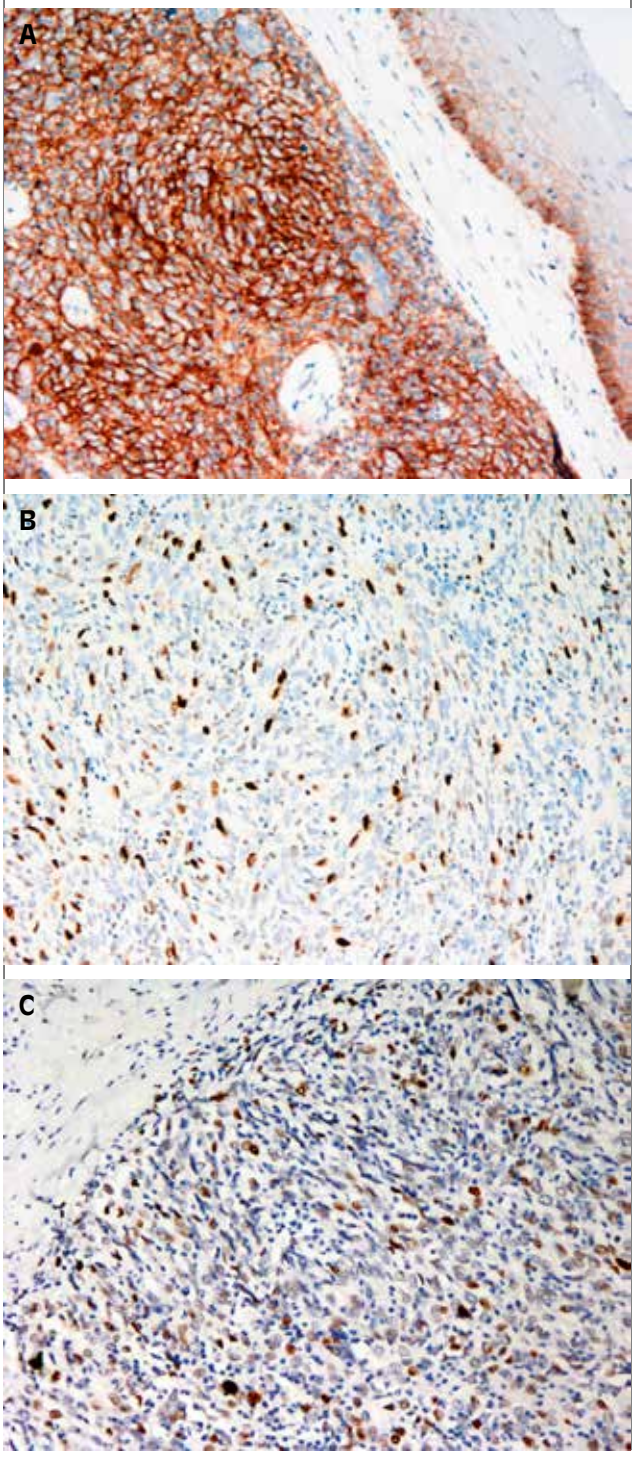


Fig. 2 a. Diffuse positivity of the FDCS for EGFR. Expression of EGFR in the normal appearing tonsillar squamous epithelium (right) is confined to the basal cell layer (x 100). **b.** Corresponding moderate to strong nuclear expression of p53 in scattered tumour cells (x 200). **c.** Immunoreactivity of the tumour cells for Ki67 antigen (x 100).



cervical lymph nodes. However, this does not hold true for the palatine tonsil, as only 6 of 49 cases (12.2%) showed local metastasis to lymph nodes at initial diagnosis.

Presently, surgery with no adjuvant treatment is considered to be the standard for FDCS treatment [7]. When metastasis to regional lymph nodes is suspected on imaging studies, a neck dissection is recommended. In the current case, dissection was not performed because no

findings suggestive of metastasis to the cervical lymph nodes were observed intraoperatively.

Adjuvant radiotherapy or chemotherapy can, however, be applied to cases with adverse pathologic features and in cases of advanced or incompletely resected lesions. Complete responses to CHOP are rare, and the benefits of this regimen may derive primarily from doxorubicin, one of the most broadly active agents against sarcoma in general.

Although the pathogenesis of this neoplasm remains unknown, in 10% to 20% of cases it occurs in association with Castleman's disease of the hyaline-vascular type [8 9].

Epidermal growth factor receptor (EGFR) expression has been investigated as another shared feature of both entities [10]. In addition, overexpression of the p53 protein is noted in FDCS. The present case showed diffuse hyperexpression of both EGFR and p53. Small molecule tyrosine kinase inhibitors and monoclonal antibodies are currently used to block EGFR activity and may prove of therapeutical interest in FCDS.

Reactive proliferations of FDCs are found in human immunodeficiency virus (HIV)-associated lymphadenopathy. Recent research studies have demonstrated that HIV infection may play a role in the formation of FDCS, via previous exposure to the Epstein Barr Virus (EBV) [11 12]. The association with EBV infection is acknowledged in the setting of the inflammatory pseudo-tumour-like variant of FDCS. However, no cases of extranodal FDCS of the head and neck region have been associated with EBV. Heavy tobacco smoke habit was reported in some of the tonsillary (Tab. I) and extratonsillary cases.

According to the fourth edition of the WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues, most FDCS show low or intermediate-grade malignancy [13]. High-grade FDCS can be identified by large tumour size (greater than 6 cm), intraabdominal location, significant cytological atypia, extensive coagulative necrosis,and high proliferative index [13]. The present case was notable for the long duration of the disease (6 years) before the patient sought medical attention, as she lived in a poor rural area. Such a slow growth indicates a low-grade malignant potential of FDCS. Additionally, recurrences may be delayed for many years (Tab. I) [14].

Owing to the short-term follow-up periods in the reported cases, the local recurrence and metastatic rates might be underestimated. 72.5 months was the mean period for local or distant recurrences in this reviewed series of tonsil FDCS, with the longest disease-free interval of 180 months.

FDCS are rare tumours that have been recognised only recently. The rarity of these tumours makes them difficult to accurately diagnose and treat, and they are often mistaken as non-Hodgkin lymphoma or other lymphoproliferative disorders. Immunohistochemistry may help in the diagnosis of FDCS (Tab. II). Of interest, despite coexpression of a leukocyte common antigen (CD45), and CD15, a monocyte common antigen in normal FDCs, in our experience and in all, but two reported cases of sarcomatous transformation, CD45 was negative.

Revision of FDCS immunohistochemical literature data cannot confirm Grogg et al. [15] impression that tu-

Tab. II. Summary data of immunohistochemical analyses in FCDS of the tonsil reported in the English literature. Data of cases reported in the Chinese literature were retrieved from the article by Lu et al. [26].

Ref	CD45	CD21	CD35	EMA	S100	EBV	other
16	NA	+	NA	NA	+/-	NA	CD68+/- Keratins-
8	-	+	+		-	-	Fascin +
8	NA	NA	NA	NA	NA	NA	na
17	-	+	+	-	+	NA	CD23+
17	-	+	-	-	-	NA	CD23+
17	NA	+	NA	NA	NA	NA	CD23+
18	+	+	+	na	-	-	CD10 MSA+ CD68-
37	NA	+	+	+	-	-	CD68-
9		+	+	-	+	-	NSE+ EGFR+ Keratins- CD68-
19	NA	+	+	-	-	NA	
5	-	+	+	+/-	-	-	CD23+/- CD68-
20	-	+	NA	NA	-	NA	Keratins- CD68-
21	NA	NA	NA	NA	NA	NA	na
15	NA	+	-	NA	-	NA	CD23+ CD68+ Fascin+
22	- -	+ +	+ +	- -	- +	- -	CD23+ CD68- CD23+ keratins+
23	-	+/-	+/-	+/-	+/-	-	CD68+ Desmin+
14	-	NA	NA	NA	-	NA	CD23+ Keratins-
24	NA	+	+	NA	+	NA	CD23+ Keratins-
25	- -	+ +	+ +	+ -	NA -	NA -	Keratins- Keratins- CD23+ CD68-
26	NA	+	-	NA	NA	NA	CD23+
27	NA	NA	NA	NA	NA	NA	CD68+ Fascin + CD23+
28	NA	+	+	NA	-	NA	CD23+ Keratins-
6	-	+	+	NA	NA	NA	CD23+ Cd1a- Desmin-
2	/	+	NA	NA	NA	NA	CD68+, fascin+, desmin- p16-, keratins-
30	NA	+	NA	NA	NA	NA	CD23+
38	NA	+	+	NA	+	-	Keratin -
32	NA	+	NA	NA	+	NA	
33	+/-	na	na	+/-	+/-	-	CD23+
34	-	+	+	NA	-	NA	CD23+ Keratins +/- CD68-
35	NA	+	NA	+	-		CD1a-, CD68-, keratins-
36	-	NA	NA	+/-	-	NA	CD23- Vimentin+ Ki-M4p+

Abbreviations: NA: not available; MSA: muscle specific actin; NSE: neuron specific enolase.

mours displaying more morphological and phenotypical (CD68+, S-100+) histiocytic differentiation may be associated with more aggressive behaviour, more akin to the behaviour of histiocytic sarcoma (Tab. II).

Conclusions

FDCS should be included in the differential diagnosis for any tonsillar mass, as an increasingly high number of cases are being added to the literature, thanks to increased awareness of this entity and more sensitive diagnostic tool. Our case shows that this tumour can also affect African patients. This should not come as a surprise in the light of a possible association of FDCS with viral infections, as the population of north Uganda is still plagued by AIDS and EBV infections.

References

[1] Krautler NJ, Kana V, Kranich J, et al. *Follicular dendritic cells emerge from ubiquitous perivascular precursors*. Cell 2012;150:194-206.

[2] Pang J, Mydlarz WK, Gooi Z, et al. *Follicular dendritic cell sarcoma of the head and neck: case report, literature review, and pooled analysis of 97 cases*. Head Neck 2016;38(Suppl 1):E2241-9.

[3] Sharpe M, Easthope SE, Keating GM, et al. *Polyethylene glycol-liposomal doxorubicin: a review of its use in the management of solid and haematological malignancies and AIDS-related Kaposi's sarcoma*. Drugs 2002;62:2089-126.

[4] Nayler SJ, Verhaart MJ, Cooper K. *Follicular dendritic cell tumour of the tonsil*. Histopathology 1996;28:89-92.

[5] Duan GJ, Wu F, Zhu J, et al. *Extranodal follicular dendritic cell sarcoma of the pharyngeal region: a potential diagnostic pitfall, with literature review*. Am J Clin Pathol 2010;133:49-58.

[6] Mondal SK, Bera H, Bhattacharya B, et al. *Follicular dendritic cell sarcoma of the tonsil*. Natl J Maxillofac Surg 2012;3:62-4.

[7] De Pas T, Spitaleri G, Pruneri G, et al. *Dendritic cell sarcoma: an analytic overview of the literature and presentation of original five cases*. Crit Rev Oncol Hematol 2008;65:1-7.

[8] Biddle DA, Ro JY, Yoon GS. *Extranodal follicular dendritic cell sarcoma of the head and neck region: three new cases, with a review of the literature*. Mod Pathol 2002;15:50-8.

[9] Clement P, Saint-Blancard P, Minvielle F, et al. *Follicular dendritic cell sarcoma of the tonsil: a case report*. Am J Otolaryngol 2006;27:207-10.

[10] Sun X, Chang KC, Abruzzo LV, et al. *Epidermal growth factor receptor expression in follicular dendritic cells: a shared feature of follicular dendritic cell sarcoma and Castleman's disease*. Hum Pathol 2003;34:835-40.

[11] Kure K, Khader SN, Suhrland MJ, et al. *Fine needle aspiration of follicular dendritic cell sarcoma in an HIV-positive man: a case report*. Acta Cytol 2010;54:707-11.

[12] Roca B, Resino E, Roca M, et al. *A dendritic cell tumor in an HIV-infected patient: case report*. Ann Oncol 2009;20:1895-6.

[13] World Heath Organization. *WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues*. Lyon, France: International Agency for Research on Cancer 2008.

[14] Kara T, Serinsoz E, Bozdogan Arpaci R, et al. *Follicular dendritic cell sarcoma of the tonsil*. BMJ Case Reports 2013;1-3 (published online). doi:10.1136/bcr-2012-007440.

[15] Grogg KL, Lae ME, Kurtin PJ, et al. *Clusterin expression distinguishes follicular dendritic cell tumors from other dendritic cell neoplasms: report of a novel follicular dendritic cell marker and clinicopathologic data on 12 additional follicular dendritic cell tumors and 6 additional interdigitating dendritic cell tumors*. Am J Surg Pathol 2004;28:988-98.

[16] Aydin E, Ozluoglu LN, Demirhan B, et al. *Follicular dendritic cell sarcoma of the tonsil: case report*. Eur Arch Otorhinolaryngol 2006;263:1155-7.

[17] Bothra R, Pai PS, Chaturvedi P, et al. *Follicular dendritic cell tumor of tonsil – is it an underdiagnosed entity?* Indian J Cancer 2005;42:211-4.

[18] Chan JK, Tsang WY, Ng CS, et al. *Follicular dendritic cell tumors of the oral cavity*. Am J Surg Pathol 1994;18:148-57.

[19] Domínguez-Malagón H, Cano-Valdez AM, Mosqueda-Taylor A, et al. *Follicular dendritic cell sarcoma of the pharyngeal region: histologic, cytologic, immunohistochemical, and ultrastructural study of three cases*. Ann Diagn Pathol 2004;8:325-32

[20] Eun YG, Kim SW, Kwon KH. *Follicular dendritic cell sarcoma of the tonsil*. Yonsei Med J 2010;51:602-4.

[21] Fan YS, Ng WK, Chan A, et al. *Fine needle aspiration cytology in follicular dendritic cell sarcoma: a report of two cases*. Acta Cytol 2007;51:642-7.

[22] Hu T, Wang X, Yu C, et al. *Follicular dendritic cell sarcoma of the pharyngeal region*. Oncol Lett 2013;5:1467-76.

[23] Idrees MT, Brandwein-Gensler M, Strauchen JA, et al. *Extranodal follicular dendritic cell tumor of the tonsil: report of a diagnostic pitfall and literature review*. Arch Otolaryngol Head Neck Surg 2004;130:1109-13.

[24] Kulkarni MP, Momin YA, Deshmukh BD, et al. *Extranodal follicular dendritic cell arcoma involving tonsil*. Malays J Pathol 2015; 37:293-9.

[25] Li L, Shi YH, Guo ZJ, et al. *Clinicopathological features and prognosis assessment of extranodal follicular dendritic cell sarcoma*. World J Gastroenterol 2010;16:2504-19.

[26] Lu ZJ, LI J, Zhou SH, et al. *Follicular dendritic cell sarcoma of the right tonsil: a case report and literature review*. Oncol Lett 2015;9:575-82.

[27] Ludwig A. *Extranodal follicular dendritic cell sarcoma of the tonsils*. [Article in German]. HNO 2006;54:701-4.

[28] McDuffie C, Lian TS,Thibodeaux J. *Follicular dendritic cell sarcoma of the tonsil: a case report and literature review*. Ear Nose Throat J 2007;86:234-5.

[29] Perez-Ordonez B, Erlandson RA, Rosai J. *Follicular dendritic cell tumor: report of 13 additional cases of a distinctive entity*. Am J Surg Pathol 1996;20:944-55.

[30] Ribeiro L, Lima N, Almeida A, et al. *Follicular dendritic cell sarcoma of the tonsil*. Acta Otorrinolaringol Esp 2014;65:200-1.

[31] Suchitha S, Sheeladevi CS, Sunila R, et al. *Extranodal follicular dendritic cell tumor*. Indian J Pathol Microbiol 2010;53:175-7.

[32] Suhail Z, Musani MA, Afaq S, et al. *Follicular dendritic cell sarcoma of tonsil*. J Coll Physicians Surg Pak 2010;20:55-6.

[33] Tisch M, Hengstermann F, Kraft K, et al. *Follicular dendritic cell sarcoma of the tonsil: report of a rare case*. Ear Nose Throat J 2003;82:507-9.

[34] Vaideeswar P, George SM, Kane SV, et al. *Extranodal follicular dendritic cell sarcoma of the tonsil-case report of an epithelioid cell variant with osteoclastic giant cells*. Pathol Res Pract 2009;205:149-53.

[35] Vargas H, Mouzakes J, Purdy SS. *Follicular dendritic cell tumor: an aggressive head and neck tumor*. Am J Otolaryngol 2002;23:93-8.

[36] Vorsprach M, Kalinski T, Vorwerk U. *Follicular dendritic cell sarcoma of the tonsil*. Pathol Res Pract 2015;211:88-91.

[37] Chan JK, Fletcher CD, Nayler SJ, et al. *Follicular dendritic cell sarcoma: Clinicopathologic analysis of 17 cases suggesting a malignant potential higher than previously recognized*. Cancer 1997;9:294-313.

[38] Shia J, Chen W, Tang LH, et al. *Extranodal follicular dendritic cell sarcoma: clinical, pathologic, and histogenetic characteristics of an underrecognized disease entity*. Virchows Arch 2006;449:148-58.