Follicular cell dendritic sarcoma of cervical nodes in a patient with significant WTC exposure

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SUMMARY

A patient who worked at the World Trade Center (WTC) site presented with right cervical lymphadenopathy. He underwent right neck dissection. The final pathology showed follicular dendritic cell sarcoma. He was treated with radiation and chemotherapy and remained free of disease initially. He then presented with left cervical lymphadenopathy 2.5 years later and underwent a left neck dissection with similar pathology. A discussion of the disease process and WTC exposure is presented. Clinicians should be cognisant of this disease process and the latency between WTC exposure and the onset of sarcomas.

BACKGROUND

Sarcomas of this type are rare in the head and neck region. The World Trade Center (WTC) exposure is intriguing as this may be an index case. It is

therefore important to bring this case to the attention of other clinicians and pathologists treating patients with the head and neck tumours with similar exposure.

CASE PRESENTATION

A 49-year-old man presented on 27 February 2010 with a non-tender, painless mass posterior to the right submandibular gland of 2–3 weeks' duration. He admitted to a 70-pack-year smoking history but denied alcohol intake. His mother had lung cancer.

The patient is a police officer who worked at the WTC site following the attack of 9/11. He was officially assigned for 60 h and worked as a volunteer for approximately another 40 h. Although steps were taken by a number of entities to provide respiratory protection to workers, adequate respiratory protection devices were not immediately or

Figure 1 MRI of neck at initial presentation.

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Figure 2 Right neck dissection specimen.

universally available or employed over the course of the rescue and recovery.

On examination disclosed a 3.3×4 cm rubbery-firm mass posterosuperior to the right submandibular gland.

INVESTIGATIONS

MRI confirmed a dense, solid mass with homogeneous enhancement, suggesting either a lymph node or neurogenic tumour. No other masses were seen ([figure 1](#)). Fine-needle aspiration (FNA) showed a lymphoproliferative disorder.

DIFFERENTIAL DIAGNOSIS

- ▶ Lymphoma
- ▶ Neurogenic tumour
- ▶ Metastatic squamous cell cancer
- ▶ Metastatic thyroid cancer
- ▶ Salivary gland neoplasm
- ▶ Paraganglioma
- ▶ Reactive lymphadenopathy

TREATMENT

The patient was taken to the operating room for an incisional biopsy of a presumed lymphoma. The tumour was pink-white in colouration and rubbery in texture. Final pathology was a histiocytic or dendritic cell neoplasm. Additional immunohistochemical tests confirmed follicular cell sarcoma. Positron emission tomography/CT (PET/CT) scan performed 3 weeks following the surgery, showed a 2.3 cm right level II node. No other tumour or primary site was identified.

Figure 3 Follicular dendritic cell sarcoma CD21 ×200.

Figure 4 Follicular dendritic cell sarcoma CD23 ×200.

The patient was subsequently returned to the operating room and a right modified neck en bloc dissection was performed ([figure 2](#)). Final pathology showed 2 of 20 nodes involved with metastatic disease. He was staged as sarcoma stage IV (T1b, N1, M0).

H&E-stained sections demonstrated extensive lymph node effacement by a diffuse, syncytial-appearing tumour composed of oval to irregular nuclei with nuclear inclusions and small but prominent nucleoli. Immunohistochemistry demonstrated that these tumour cells were positive for CD21, CD23 and CD35, and were negative for keratin and S-100 ([figures 3–8](#)). On the basis of this morphology and immunoprofile, the diagnosis of follicular dendritic cell sarcoma (FDCS) was rendered.

The case was presented at Tumour Board. By consensus, he was then treated with six cycles of cyclophosphamide, vincristine, doxorubicin and prednisone (CHOP) as well as radiotherapy (intensity-modulated radiation therapy) 5580 cGy over 31 treatments to the head and neck area.

The patient was followed monthly by one of his clinicians and annual PET scan. The PET/CT scan 2 years later showed he was free of disease. MR angiography (MRA) of the neck 3 years later showed no disease present. MRA did, however, demonstrate the right carotid 60% stenosis.

OUTCOME AND FOLLOW-UP

Six months after the MRA, he presented with left level II nodal enlargement measuring 1.5 cm. PET/CT scan at this time showed a 1.5 cm left level II jugular node ([figures 9–11](#)). FNA was consistent with FDCS. He then underwent modified left neck

Figure 5 Follicular dendritic cell sarcoma CD35 ×200.

Figure 6 Follicular dendritic cell sarcoma H&E $\times 200$.

dissection. His final appearance is shown (figure 12). Final pathology showed 3 of 20 nodes positive for metastatic disease. He was then retreated with chemotherapy and sought multiple other opinions. As of 5/13/14, he was free of disease.

DISCUSSION

FDCS, first described in 1986¹ is a rare malignancy which arises from the antigen-presenting cells within the germinal centres of lymph nodes.² According to WHO, there are five subtypes: (1) Langerhans cell histiocytosis, (2) Langerhans cell sarcoma, (3) interdigitating dendritic cell sarcoma/tumour, (4) FDCS/tumour and (5) dendritic cell sarcoma not otherwise specified.³ There is a male predominance (1.4:1) and the median age is 46. The disease has been found to arise in patients with Castleman disease, HS 8, Epstein-Barr virus, Kaposi sarcoma (HIV+ population), paraneoplastic pemphigus and lymphomas. The mortality rate varies 6–58% with the worst prognosis among those patients with abdominal spread⁴ and marked nuclear pleomorphism.⁵ Other poor prognostic factors include the presence of coagulative necrosis, a high mitotic count and moderate nuclear pleomorphism.⁶

About 50 cases have been reported within the head and neck area. Involvement of cervical nodes has been reported by several authors.^{7–9} Other reported sites include the parapharyngeal space¹⁰ and the tonsil.^{11–13}

Follicular dendritic cells may proliferate in other reactive or neoplastic conditions, from which it must be differentiated, such as reactive follicular hyperplasia, follicular lymphoma, mantle

Figure 7 Follicular dendritic cell sarcoma keratin $\times 200$.

Figure 8 Follicular dendritic cell sarcoma S100 $\times 200$.

cell lymphoma, nodular lymphocyte-predominant Hodgkin's lymphoma and angioimmunoblastic T-cell lymphoma.

Immunohistochemistry is vital in confirming the diagnosis. The cells are typically positive for follicular dendritic cells (CD21, CD23 and CD35), usually positive for vimentin, fascin, human leucocyte antigens-DR and epithelial membrane antigen, variably positive for S100 and CD68, and negative for CD1a, lysozyme, CD34, CD3, CD79a, CD30, HMB45 and CK.¹⁴

Combined treatment is advocated for these potentially aggressive tumours including surgery, radiation and chemotherapy. The latter includes CHOP, ABVD, DHAP, EPOCH, ICE PEG liposomal doxorubicin and cisplatin/epirubicin, but response rates are low and there is no standard chemotherapy regimen. In this case, treatment with surgery, radiation and chemotherapy was employed as there were multiple large nodes involved and there was considerable nuclear pleomorphism.

The overarching question is whether this patient represents an index case among those at WTC immediately following the building collapse. It should be noted that follicular dendritic

Figure 9 Positron emission tomography scan dated 25 November 2013 showing left level II node with avid FDG uptake.

Figure 10 CT scan dated 25 November 2013 showing corresponding left level II node.

cells are the ones which process the antigens to which one is exposed. Certainly, those at WTC were exposed to a host of chemicals and carcinogens,^{15 16} which may have overwhelmed

Figure 11 Positron emission tomography scan dated 25 November 2013 showing left level II node with avid FDG uptake.

Figure 12 Appearance following bilateral neck dissections.

the dendritic cells leading to this uncommon tumour. The latency period of 10–15 years after exposure is certainly within the expected time frame.¹⁷ Moreover, the WTC Scientific Advisory Committee recommended that soft tissue sarcomas be considered as WTC-related conditions insofar as there was exposure to polychlorophenols and their sodium salts, which are regarded as risk factors.¹⁸

Clinicians treating patients exposed at WTC, and pathologists examining FNA or tissue biopsies should be cognisant of this tumour and consider it among other possibilities for aetiology of a neck mass. It is important for clinicians and patients to be aware that evaluation and treatment of cancers such as this and other health conditions occurring following exposure to the WTC disaster of 2001 may be covered by the World Trade Center Health Programme established in 2010 by Congress under The Zadroga Act.¹⁹

Patient's perspective

World Trade Center (WTC) exposure may have contributed to the development of a malignant tumour in the neck.

Learning points

- ▶ Clinicians and pathologists should consider follicular dendritic cell sarcoma in the differential of a neck mass arising in a person exposed to World Trade Center (WTC).
- ▶ The diagnosis is confirmed using immunohistochemistry.
- ▶ Definitive treatment is still undetermined.

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Contributors LS is the surgeon who first saw the patient, performed the surgeries and wrote the case history. BK is the treating medical oncologist who researched the condition and treatment. LS is the pathologist who interpreted the slides and wrote the pathology section of the article.

Competing interests None.

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