*The Journal of Laryngology & Otology*
February 2004, Vol. **118,** pp. 156–158

# Submandibular neurilemmoma; a diagnostic dilemma

Robert Almeyda, B.Sc., M.R.S.C., D.O.H.N.S., Prasad Kothari, M.D.S., F.D.S.R.C.S., F.R.C.S., Ha Chau, M.R.C.S., D.L.O., Vincent Cumberworth, B.Sc., F.R.C.S.

**Abstract**
Neurilemmomas are slow growing, benign neoplasms of neural crest Schwann cell origin. They arise from any peripheral, spinal or cranial nerve except the olfactory and optic. Presentation is usually asymptomatic but focal neurological signs and symptoms may be associated with nerve compression. With approximately one third of all documented cases presenting in the head and neck region,[1] we report a case of a submandibular neurilemmoma misdiagnosed pre-operatively. The diagnostic difficulties are discussed and the current literature reviewed. This case highlights the importance of inclusion of nerve sheath tumours in differential diagnoses of soft tissue lesions in the head and neck.

**Key words: Neurilemmoma; Submandibular Gland; Lingual Nerve**

## Case report

An 18-year-old Caucasian girl presented to the ENT department with a 10-month history of a mass in the right submandibular region. The lesion was painless, and had not changed in size or character since it was first noticed. There was no associated weight loss, night sweats, rigors, odynophagia nor dysphagia. Past medical and family history was unremarkable.

Clinical examination confirmed a palpable, firm mass in the right submandibular triangle of approximately 2 cm diameter. On bimanual palpation, the swelling was not clinically distinct from the submandibular gland and there were no focal neurological signs. No regional lymphadenopathy was found. Ultrasound imaging confirmed a $3.5 \times 2 \times 2$ cm homogeneous, well-defined mass arising in the right submandibular triangle, closely adherent to the inferior aspect of the right submandibular gland (Figure 1). Initial fine needle aspiration (FNA) was inconclusive and was therefore repeated under ultrasound guidance. The second specimen consisted of scattered lymphocytes, salivary gland tissue and monolayered sheets of cells in a mucoid background. The differential diagnosis of adenolymphoma (Warthin's tumour) was offered. Surgical exploration was therefore performed via a standard submandibular approach. The operative findings highlighted a well-defined mass adherent to the deep lobe of the submandibular gland. The mass and submandibular gland were easily excised 'en-bloc'. Although hypoglossal and lingual nerves were identified and preserved, the surgeon noted adherence to a branch of the lingual nerve. Post-operatively, the patient made an uneventful recovery with no focal cranial nerve deficit.

Histological evaluation confirmed the mass corresponded to an encapsulated neoplasm of variable cellularity with focal cystic change and numerous medium calibre blood vessels. The tumour cells had ovoid and spindled nuclei, abundant fibrillar cytoplasm, and showed strong diffuse immuno-reactivity for S-100 protein.[1,2] These histological findings were consistent with a predominantly Antoni A pattern and diagnostic of a benign neurilemmoma. The submandibular gland was reported as normal.

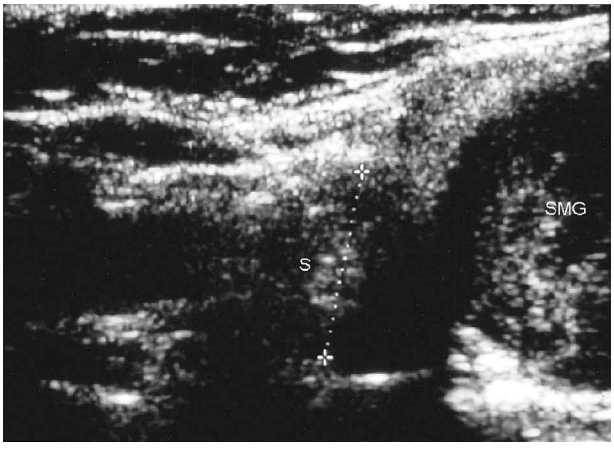


Fig. 1
Ultrasound scan right submandibular region. SMG – submandibular gland, S – Schwannoma/neurilemmoma.

## Discussion

Neurilemmoma is an uncommon tumour with a predilection to head and neck, with the lateral cervical region being the most common site outside the cranium.[3] The true incidence of neurilemmoma in the head and neck region is unknown, but intra-oral lesions have been reported to make up between eight per cent and 22 per cent of the total head and neck numbers.[4,5] It arises from Schwann cells and tends to be solitary, slow growing and benign in character.[6] Lesions are usually encapsulated, but a non-encapsulated, pedunculated form is also recognized in the

From the Department of Otolaryngology, West Middlesex Hospital, Isleworth, UK.
Accepted for publication: 14 November 2003.

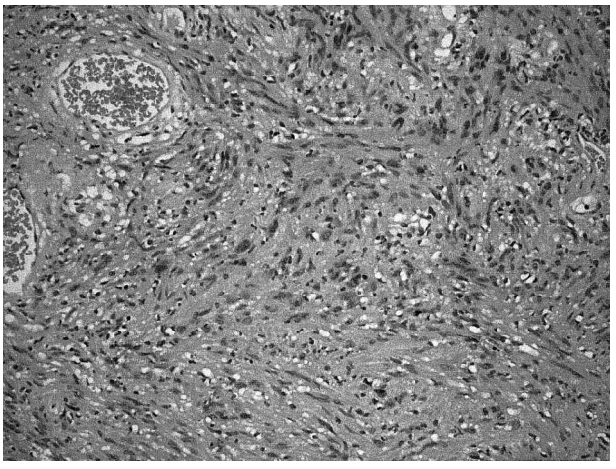

FIG. 2
Antoni A area. Classic spindle shaped cellular appearance. (H & E; ×400).

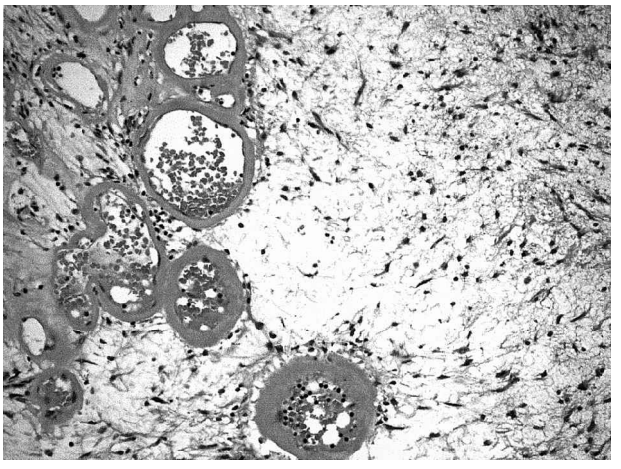

FIG. 3
Antoni B area. Less orderly arrangement of cells seen in a loose stroma. Note classic oedema, degeneration and thick, hyalinized vessel walls. (H & E; ×400).

oral cavity.[7] The tumour, arising from the nerve sheath, tends to push the associated nerve aside as it grows, accounting for its common asymptomatic presentation. It may present at any age, but most commonly affects those between the ages of 20 and 50 years. An equal sex distribution has been suggested,[8] although several groups contest a two to four times increase in females.[4,5]

Macroscopically, neurilemmomas appear as eccentric, discrete, globular, expansile masses. They are usually less than 4 cm in diameter in the head and neck region, although tumours as large as 10 cm have been reported, a finding usually associated with neglect and late presentation or intra-lesional haemorrhage.[9] The nerve of origin is often not identified at the time of surgical excision, although if present it is displaced to the side by the expanding tumour. Macroscopically, the cut surface is tan/grey with a myxoid, solid to cystic appearance. Histologically, the tumour is usually encapsulated and shows two distinct growth patterns in highly variable proportions. These are named Antoni A and B types (Figures 2 and 3). Antoni A classically comprises of compact arrangements of elongated spindal cells arranged in a well-organized pallisading pattern. Amongst this, acellular eosinophillic zones may be seen named Verocay bodies. In contrast, the Antoni B pattern is characterized by less orderly arrangement of spindle cells in a loose stroma, often displaying vessels with thick hyalinized walls and microcystic change. This latter pattern is thought to be secondary to degeneration and therefore more common in ancient neurilemmomas. Both, however, are seen in variable amounts in all neurilemmomas. Mitoses are rare, although hyperchromatic nuclei may be misinterpreted as having malignant potential.

Importantly, neurilemmomas are homogenous, containing no axonal or other perineural tissue types. They usually exhibit a fibrous capsule separating them from their originating nerve fibres. These features help to distinguish them from neurofibroma. The latter are also benign, well-defined, tumours of nerve sheath origin, but differ in that they are non-encapsulated,[10] contain cells of all neural origin including axonal and envelop the associated nerve leading to neurological signs.[11] Their clinical importance lies in their relation to neurofibromatosis and malignant transformation.[12] Although clinical presentation and the surgical specimen may mimic neurilemmoma, histological examination reveals significant differences. The originating nerve fibre is usually enclosed and focal atypia and scattered mitoses are not uncommon. These classical histological features allow for easy distinction between neurilemmoma and neurofibroma. In addition immunohistological staining by S-100 protein is of diagnostic use.[12] Both stain positively, but a neurilemmoma shows a strongly positive, homogenous uptake compared with the weaker patchy picture seen with neurofibroma.

- **Neurilemmomas are slowly growing tumours of Schwann cell origin**
- **In this case the diagnosis was of a mass separate from the submandibular gland was made pre-operatively on ultrasound, and was confirmed at surgery**
- **The authors appear to suggest that this arose from a branch of the lingual nerve**
- **A review of these tumours is included and the paper reinforces the need to include such lesions in the differential diagnosis of head and neck swellings**

The importance of differentiation between these two tumours hinges around malignant transformation. Neurilemmoma is almost always benign,[4,8] with only one reported case of malignant transformation in the scientific press.[13] Neurofibroma, by contrast, has a recognized transformation rate, with reports varying from two to 29 per cent (higher when associated with neurofibromatosis).[2,3,12,14] This has serious implications on surgical treatment and therefore pre-operative diagnosis. However, in the head and neck region, this is further complicated by alternate diagnoses.[9] Ultrasound scanning (USS) remains the mainstay of initial diagnostic imaging for lumps in the neck. The specificity and sensitivity, although operator dependent, are generally high. Neurilemmoma, however, has proven extremely difficult to diagnose pre-operatively when associated with salivary glands, due to its similarity with pleomorphic adenoma. Williams *et al.* reports that of 12 cases of head and neck neurilemmoma examined, all were misdiagnosed pre-operatively, both clinically and on

https://doi.org/10.1258/002221504772784667 Published online by Cambridge University Press

investigation.[4] Even with advances in imaging, the diagnostic dilemma remains. From our review of the literature, other imaging techniques employed have fared little better. Sialogram shows glandular displacement indistinguishable from adenoma.[9] CT interpretation of Antoni B hypocellular, mixed attenuated areas can lead to incorrect malignant diagnoses.[8] MRI has been of greater use, with a distinctive target pattern demonstrated by most, but not all neurilemmomas.[8] One author has found a technectium scan in addition to USS to be of benefit,[9] with uniform submandibular gland uptake highlighting displacement rather than involvement of the gland. However, these latter investigations are realistically beyond the realms of most district general hospital resources as an initial investigation. Even with the addition of fine needle aspiration cytology (FNAC) to imaging, the correct diagnosis can be missed, a finding echoed by numerous authors.[9,15–17] Yu *et al.* postulated that inadequate sampling and difficulties with interpretation of the variable cellularity within Antoni B areas could account for this finding.[18] The accuracy can be improved by using immunohistochemical and electron microscopic studies on the aspirated material,[19] but once again this is beyond the remit of most district general hospitals.

The necessity of pre-operative imaging is not disputed. It is essential in determining tumour extent, malignant potential and adjacent anatomy prior to surgical intervention. We do feel, however, that acknowledgement of the potential difficulties with neural crest tumour diagnosis is warranted.

Regarding management, surgical excision is generally accepted as the treatment of choice for neurilemmoma, since the majority are encapsulated, and require little more than enucleation to ensure adequate clearance margins.[7] Non-encapsulated forms, however, require a cuff of normal tissue if recurrence is to be minimized.[20] Much debate remains regarding lesions intimately associated with the host nerve and surrounding structures. In such cases, some authors recommend partial excision despite the risk of recurrence when excision margins are not clear.[8,9,21] Other authors, meanwhile, advocate excision to healthy tissue with either immediate axonal suturing or autologous transplantation.[22] The treatment choice would depend on tumour position and cranial nerve involved. Nerve preservation is important since a neurilemmoma is benign and slow growing, and further surgical exploration may not be required. It should be noted that radiotherapy is not effective in these tumours.[8]

Two final observations have been made during this review. Firstly, there remains the question of benefit and length of follow-up. Despite our searches, no suggestions regarding this topic have been made. It is recommended that if clearance margins are tumour free, then no long-term follow-up is required but inadequate clearance should benefit from annual review with serial ultrasound evaluation of growth rate. Secondly, it is noted that neural crest tumours are rarely included in the differential diagnosis of salivary gland lesions. We believe that the combination of slow tumour growth and difficult pre-operative diagnosis may in fact mask a higher true incidence.[4] It is therefore recommended that neural crest tumours be included in the differential diagnosis of salivary gland and head and neck swellings.

## References


1 Putney FJ, Moran JJ, Thomas GK. Neurogenic tumours of the head and neck. *Laryngoscope* 1964;**74**:1037–7
2 Enzinger FM, Weiss SW. *Soft Tissue Tumors*, 2nd edn. St Louis: CV Mosby Company, 1983
3 Gooder P, Farrington T. Extracranial neurilemmomata of the head and neck. *J Laryngol Otol* 1980;**94**:243–9
4 Williams HK, Cannell H, Silvester K, Williams DM. Neurilemmoma of the head and neck. *B J Oral Maxillofac Surg* 1993;**31**:32–5
5 Das Gupta TK, Brasfield RD, Strong EW, Hajdu SI. Benign solitary schwannomas (neurilemmomas). *Cancer* 1969;**24**:355–66
6 Murray M, Stout AP. Characteristics of human schwann cells in vitro. *Anat Rec* 1942;**84**:275
7 Hribernik SJ, Gould AR, Alpart B, Jones JL. Well-circumscribed mass of the lateral floor of the mouth. *J Oral Maxillofac Surg* 1992;**50**:741–6
8 Barnes L, Peel RL, Verbin RS. Tumours of the nervous system. In: Barnes L, ed. *Surgical Pathology of the Head and Neck*. New York: M Dekker Inc., 1985
9 Bochlogyros PN, Kanakis P, Tsikou-Papafrangou N, Chase D. A large, painless mass in the submandibular space. *J Oral Maxillofac Surg* 1992;**50**:1213–6
10 Chen SY, Miller AS. Neurofibroma and schwannoma of the oral cavity. A clinical and ultrastructure study. *Oral Surg* 1979;**47**:522–8
11 Prager TM, Klesper B. Neurilemmoma of the facial nerve mimicking a parotid tumour. A case report. *J Oral Maxillofac Surg* 1998;**27**:370
12 Ackerman VR, Rosai J. *Ackerman's Surgical Pathology*, 6th edn. St Louis: CV Mosby, 1981
13 Carstens H, Schrodt G. Malignant transformation of a benign encapsulated neurilemmoma. *Am J Clin Pathol* 1969;**51**:144
14 Jones JAH, McWilliam LJ. Intraoral neurilemmoma (schwannoma): an unusual palatal swelling. *Oral Surg Oral Med Oral Pathol* 1987;**63**:351–2
15 Kun Z, Dao-Yi Q, Kui-Hua Z. A comparison between the clinical behaviour of neurilemmomas in the neck and oral and maxillofacial region. *J Oral Maxillofac Surg* 1993;**51**:769–71
16 Halle VH, Greisen O. Neurilemmomas of the facial nerve presenting as parotid tumours. *Ann Otol Rhinol Laryngol* 1984;**9**:70–2
17 Zachariades N, Skoura C, Papageogiou G, Chrissomali E. Giant ancient neurilemmoma of the cervical region: report of a case. *J Oral Maxillofac Surg* 2001;**59**:668–72
18 Yu GH, Sack MJ, Baloch Z, Gupta PK. Difficulties in the fine needle aspiration (FNA) diagnosis of schwannoma. *Cytopathology* 1999;**10**:186–94
19 Zbieranowski I, Bedard YC. *Fine needle aspiration of schwannomas*. *Acta Cytol* 1989;**33**:381–2
20 Crawford WH, Korchin L, Greskovich FJ. Neurilemmomas of the oral cavity. *J Oral Surg* 1968;**26**:651–2
21 Llewelyn J, Sugar AW. Neurilemmoma of the mandible. Report of a case. *B J Oral Maxillofac Surg* 1989;**27**:512–5
22 Hemmy DC. Intramedullary nerve implantation in amputation and other traumatic neuromas. *J Neurosurg* 1981;**54**:842–5



Address for correspondence:
Mr Robert Almeyda, M.R.C.S., D.O.H.N.S.,
176, Oxford Road,
Windsor, SL4 5DU, UK.



Mr R. Almeyda takes responsibility for the integrity of the content of the paper.
Competing interests: None declared