The Journal of Laryngology & Otology (2009), ***123***, *541–544.*

doi:10.1017/S0022215108002260

Main Article

Nodular fasciitis: a case series

S D Reitzen, S Dogan*, G Har-El†

Abstract

Background: Given its rarity, varied histological presentation and often pseudosarcomatous appearance, nodular fasciitis is frequently misdiagnosed on pre-operative, intra-operative and final analyses.

Methods: Four cases of nodular fasciitis are reviewed.

Results: Physical and radiological findings were consistent with a parapharyngeal tumour, probably neurogenic, a level four neck mass suspicious for lymphoma; a sternoclavicular mass in a patient with a history of breast cancer suspicious for metastasis; and a cheek mass consistent with an accessory parotid tumour. Fine needle aspiration results were consistent with a neurogenic tumour in two patients and an undifferentiated malignancy in two patients. Frozen section examination most commonly included masses with spindle-type cells. The final diagnosis of nodular fasciitis was made only after permanent section and immunohistological analysis.

Conclusions: In a patient with nonspecific results following investigation of a head or neck mass, nodular fasciitis should be considered. Use of appropriate immunohistochemical markers will aid in the final diagnosis.

Key words: Nodular Fasciitis; Head And Neck Neoplasms; Sarcoma

Introduction

Nodular fasciitis is a rare, benign, pseudoneoplastic process occurring on mucosal, fascial and tendinous surfaces. Its overall incidence has been cited as 0.025 per cent, of which 15 per cent localise to the head and neck region.[1] Although rare, it is the most common soft tissue pseudosarcoma.[2] Given its rarity, varied histological presentation and pseudosarcomatous appearance, nodular fasciitis is frequently misdiagnosed on pre-operative, intra-operative and final analyses.[3] More importantly, it is often mistaken for a sarcoma, due to its rapid growth, increased cellularity, prolific mitotic activity and infiltrative borders.[4]

Although there have been recent reports of nodular fasciitis in the literature, there has been no discussion of the difficulty in diagnosing nodular fasciitis pre-operatively.[4–7] The purpose of this study is to report the clinical, radiological, cytological and intra-operative findings made prior to the determination of nodular fasciitis on final histopathological analysis.

Materials and methods

From 1999 to 2007, four female patients aged between 39 and 71 years with a final diagnosis of nodular fasciitis were reviewed at a tertiary care centre in New York City. Patients underwent pre-operative investigation for a head or neck mass, which included contrast-enhanced computed tomography (CT) of the neck and fine needle aspiration cytology. A frozen section was reviewed intra-operatively. The final diagnosis was based on pathological examination of the mass in its entirety.

Results

Case one

A 52-year-old woman presented with a mass in the left parapharyngeal space. Pre-operative radiological examination revealed a left parapharyngeal space tumour, non-vascular in origin. Fine needle aspiration cytology was consistent with either a possible sarcoma or a neurogenic tumour. The patient underwent resection of the mass. The frozen section diagnosis suggested a malignant process of a spindle cell type.

Case two

A 44-year-old woman presented with a left, level four neck mass. The CT scan suggested lymphoma. Fine needle aspiration cytology was consistent with a pseudo-inflammatory process, reported as a

From the Department of Otolaryngology, New York University Medical Center, and the Departments of *Pathology and †Otolaryngology, Lenox Hill Hospital, New York, New York, USA.
Presented as a poster at the Head and Neck Society Meeting, Combined Otolaryngologic Spring Meetings, 28 April 2007, San Diego, California, USA.
Accepted for publication: 5 February 2008. First published online 13 June 2008.

possible undifferentiated malignancy. Frozen section diagnosis was consistent with a neoplasm, possibly spindle cell type in origin.

Case three

A 71-year-old woman with a history of breast cancer seven years previously presented with a mass at the right sternoclavicular joint (Figure 1). The presumed clinical and radiological diagnosis was a metastatic breast cancer lesion. Fine needle aspiration cytology suggested a diagnosis of either neurofibroma or fibromatosis. Intra-operatively, frozen section analysis revealed a neurogenic tumour, probably benign, with an inflammatory component.

Case four

A 39-year-old woman presented with a right cheek mass (Figure 2). Radiologically, the mass appeared to be an accessory parotid tumour (Figure 3). Fine needle aspiration cytology revealed scattered epithelial cells with focal nuclear atypia, and spindle cell features embedded in a mucoid and myxoid matrix. The differential diagnosis ranged from a salivary gland adenoma to a low-grade salivary gland carcinoma. The patient underwent resection of the lesion. Intra-operatively, biopsy results were consistent with either a spindle cell neoplasm or a schwannoma.

Grossly, the lesion in case four comprised an irregular, nodular structure measuring 2.7 cm in its greatest dimension. The cut surface was pale pink, glistening and rubbery, with intermingling fascicles of firm, fibrous tissue. Microscopically, the tissue showed a fascicular arrangement of spindle cells mainly comprising fibroblasts and myofibroblasts. In some areas, these were more tightly packed and intermingled with scanty bundles of mature collagen, whereas in others they were loose and surrounded by a moderate amount of stromal oedema and microhaemorrhages (Figure 4a). There was an appreciable variation in cellularity, with hypercellular spindle cell areas with lymphoid infiltrate (Figure 4b), together

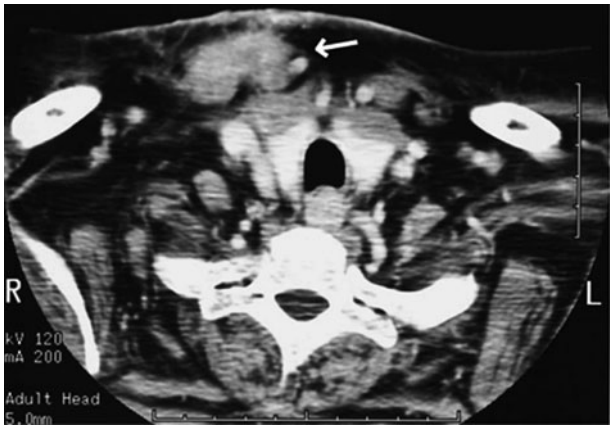

FIG. 1

Nodular fasciitis. Axial, contrast-enhanced neck computed tomography scan demonstrating a heterogenous, soft tissue mass (arrow) at the right sternoclavicular joint.

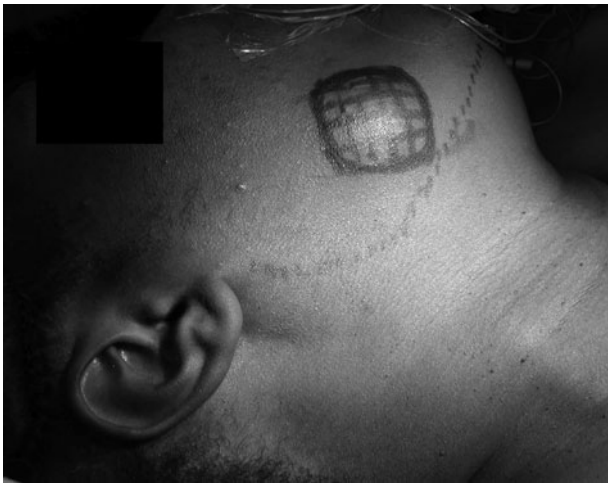

FIG. 2

Nodular fasciitis. A 39-year-old woman who presented with a right cheek mass.

with less cellular areas showing a characteristic loosely textured, 'feathery' appearance. Lesional cells showed bland cytological features, with an absence of hyperchromasia or variably sized nuclei (Figure 4c). Less than three mitotic figures were observed per 10 high power fields, and none were atypical. Immunohistochemical testing using antisera to smooth muscle actin, vimentin and CD68 was

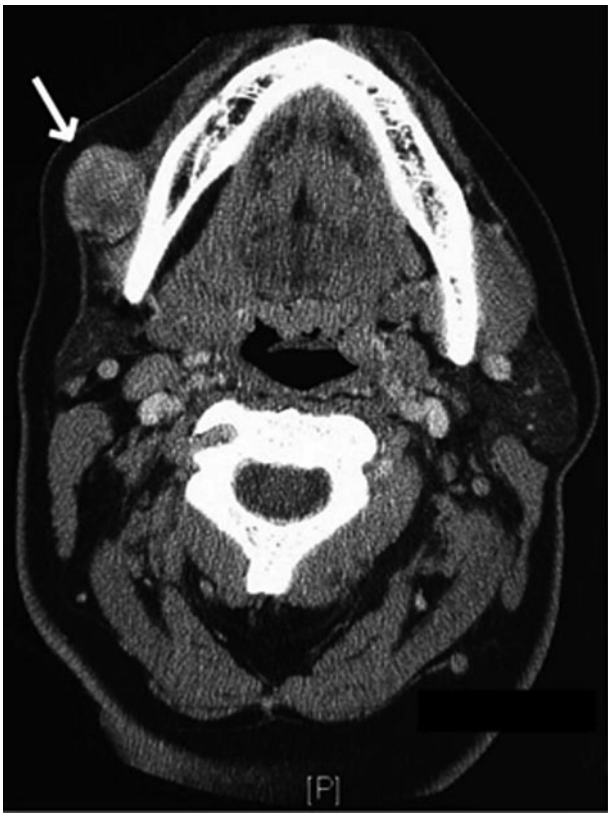

FIG. 3

Nodular fasciitis. Axial, contrast-enhanced neck computed tomography scan demonstrating a heterogenous, soft tissue mass (arrow) located anterior to the right parotid gland.

https://doi.org/10.1017/S0022215108002260 Published online by Cambridge University Press

positive in lesional cells (Figure 4d). However, immunostaining for cytokeratin and S-100 was negative, as expected.

All patients underwent resection of their masses without peri-operative complication. In all patients, the final diagnosis of nodular fasciitis was made only after permanent section and immunohistological analysis.

Discussion

Nodular fasciitis presents clinically as a rapidly enlarging, subcutaneous mass, which may be tender or painful and can extend into surrounding tissues. The peak incidence is in the fourth decade, and men and women are equally affected. Seven to 12 per cent of all cases occur in children.[1,4,8] On CT and magnetic resonance imaging, nodular fasciitis has a varied presentation; lesions appear as discrete masses, either cystic or solid in appearance, with enhancement.[9] On cytology, nodular fasciitis appears as a cellular smear composed primarily of various-sized spindle cells, occurring as single cells or as cohesive tissue particles in a myxoid background. Ganglion-like cells have also been described. In these cells, there is no atypia or atypical mitoses.[8]

Microscopically, nodular fasciitis is mainly composed of immature fibroblasts arranged in bundles and interweaving fascicles, with a small amount of collagen, within a loose, mucopolysaccharide-rich stroma. The vasculature of the lesion is fairly constant, consisting of a fine capillary network arranged in a radial pattern. Other cells that may be found include foamy histiocytes and multinucleate giant cells.[1,3,8] Nodular fasciitis is often confused with neurofibroma, fibromatosis, fibrous histiocytoma, fibrosarcoma and leiomyosarcoma.[6,8]

Due to the nonspecific nature of nodular fasciitis, its diagnosis is aided by specialised staining, including that for smooth muscle, muscle-specific actins, vimentin, CD68 and KP1 (a histiocyte marker). Staining for cytokeratin, S-100 protein, HMB45,

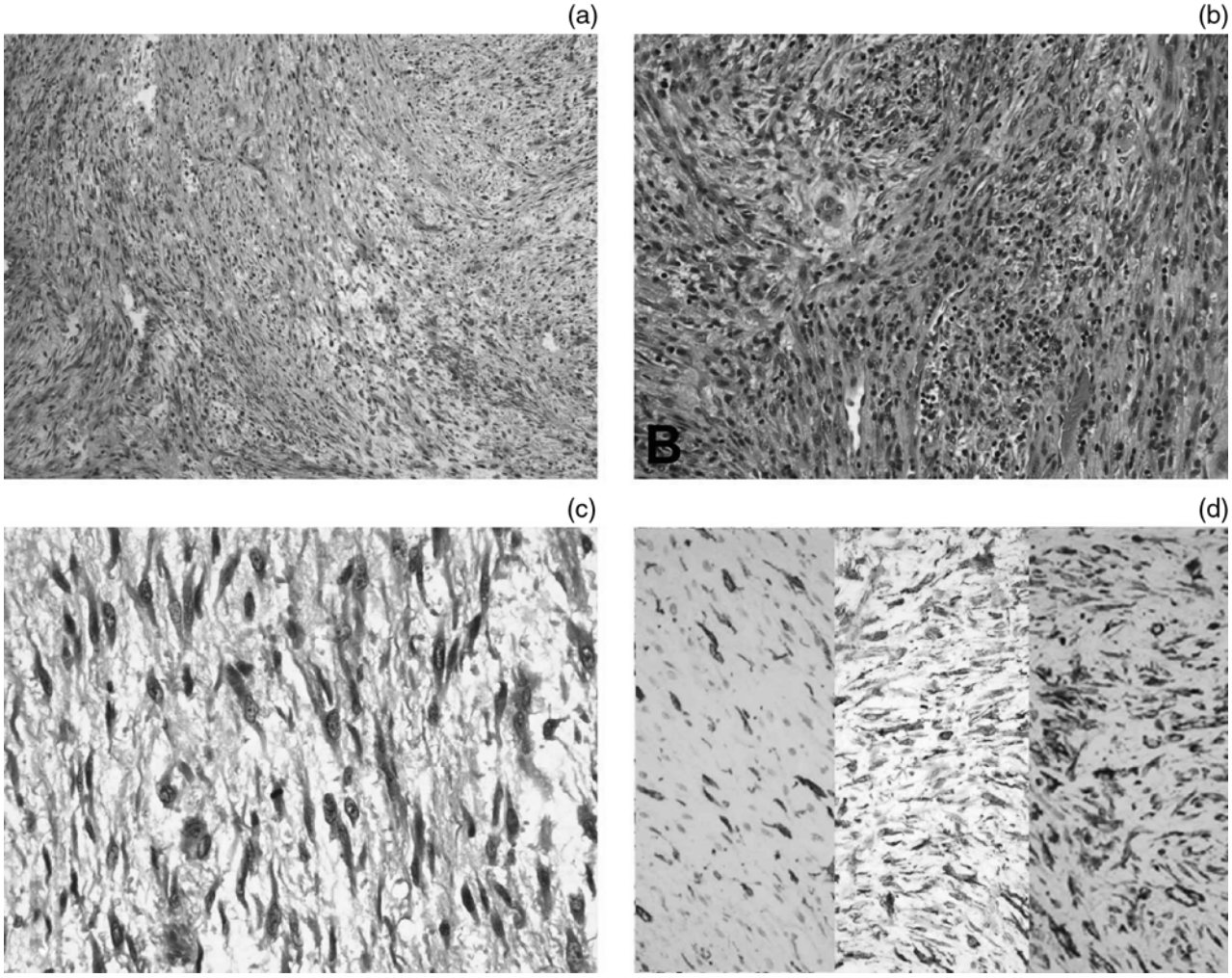

FIG. 4

Photomicrographs of nodular fasciitis, demonstrating: (a) cellular areas and scanty collagen bundles (left), plus less cellular areas with oedema and extravasation of erythrocytes (right) (HPS, hematoxylin-phloxine-saffron; ×100); (b) hypercellular areas with abundant lymphocytic infiltrate and rare plasma cells (HPS, hematoxylin-phloxine-saffron; ×200); (c) bland cytological features, absence of hyperchromasia and pleomorphism, and occasional mitotic figures (centre) (HPS, hematoxylin-phloxine-saffron; ×400); and (d) reactivity with antisera to CD68, smooth muscle actin and vimentin (×40).

https://doi.org/10.1017/S0022215108002260 Published online by Cambridge University Press

CD34, factor VIII related antigens and desmin is negative.[3,5,8,10] Unfortunately, special staining and multiple immunohistochemical studies may be difficult to perform on a small needle aspirate, and a surgical tissue biopsy may be required.

- **Nodular fasciitis is a rare, benign, pseudoneoplastic process occurring on mucosal, fascial and tendinous surfaces**
- **Although rare, it is the most common soft tissue pseudosarcoma**
- **This paper describes four cases of nodular fasciitis presenting in the head and neck**
- **In a patient with nonspecific results following investigation of a head or neck mass, nodular fasciitis should be considered. Use of appropriate immunohistochemical markers will aid the final diagnosis**

Nodular fasciitis, although rare, can be mistaken for other benign or malignant head or neck lesions. Radiographical and pathological studies can lead to equivocal diagnoses. Nodular fasciitis is a benign process that is self-limited; it never metastasises. Often, lesions can be followed clinically as they may regress spontaneously.[8] If the diagnosis is unclear, local excision of the tumour is the preferred treatment.[11] Recurrence is rare; if it does occur, the initial diagnosis should be reconsidered.[12] Preoperative findings suggesting a malignant process can have a negative effect on surgical planning, with unnecessary risk of injury to adjacent structures. In a patient with nonspecific results after investigation of a head or neck mass, nodular fasciitis should be considered.

References

1 Batsakis JG, Rice DH, Howard DR. The pathology of head and neck tumors: spindle cell lesions (sarcomatoid carcinomas, nodular fasciitis, and fibrosarcoma) of the aerodigestive tracts, Part 14. *Head Neck Surg* 1982;**4**:499–513
2 Dahl I, Angervall L. Pseudosarcomatous lesions of the soft tissues reported as sarcoma during a 6-year period (1958–1963). *Acta Pathol Microbiol Scand [A]* 1977;**85**:917–30
3 Montgomery EA, Meis JM. Nodular fasciitis: its morphologic spectrum and immunohistochemical profile. *Am J Surg Pathol* 1991;**15**:942–8
4 Silva P, Bruce IA, Malik T, Homer J, Banerjee S. Nodular fasciitis of the head and neck. *J Laryngol Otol* 2005;**119**:8–11
5 Nishi SP, Brey NV, Sanchez RL. Dermal nodular fasciitis: three case reports of the head and neck and literature review. *J Cutan Pathol* 2006;**33**:378–82
6 Han W, Hu Q, Yang X, Wang Z, Huang X. Nodular fasciitis in the orofacial region. *Int J Oral Maxillofac Surg* 2006;**35**:924–7
7 Thompson LD, Fanburg-Smith JC, Wenig BM. Nodular fasciitis of the external ear region: a clinicopathologic study of 50 cases. *Ann Diagn Pathol* 2001;**5**:191–8
8 Matusik J, Wiberg A, Sloboda J, Andersson O. Fine needle aspiration in nodular fasciitis of the face. *Cytopathology* 2002;**13**:128–32
9 Kim ST, Kim HJ, Park SW, Baek CH, Byun HS, Kim YM. Nodular fasciitis in the head and neck: CT and MR imaging findings. *Am J Neuroradiol* 2005;**26**:2617–23
10 Kayaselcuk F, Demirhan B, Kayaselcuk U, Ozerdem OR, Tuncer I. Vimentin, smooth muscle actin, desmin, S-100 protein, p53, and estrogen receptor expression in elastofibroma and nodular fasciitis. *Ann Diagn Pathol* 2002;**6**:94–9
11 Dahl I, Akerman M. Nodular fasciitis: a correlative cytologic and histologic study of 13 cases. *Acta Cytol* 1981;**25**:215–23
12 DiNardo LJ, Wetmore RF, Potsic WP. Nodular fasciitis of the head and neck in children: a deceptive lesion. *Arch Otolaryngol Head Neck Surg* 1991;**117**:1001–2

Address for correspondence:
Dr Shari D Reitzen,
New York University Medical Center,
Department of Otolaryngology,
550 First Avenue, NBV 5E5,
New York, NY 10016, USA.

Fax: +1 212 434 4222
E-mail: reitzs01@med.nyu.edu

Dr Gady Har-El takes responsibility for the integrity of the content of the paper.
Competing interests: None declared