Neurovascular Compression by a Subpectoral Lipoma
A Case Report of a Rare Cause of Thoracic Outlet Syndrome

G. Sergeant*, O. Gheysens*, P. Seynaeve**, J. Van Cauvelaert***, H. Ceuppens*

Departments of Vascular and Thorax Surgery*, Imaging** and Orthopaedics***, AZ Groeninge, Kortrijk, Belgium.

Key words. Thoracic Outlet Syndrome (C10.668.829.550.850) ; Lipoma (C04.557.450.550.400).

Abstract. Background : Lipomas are benign soft tissue tumours, progressively expanding in volume. Beside frequent aesthetic consequences, lipomas can also exert pressure on surrounding tissues and structures. Materials and Methods : A case of a subpectoral infraclavicular lipoma compressing the axillo-subclavicular neurovascular bundle, produced unilateral brachialgia, thereby simulating a Thoracic Outlet Syndrome. The expansive, but non-infiltrative, nature of the lipoma allowed local excision in the vicinity of the brachial plexus and infraclavicular vascular structures. Results : Surgical removal of the lipoma resulted in complete remission of symptoms in the left arm and hand. Conclusions : In the presence of unilateral brachialgia, a subpectoral tumour causing a Thoracic Outlet Syndrome should always be excluded in the absence of other relevant pathology.

Case report

Patient history and clinical examination

A 70-year old man was referred with a four-year history of a progressively expanding mass in the left subclavicular region. The patient complained of high subpectoral pain, irradiating to the left upper arm and shoulder, paraesthesia, episodic dullness of all left fingers and a feeling of heaviness and minor swelling of the complete left arm. The left hand was pale and felt cold to touch. No claudication or hyperhidrosis could be found. The tumour obliterated the supraclavicular fossa and limited the normal adduction of the arm. The pectoral muscles and skin were stretched over the mass. The symptoms were present in all positions of the arm, but adduction of the arm increased the discomfort. The radial pulse was palpable with the arm at rest and remained palpable with mobilization of the arm.

There was no history of local trauma. The patient was known with a previous myocardial infarction, advanced diabetes mellitus type 2 and generalized atherosclerotic disease.

Medical imaging

A left subpectoral hypodense mass (8.5 × 6 × 5.5 cm³), suspected to be a lipoma, was detected on axial CT scan and CT angiogram. The lipoma displaced the axillary vasculature anteriorly. A second smaller intramuscular mass, also suspected to be a lipoma, was found on the left lower chest wall. An asymmetrical left thyroid lobe expanded into the thoracic cavity. Multiple mediastinal lymph nodes and right intrapulmonary micro-nodules were also noticed. A PET scan was performed to exclude a metastatic neoplasm, but failed to reveal any hypermetabolic activity. The exact anatomical relations, without invasion of surrounding tissues, were brought into light with axial, sagittal and coronal Magnetic Resonance Imaging (Fig. 1).

The ulnar and median nerve conduction study and electromyography indicated a decreased ulnar motor nerve conduction of 48 m/sec over the cubital tunnel.

Fig. 1
Axial T1 weighted image after Gadolinium injection
Neurovascular Compression by a Subpectoral Lipoma

The ulnar motor nerve conduction below the elbow was 54 m/sec. No median nerve or upper ulnar nerve conduction impairment was detected.

Preoperative examinations
Thyroid scintigraphy showed a normal radioactive iodide captation. Lung function testing was normal. A revascularization procedure of a stenosed right coronary artery was not considered necessary prior to surgical removal of the tumour. Laboratory results were normal.

Resection
The surgical procedure was performed under general anaesthesia with the patient in dorsal decubitus. Full mobilization of the left arm was possible. The subpectoral mass was approached and removed through a single longitudinal incision alongside the lateral margin of the large pectoral muscle from high in the axilla to about 2 cm above the nipple. Axillary fat and lymphatic tissue were removed, followed by freeing the lipoma in the depth. The lipoma was well-delimited, without invasion of neighbouring structures. The axillary vein and artery, together with the subclavian artery and the medial and lateral bundle of the brachial plexus, were carefully separated from the lipoma. The lipoma was detached medially from the normal fatty tissue. No accessory incision at the supraclavicular fossa was needed (Fig. 2). All the neurovascular structures remained intact during resection.

During the same intervention, the lower intramuscular lipoma was removed as well.

Anatomopathological report
The paraffin slides from an encapsulated fat nodule of 112 g, confirmed the diagnosis of a lipoma. The histological characteristics were well differentiated fatty tissue with a fine vascular fibrous septal network. The cellular nuclei were small, pyknotic and quiet, without signs of malignity. Additional immuno-histochemical examinations (CD34, p53, Ki 67, S 100) supported the diagnosis of a benign lipoma.

Postoperative result and follow-up:
The patient complained of some paraesthesia in the left hand in the first few days after surgery and was discharged on day seven. The patient was completely symptom-free in an out-patient clinic five weeks after surgery and the surgical wounds had healed completely.

Discussion
The symptoms of our patient and the localization of the mass suggest a Thoracic Outlet Syndrome. According to...
Sanders the simplest definition of Thoracic Outlet Syndrome is: “neurovascular compression in the upper extremity due to pressure on the nerves and vessels in the thoracic outlet area”. The compressed structures are usually the nerves of the brachial plexus and occasionally the subclavian artery or subclavian vein. Osseous structures (rudimentary first rib, cervical rib, ...), soft tissue structures (muscles, congenital bands or ligaments, tumours, ...), sequelae of trauma (fractures of clavicle or first rib, whiplash injuries, ...) and other aetiologies cause neurovascular compression in this tunnel to the arm (1-2).

The two major neurological causes of unilateral brachialgia to be excluded are cervical spondylosis and carpal tunnel syndrome. Of lesser prevalence are nerve root compression by posterior osteophytosis in cervical osteoarthritis and other peripheral neuropathies.

The minor swelling of our patient’s arm can be caused by venous compression. The clinical findings, limited radiological abnormalities on MRI-scan and neurophysiological test results oppose a critical arterial or high nerve compression as the cause of the brachialgia. A. J. Wilbourn subdivides neurogenic Thoracic Outlet Syndrome into two groups: true or a disputed TOS. Disputed neurogenic TOS includes all cases without objective criteria, as seen in our patient (3). Coldness and pallor of the arm without arterial insufficiency could be explained by a prolonged secondary Raynaud’s phenomenon due to irritation of the perivascular sympathetic plexus. The elevated sympathetic tone elicits a long-lasting vasospastic attack of the left arm (4).

In this case of a “disputed” TOS, we still suspect advanced nerve damage. Typically, with chronic nerve compression, there may be fascicles within the nerve that show more severe changes than others. This will account for patient symptomatology in the face of normal or near-normal electrodiagnostic studies (5).

The slowed ulnar motor nerve conduction velocity (48 m/sec) at the elbow compared to a normal nerve conduction velocity (54m/sec) below the elbow is a coincidental finding probably contributing to the complaints of our patient. Abnormal results include a velocity of less than 48 m/sec across the elbow, or a velocity across the elbow more than 10m/sec slower than the velocity above or below the elbow. Upton and McComas stated that a proximal level of nerve compression, in this case at the thoracic outlet level, could result in alterations in axoplasmatic flow, causing more distal sites along the nerve to be more susceptible to compression. They also suggested that neuropathies such as those related to diabetes could provide an “initial crush”. This hypothesis was introduced as the “double-crush syndrome” (5-6). Although this phenomenon was disputed by A. J. Wilbourn and R. W. Gilliat, it was never refuted (7).

Therefore the cumulative effect of minor compression at several sites along the nerve and the presence of advanced diabetes mellitus could cause the significant patient symptoms. Evaluation and treatment must be directed towards all sites of nerve compression in order to alleviate symptoms.

In our patient the Thoracic Outlet Syndrome was caused by a lipoma. A lipoma is a benign tumour of adipose tissue. With an estimated annual clinical incidence (number of patients consulting a doctor for a lipoma, even if no histologically verified) of 1/1000, lipomas represent almost 50% of benign soft tissue tumours (8-9). Lipoma may occur in almost any organ of the human body. Although the exact aetiology remains unknown, several theories have been postulated including the role of endocrine, dysmetabolic, genetic and traumatic factors (10-11). S. Simango et al. described an unique case of a left subpectoral posttraumatic lipoma, growing between the pectoralis major and minor muscles (12). In our case no prior trauma had occurred in the shoulder region. Lipomas are generally well encapsulated. They usually grow expansively between different fascial planes without infiltrating the neighbouring structures and therefore, can be excised or aspirated easily and with low recurrence rates (11). Although rare, for some histological subtypes, malignant transformation into liposarcoma has been described (13-14).

The MRI-scan was able to demonstrate the absence of invasion of the neurovascular bundle by the lipoma (15). The noninvasive tumour growth, the possibility of malignant transformation, together with probable correlation of the symptoms in the left arm and hand and need for a definitive histological diagnosis led to the decision of surgical removal of the lipoma. Since the patient was free of symptoms at follow-up, no further treatment was initiated.
Conclusion

In the presence of unilateral brachialgia, a tumour causing a Thoracic Outlet Syndrome should always be excluded in the absence of other relevant pathology.

References


G. Sergeant
Department of Vascular and Thorax Surgery, AZ Groeninge, Kortrijk.
Halewijnlaan 14,
B-3060 Bertem, Belgium
Tel. : + 32 16 48 82 09
Fax : + 32 16 48 13 77
E-mail : Gregory.Sergeant@student.kuleuven.ac.be