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CT Demonstration of a Brachial Plexus Neuroma

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Computed tomography (CT) of the peripheral soft tissues can demonstrate neoplasms that are undetectable by other imaging methods by its ability to differentiate regions of slightly different radiation absorption. Difficulty in evaluation of the unfamiliar and often confusing structures in the peripheral soft tissues is offset by the presence of mirror image symmetry. A patient is described who had undergone a variety of unsuccessful diagnostic and therapeutic procedures for arm and hand pain that she had had for 9 years. CT revealed a unilateral mass in the deep tissues of the shoulder consistent with a brachial plexus neuroma. All symptoms disappeared after complete surgical removal of a benign neurofibroma. To our knowledge there is no prior report of CT demonstration of this lesion.

Case Report

A 58-year-old woman was admitted for evaluation of pain in the right upper extremity. The pain first appeared 9 years before admission after surgery for vagotomy, pyloroplasty, and repair of a hiatal hernia. She was never free of pain from that time. No mass was ever detected and there were no signs of neurofibromatosis. A number of physicians had been consulted during the 9 year interval. Treatment included cervical fusion anteriorly, antecubital fossa exploration, nerve blocks, arm castings, hot packs, physical therapy, and ultrasound. Analgesics, narcotics, muscle relaxants, vitamins, and stimulants had been given singly or in combination over the years. Recently, psychiatric evaluation had been entertained because the refractory nature of the symptoms suggested that they might be functional in origin.

The pain was variously described as pinching, numbness, tingling, and burning. It was capable of causing both hot and cold sensations. The distribution included the supraclavicular region and the axilla, the volar aspect of the forearm, the wrist, and the thumb.

During the first year of pain, a myelogram showed degenerative spur formation of C5–C6. The anterior C5–C6 fusion failed to change the character, extent, or severity of the pain. Partial relief occurred 8 years before admission after a median nerve exploration in the antecubital fossa with sectioning of the lacertus fibrosus. No change in symptoms was experienced after any other surgical procedures. Of all the drugs used, only Elavil at bedtime had any beneficial effect.

An extensive neurologic examination by the senior neurosurgeon (T. W.) elicited tenderness in the infraclavicular fossa as the only abnormality. The two arms were of normal and equal size. Motion and grip were normal. Good strength was demonstrated in the deltoid, biceps, and triceps. The wrist dorsiflexors were strong, and the radial pulse could not be obliterated with various changes of posture. No reflex loss could be shown. The sensations of touch and feeling of pin prick were normal throughout the arm and hand.

The unusual infraclavicular tenderness suggested the possibility of brachial plexus neoplasm and CT of the shoulder was ordered. This revealed a soft-tissue mass in the region of the brachial plexus on the right side with normal soft-tissue structures on the left (fig. 1A). All other clinical laboratory tests were unremarkable.

Exploration was carried out with microsurgical technique. Although the procedure was technically difficult, the four trunks of the brachial plexus were isolated and separated from the capsule of the tumor. The lesion was removed completely with its capsule intact. The histologic report described a 3.5 × 2.5 cm benign neurofibroma with dense collagenous tissue acting as a pseudocapsule (fig. 1B).

Muscle function and sensation in the right arm were normal after surgery and the patient was completely free of arm pain for the first time in 9 years. The postoperative convalescent period was uneventful; there was no recurrence of arm pain in a 4 month follow-up.

Discussion

Brachial plexus neuromas are uncommon. Only about 80 have been reported [1]. Godwin [2] published a comprehensive review in 1952 in which he discussed his own 11 cases of neurilemoma and quoted Stout, who found that of 194 cases of neurilemoma of the entire body discussed up to 1935, only two were in the brachial plexus.

Although some reviews consider all brachial plexus neuromas to be histologically similar, most agree that there are two distinct pathologic types: (1) neurilemomas (schwannomas) or nerve sheath tumors that are slowly growing, encapsulated neoplasm composed of Schwann cells in a collagenous matrix; or (2) slowly growing, unencapsulated, benign neurofibromas that are isolated lesions or neurofibromas (up to 10% of which are malignant neurofibromas) arising as part of generalized neurofibromatosis (von Recklinghausen disease). A few authors believe all neurofibromas

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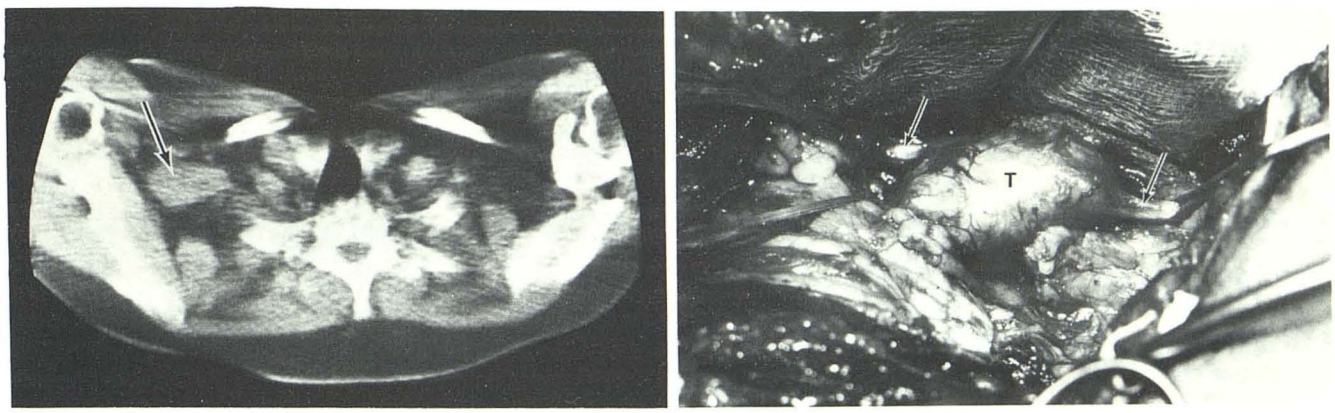

Fig. 1.—**A**, CT scan of upper thorax. Mass in region of right brachial plexus. **B**, Operative photograph. Neurofibroma (T) and attachment to musculocutaneous nerve of brachial plexus (*arrows*).

are associated with this disease, while most state that at least two of four features of the entity must be present for diagnosis. Classically neurofibromatosis includes (1) skin café au lait spots, (2) neurofibromatous nodules, (3) bone deformities, and (4) family history [1]. Other lesions in axilla are occasional malignant tumors that occur unrelated to neural elements [3]. Symptoms can include pain, numbness, paresthesias, or upper extremity weakness [4], but some patients are asymptomatic and have a mass found during routine physical examination.

As in our case, the lesion is occasionally suggested when long-standing arm pain increases in severity with pressure in the axilla or the infraclavicular fossa. Differential diagnostic possibilities when pain is the chief complaint include cervical spondylosis, cervical trauma, thoracic outlet syndrome, various peripheral nerve entrapment syndromes, and brachial plexus neuropathy [5].

Treatment for brachial plexus neuromas is preferably by microsurgery, since most of the lesions can be removed from the nerve trunks without sacrificing nerve fibrils. Frozen sections and needle aspiration for biopsy are to be avoided; frequently neurilemomas exhibit pleomorphism and are mistakenly labeled malignant when small fragments are examined, yet when the entire lesion is studied they are seen to be benign [2]. A second surgical procedure should be considered for those rare malignancies proven by permanent pathologic specimens.

This case shows the advantage of CT of the axilla in documenting a mass when one is suspected. It may also have value in eliminating brachial plexus neuroma in those complex clinical states where there is an unusual pain pattern, no palpable mass or positive physical finding, and no apparent cause for pain.

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