The Journal of Laryngology & Otology
June 2000, Vol. **114,** pp. 414–417

Review Article

Cervical schwannoma: a case report and eight years review

Hui-chi Ku[1] M.D., Chi-wei Yeh[2], M.D.

Abstract
Schwannomas are peripheral nerve tumours of nerve sheath origin. We report one case of cervical schwannoma originating from the brachial plexus. A 56-year-old man presented with a slow-growing mass on the right side of his neck that had been noted for more than 10 years. During operation, a well-encapsulated mass was seen beneath the brachial plexus with adhesion to the plexus element. It was reported as a schwannoma. Three days after surgery, the patient had a motor deficit of the right upper arm and neurological examination showed a CV nerve deficit. The neurological function recovered completely after three months. In addition, the other five cases of cervical schwannoma seen in our hospital between March 1990 and June 1998 are also reviewed. All patients had surgery. The pre-operative symptoms, impressions, and post-operative neurological status were shown and discussed. Only two cases were diagnosed as neurogenic tumour pre-operatively. Post-operatively, one patient had transient neurological deficit and another one had permanent deficit.

Key words: Neurilemmoma; Brachial plexus; Neck

Introduction

Schwannomas are benign peripheral nerve tumours. About 25 per cent of the cases occur in the head and neck region.[1] Management of these tumours has been described as a cautious surgical dissection with extracapsular 'peeling' or even enucleation of the tumour from the nerve in an effort to preserve the function of the nerve. Post-operative neurological deficits are occasionally found. Permanent deficits are reported to be two out of seven (29 per cent), transient deficits three out of seven (43 per cent), and no deficit two out of seven (29 per cent) in one review study including seven cases.[2] There are no large studies concerning the neurological status after the enucleation operations. Brachial plexus schwannomas are rare.[3,4] We report such a case and review the other five cases of cervical schwannoma in our hospital over the past eight years with special emphasis on the post-operative neurological status.

Case report

A 56-year-old male patient came to the ENT department for further work-up of a right-side neck mass. The slowly growing neck mass had been noted for more than 10 years. Physical examination revealed a $6 \times 6 \times 6$ cm^3 mass in the right neck posterior triangle. It was elastic, semi-fixed, and non-tender. But the patient complained of a tingling sensation over the right upper arm when the mass was compressed. The remainder of the ENT examination was unremarkable. Chest X-ray showed increased density in the right lower neck. Fine needle aspiration cytology showed many small lymphocytes and few neutrophils. Computed tomo-

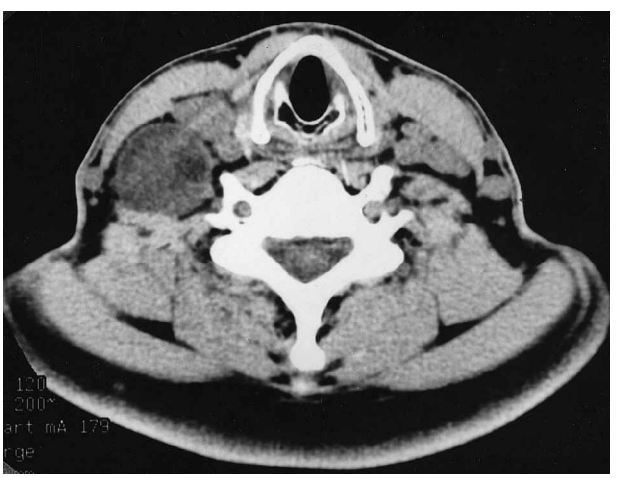

Fig. 1
CT scan showed a well-encapsulated, low density mass, close to the cervical spinal root.

From the Department of Otolaryngology, Taipei Municipal Jen-Ai Hospital, Taipei, Taiwan, R.O.C.
Accepted for publication: 31 January 2000.

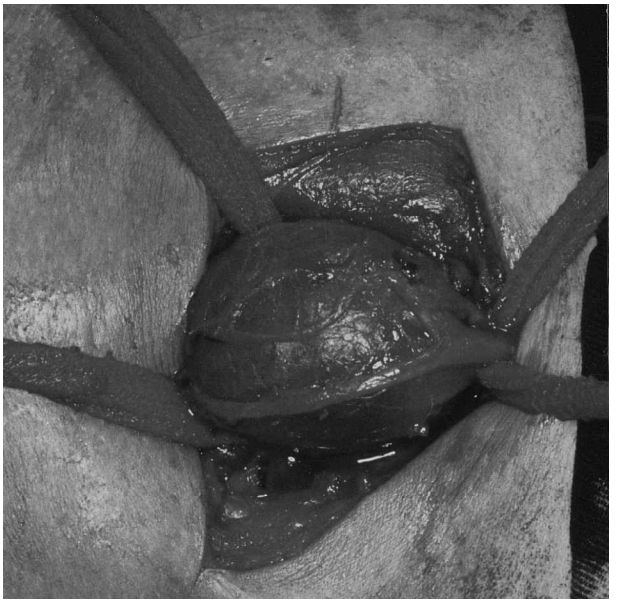

FIG. 2
A well-encapsulated mass with nerve fibres spread over it was found during the operation.

graphy (CT) showed a well-encapsulated, low-density mass near the cervical spinal root (Figure 1). The mass was excised through a transverse right cervical incision. A well-encapsulated mass over which several nerve fascicles spread was found during the operation (Figure 2). The nerves were carefully dissected from the mass and then the entire mass was enucleated. One nerve was found entering and exiting the mass. The nerve was sacrificed to completely remove the tumour. Tracing these nerves, it was found that the tumour originated mainly from the upper trunk of the brachial plexus. Final pathological evaluation was consistent with a schwannoma (Figure 3). Antoni A and Antoni B cells were found. Unfortunately, a neurological deficit was found three days after the operation. The patient had right upper arm weakness as well as numbness and pain over the neck and shoulder area. Muscle testing showed deltoid muscle weakness with grade III muscle power. Neurological examination revealed CV nerve deficit. The patient then received two sessions of rehabilitation therapy only. Three months later, both the sensory and motor neurological functions had completely recovered. There were no neurological sequelae.

Review of cases

We reviewed the cases of schwannoma that were seen in our hospital between March 1990 and June 1998. There were a total of 72 cases of schwannoma with 21 cases occurring in the head and neck. Of these, four were over the scalp, six in the neck, eight in the brain, one over the auricle, one over the tongue, and one in the nose (see Figure 4). The detailed data of the six cases of cervical schwannoma (including the case we report above) were reviewed and are summarized in Table I.

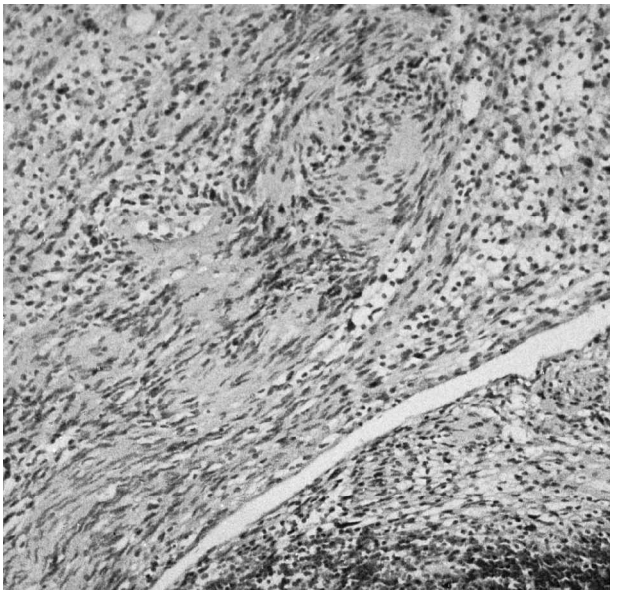

FIG. 3
Pathology finding: a schwannoma. It was composed of cellular and myxoid areas with focal cystic change and vascular ectasia. The cellular areas were composed of bundles of spindle cells with occasional palisading of nuclei. (H & E; ×100)

There were five males and one female whose ages ranged from 29 to 56 years old, with an average age of presentation at 44 years old. All six patients presented with the symptom of a slowly growing neck mass. Only one case complained of neurological symptoms of a numb sensation over the chest wall and hand on the same side of tumour. The preoperative impressions were as follows: two neurogenic tumours, one neck mass, two cervical lymphadenopathies, and one branchial cleft cyst. Two impressions of neurogenic origin were made at our ENT department. All patients received an

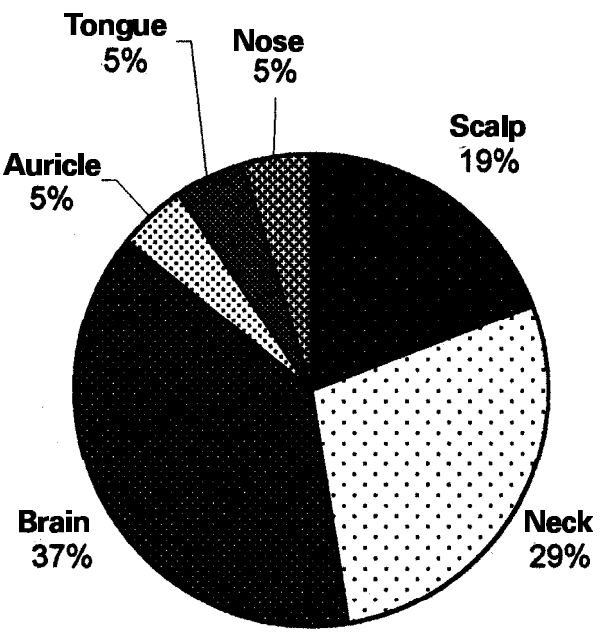

FIG. 4
Distribution of head and neck schwannomas; total: 21 cases.

https://doi.org/10.1258/0022215001905913 Published online by Cambridge University Press

TABLE I
SUMMARY OF THE SIX CASES OF CERVICAL SCHWANNOMAS

Age	Tumour site	Tumour size (cm^3)	Pre-op symptom	Pre-op diagnosis	Operation	Op depart	Post-op status	Follow-up
1 48	Neck posterior triangle	3 × 3 × 2	Neck mass	Neurofibroma	Total excision	ENT	No deficit	
2 49	Supraclavicular area	2.5 × 1.5 × 1.1	R chest wall and hand numbness	Lymphadeno-pathy	Total excision	Not ENT	Motor and sensory deficit Mainly CVIII-TI	Atrophy over right hand and forearm Decreased pain and touch over forearm medial side
3 39	Neck posterior triangle	2 × 2 × 1	Neck mass	Lymphadeno-pathy	Total excision	Not ENT	No deficit	
4 29	Posterior neck	2.8 × 2.4 × 2	Neck mass	Neck tumour	Total excision	Not ENT	No deficit	
5 41	Neck	1.2 × 1 × 1	Neck mass	Branchial cyst	Total excision	ENT	No deficit	
6 56	Neck posterior triangle	4 × 4 × 4	Neck mass Pain over shoulder and forearm when mass compressed	Neurogenic tumour	Total excision With neurolysis	ENT	Motor weak-ness over CV Numbness and pain over right shoulder and hand	Complete recovery after three months post-op

operation and all pathology specimens were reviewed again and confirmed to be schwannomas. Permanent post-operative neurological deficits including right hand and forearm motor atrophy and sensory deficits were noted in one case out of six. Transient deficits were also noted in one case (one out of six).

Discussion

Schwannomas are benign tumours of Schwann cell origin. They are typically solitary, well-encapsulated tumours characteristically running along the course of, or attached to, peripheral, cranial or sympathetic nerves. The reported sites of origin of cervical schwannomas are the cranial nerves IX–XII, the sympathetic chain, the cervical plexus, and the brachial plexus. The key element in management is a correct pre-operative diagnosis; although differential diagnosis may be difficult. Our correct pre-operative diagnosis rate is two out of six (33 per cent), higher than that reported in the literature (25 per cent),[5] but this may be due to limited case numbers.

Schwannomas often present as a neck mass of variable size. Upon palpation, they are slightly movable except along the long axis of the nerve. Neurological symptoms are not usually seen. The incidence of pain was reported to be 31 per cent and motor weakness to be 41 per cent.[2] The diagnosis relies on clinical suspicion. Aspiration biopsy has been recommended as an initial testing procedure[6] but has not gained widespread acceptance.[7] Contrast-enhanced CT and magnetic resonance image (MRI) are helpful in the pre-operative diagnosis. CT scan is sensitive to the cystic change that frequently accompanies these tumours. MRI is capable of reliably imaging not only the tumour and its capsule, but also the nerve from which the tumour arises.[9–11]

The treatment of schwannomas is surgical excision. If the lesion is known to be a schwannoma, it is possible to open the capsule and shell out the tumour, thereby leaving the capsular nerve fibres undisturbed and possibly avoiding functional deficits.[12] Despite the extrafascicular characterization of the tumour, it is almost always possible to find a small fascicle entering and exiting the proximal and distal poles of the tumours, such as in our reported case. This fascicle does not transmit nerve action potential and can be sectioned so that the tumour can be totally removed.[2] A dissecting microscope may be helpful.

However, the argument for the surgical method for resection of schwannoma has still been a clear one until now. Reviewing the literature, it is said that the nerve action potential from capsular fascicles usually give a positive response. Moreover, whenever possible, these fascicles have been spared during excision operation for functional preservation.[6] Our operative approach involves intracapsular enucleation without subsequent removal of the capsule, but some authors prefer extracapsular excision. However, the outcome is uniformly good for those who have complete excision of the tumour at the first operation.[13] Intra-operative nerve action potential studies should be performed, usually both prior to, and following, excision of the lesion.[6] Despite the low malignant degeneration rate (four per cent),[14,15] it is important to remove the whole mass. If it is not possible to preserve the functioning nerve, nerve grafting should be performed.

Most patients with cervical schwannomas present initially without motor deficit,[16–18] so the decision to operate is based largely on expected improvement of pain, the presence of space-occupying symptoms, or rarely, cosmesis.[19] Schwannomas can be removed, even from large nerve trunks, with an acceptable risk of injury to the nerve.[2] In our reported case, no neurological deficit was noted until three days after

https://doi.org/10.1258/0022215001905913 Published online by Cambridge University Press

the operation. The reason for the transient deficit may have been perineural oedema caused by nerve manipulation during the operation instead of direct nerve injury. The paresthetic sensation may have been due to post-operative neuroma.

Gross pathology usually reveals a solitary, encapsulated tumour attached to a peripheral nerve. Cystic degeneration and haemorrhagic necrosis are often present. On histological evaluation, there are areas of high cellularity called Antoni A tissue, whereas those areas of low cellularity are termed Antoni B tissue. The Antoni A areas may contain foci of palisading nuclei called Verocay bodies.[20]

Conclusions

When dealing with cases of neck mass, the possibility of a schwannoma should be considered, especially when there are some existing neurological symptoms. Cervical schwannomas may originate from the sympathetic chains, the cranial nerves, or the brachial plexus. Imaging studies such as CT or MRI should be done for pre-operative assessment. During the operation, care should be taken to preserve nerve function. Microscopic dissection may sometimes be necessary.

Transient neurological deficit may be due to neuropraxia caused by manipulation of the nerve during the operation. Permanent deficit is always associated with direct nerve injury. Neurological deficit may sometimes be inevitable when removing the mass, thus the doctor should discuss the possibility of neurological deficit with the patient before the operation. It is a wise decision to transfer cases with neck mass to an experienced otolaryngologist because of the higher pre-operative diagnosis rate.

References

1 Katz AD, Passy V, Kaplan L. Neurogenous neoplasm of major nerves of face and neck. *Arch Surg* 1971;**103**:51
2 Valentino J, Boggess MA, Ellis JL, Hester TO, Jones RO. Expected neurologic outcomes for surgical treatment of cervical neurilemmomas. *Laryngoscope* 1998;**108**:1009–13
3 Osguthorpe JD, Handler SD, Canalis RF. Neurilemmoma of the brachial plexus. *Arch Otolaryngol* 1979;**105**:296–9
4 Handler SD, Canalis RF, Jenkins HA, Weiss AJ. Management of brachial plexus tumors. *Arch Otolaryngol* 1977;**103**:653–7
5 Kehoe NJS, Reid RP, Campbell Semple J. Solitary benign peripheral-nerve tumors. *J Bone Joint Surg* 1995;**77-B**: 497–500
6 Donner TR, Voorhies RM, Kline DG. Neural sheath tumors of major nerves. *J Neurosurg* 1994;**81**:362–73
7 Ehrlich HE, Martin H. Schwannomas (neurolemmomas) in the head and neck. *Surg Gynecol Obstet* 1943;**76**:577–83
8 Godwin JT. Encapsulated neurilemmoma (schwannoma) of the brachial plexus: report of eleven cases. *Cancer* 1952;**5**:708–20
9 Kragh LV, Soule EH, Masson JK. Benign and malignant neurilemmomas of the head and neck. *Surg Gynecol Obstet* 1960;**111**:211–8
10 Cerofolini E, Landi A, DeSantis G, Maiorana A, Canossi G, Romagnoli R. MR of benign peripheral nerve sheath tumors. *J Comput Assisted Tomogr* 1991;**15**:593–7
11 Friedman DP. Segmental neurofibromatosis (NF-5): a rare form of neurofibromatosis. *Am J Neuroradiol* 1991;**12**: 971–2
12 Sheridan MF, Yim DWS. Cervical sympathetic schwannoma: A case report and review of the English literature. *Otolaryngol Head Neck Surg* 1997;**117**:206–10
13 Kline DG, Judice DJ. Operative management of selected brachial plexus lesions. *J Neurosurg* 1983;**58**:631–49
14 Smith W, Amis JA. Neurilemmoma of the tibial nerve. A case report. *J Bone Joint Surg* 1992;**74**:443–4
15 Chang SC, Schi YM. Neurilemmoma of the vagus nerve. A case report and brief literature review. *Laryngoscope* 1984;**94**:946–9
16 Al-Ghamdi S, Black MJ, Lanford G. Extracranial head and neck schwannoma. *J Otolaryngol* 1992;**176**:186–8
17 Cravioto H. Neoplasms of peripheral nerves. In: Wilkins R, Rengachary S. eds. *Neurosurgery*. Baltimore: Williams and Wilkins, 1988;1894–9
18 Fisher RG, Tate HB. Isolated neurilemmomas of the brachial plexus. *J Neurosurg* 1970;**32**:463–7
19 White NB. Neurilemmomas of the extremities. *J Bone Joint Surg* 1967;**49**:1605–10
20 Weller R, Cervos-Navarro J. Tumours of the peripheral nervous system. In: Asbury AK, Johnson PC, eds. *Pathology of Peripheral Nerves. Major Problems in Pathology*. Philadelphia: WB Saunders, 1978;206–59

Address for correspondence:
Hui-chi Ku,
Department of Otolaryngology,
Taipei Municipal Jen-Ai Hospital,
No. 10, Section 4,
Jen-Ai Rd.
Taipei,
Taiwan,
R.O.C.

Dr Ku takes responsibility for the integrity of the content of the paper.
Competing interests: None declared.