CASE REPORT – OPEN ACCESS

International Journal of Surgery Case Reports 9 (2015) 101–104

Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Infraclavicular subpectoral lipoma causing thoracic outlet syndrome

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ARTICLE INFO

Article history:
Received 12 December 2014
Received in revised form 10 February 2015
Accepted 25 February 2015
Available online 26 February 2015

Keywords:
Thoracic outlet syndrome
Subpectoral mass
Lipoma
Raynaud's phenomenon

ABSTRACT

INTRODUCTION: Thoracic outlet syndrome (TOS) includes a group of disorders caused by extrinsic compression of neurovascular structures between the 1st rib and clavicle. It usually presents as an enlarging neck mass, with shoulder or upper limb pain, weakness, paresthesias and impalpable radial pulse (Raynaud's phenomenon).
PRESENTATION OF CASE: We report a rare case of TOS caused by an infraclavicular subpectoral lipoma that, although challenging because of limited access and proximity of vital neurovascular structures, was successfully removed through a simple transaxillary incision with an excellent esthetic result. The patients is symptom-free 6 months after surgery.
DISCUSSION: Multiplicity of symptoms makes causes, diagnosis, and treatment of TOS controversial. Accurate diagnosis of TOS can be a substantial challenge in practice, because of a lack of physician awareness, overlapping of clinical features, and an absence of clearly defined diagnostic criteria. TOS may be associated with the presence of a benign subpectoral mass like lipomas, that seldom have an irregular distribution that involve neurovascular structures.
CONCLUSION: Although benign soft tissue tumors infraclavicular subpectoral lipomas may exert pressure on neurovascular surrounding structures during their progressive expansion and cause TOS. Therefore, a thorough preoperative study by radiological imaging such as MRI or neurophysiological test should always be performed in order to prevent unintentional lesions of the involved axillo-subclavicular plexus and plan correct surgical procedure.

1. Introduction

The recognition, diagnosis and treatment of conditions affecting the neurovascular bundle at the thoracic outlet have been clarified in recent years [1]. The whole subject has been usually grouped together under the name of thoracic outlet syndrome (TOS) which is considered as one of the most controversial clinical entities in medicine [2].

TOS generally affects young patients, with an average age of 36 and a male preponderance, however, this is changing as women become more active in sports and physical occupations [3]. A delay in diagnosis is common, which is frustrating for the patient and may lead to permanent psychological damage [4].

More recently, it has been suggested to divide TOS into three main variants depending on the principle component; venous, arterial or neurological. These three may co-exist to a greater or lesser degree, but treatment of the dominant component usually results in complete resolution of symptoms [1].

Despite many reports of operative and non-operative interventions, rigorous scientific investigation of this syndrome leading to evidence based management is lacking [5].

Thoracic outlet syndrome is caused by extrinsic compression of neurovascular structures between the 1st rib and clavicle associated with a wide range of symptoms such as pain, weakness, paresthesias and vascular insufficiency, muscle imbalance of the neck, shoulder, and back. The clinical manifestations are caused by multilevel brachial nerve and subclavian artery or vein compression. The heterogeneity of symptoms and signs of such disease, the absence of widely recognized signs or cost effective laboratory tests, and the lack of sufficient diffusion of the syndrome in the medical literature, makes its diagnosis a difficult challenge and its treatment controversial [6]. TOS has been reported as caused by a variety of diseases but seldom if not ever by the presence of a subpectoral mass [7]. We report the successful surgical treatment of a rare case of a young lady who suffered of brachialgia, loss of strength and Raynaud's phenomenon and presented with a magnetic resonance imaging showing a subpectoral infraclavicular multilobar lipoma.

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http://dx.doi.org/10.1016/j.ijscr.2015.02.047

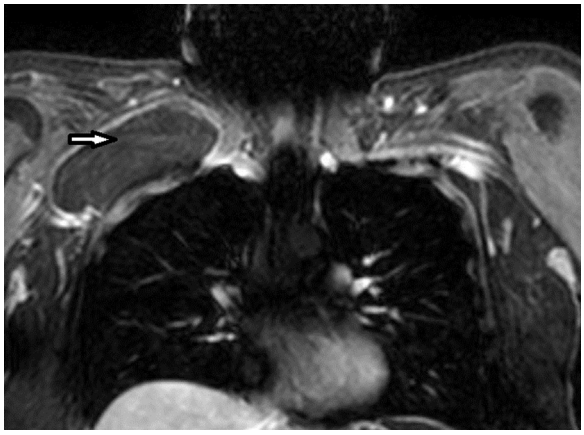

Fig. 1. Preoperative contrast MRI showing the mass (arrow) in its subpectoral and infraclavicular extension with clear dislocation of axillary and subclavian artery and vein.

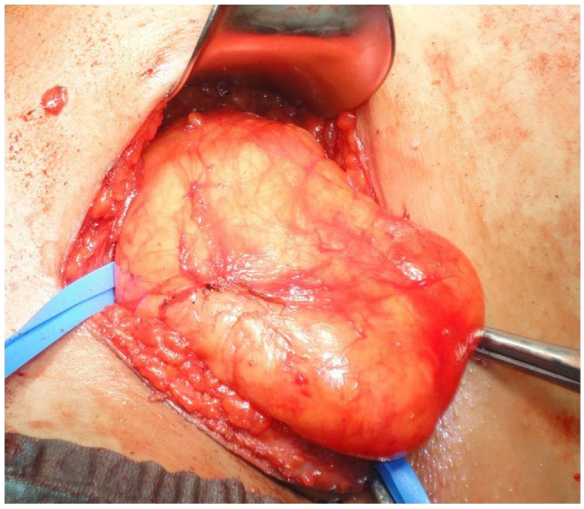

Fig. 2. Intraoperative pattern showing the mass that has been isolated from subclavian (right loop) and axillary (left loop) arteries.

2. Presentation of case

2.1. Patient history, clinical examination and imaging

A 30-year old lady from Bangladesh was referred with a 6 months history of increasing subpectoral and shoulder pain, right arm swelling, right forearm paresthesias and an expanding mass in the right supraclavicular region. The patient complained of weak grip and her right hand was cold to touch. The physiological adduction of the arm was limited by exacerbation of all symptoms. Clinical examination revealed a firm, tender mass in the supraclavicular fossa, overlying the skin, that extended downward and spread around and between pectoral muscles. The patient had been referred by general practitioner to undergo a thoracoscopic sympathectomy but the clinical pattern induced more accurate investigations. Contrast computed tomography (CT) and magnetic resonance imaging (MRI) T1 and T2-weighted sequences by fat-suppression techniques, revealed a $125 \times 72 \times 46$ mm subpectoral thinly septated hypodense mass extending from the neck to the anterior right hemithorax. The ovoidal well capsulated mass in the right retroclavear and subclavear region, between the axillary artery and vein, displaced the axillary–subclavian bundle anteriorly without extension into the neural foramina (Fig. 1). The lesion compressed the brachial plexus and was consistent with either a lipoma or liposarcoma.

The ulnar and median nerve conduction study and electromyography revealed a generally decreased conduction at cubital tunnel level.

2.2. Surgical procedure

Severe compressive symptoms and inability to exclude malignancy suggested surgical treatment. INR was maintained between 2 and 3 because the risk of thrombosis was considered more important than an intraoperative hemorrhage. Moreover, the features and the location of the mass would suggest a short surgical time. The surgical procedure was performed under general anaesthesia, in dorsal decubitus and right arm hyperadduction to better expose axillary region and right hemithorax. An axillary incision was made along the anterior border of the latissimus dorsi muscle and the lateral border of the pectoralis minor from high in the axilla to the 4th rib level. The fat and lymphatic tissue were removed and access to the axillary vein was gained where a lipomatous mass was detected. The mass followed the axillary vessels, separating the artery upward and anteriorly from the vein downward, in a complete subpectoral position, developing itself up to the supraclavicular fossa and displacing the subclavian artery anteriorly. No infiltration of surrounding structures was detected so the mass was carefully isolated following the vascular bundle and the brachial plexus up to the subclavicular edge and supraclavicular fossa (Fig. 2). The mass was completely removed with no need of a further supraclavicular incision and a 10 French drain was left in place. Final pathology was consistent with a capsulated $120 \times 60 \times 25$ mm lipoma of 160 g showing some steatonecrotic area in its context but no sign of malignancy (Fig. 3). The diagnosis of benign lipoma was confirmed also by immune-histochemical analysis.

The patient was discharged on the 2nd postoperative day without any complication. At 6 months from surgery the patient was completely symptom-free, a computed tomography showed no recurrence and last but not least, esthetical results were excellent.

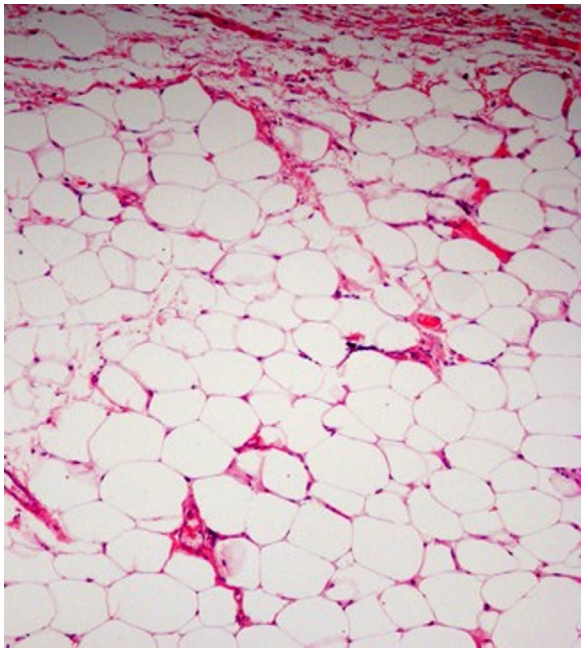

Fig. 3. Histological pattern showing well differentiated adipocytes with no signs of infiltration.

3. Discussion

Thoracic outlet lesions are usually represented by an enlarging neck or supraclavicular mass that is typically associated to upper shoulder or arm pain.

TOS real incidence in the general population is not known due to the absence of widely recognized signs or cost effective laboratory tests, and the lack of sufficient diffusion of the syndrome in the medical literature, it is also a poorly defined medical entity. The actual incidence seems generally low (from 3 to 80 cases per 1000) even though in more recent studies the incidence appears to be higher, and this disease is an often misdiagnosed cause of chest, neck and shoulder pain and one of the frequent upper extremity neuropathies related to sport [1,3,8].

Main causes of TOS are congenital abnormalities such as cervical rib, prolonged transverse process, and muscular abnormalities (scalenus anticus muscle, a sickle-shaped scalenus medius) or fibrous connective tissue anomalies, neck and shoulder trauma (whiplash injuries), functional acquired causes, more rarely tumors, hyperostosis and osteomyelitis.

TOS may be neurogenic, venous, and arterial. All forms are rare, but clinically significant because, when unrecognized or inadequately treated, they can cause chronic pain syndromes, long-term limitations in use of the upper extremities, and substantial disability even in relatively young, active, and healthy individuals. Accurate diagnosis of TOS can be a substantial challenge in practice, because of a lack of physician awareness, overlapping of clinical features, and an absence of clearly defined diagnostic criteria. Neurogenic compressive symptoms of brachial plexus consist of pain, numbness, and paresthesia affecting the neck, upper back, shoulder, arm, and hand with weakening grip. These symptoms are typically dynamic, with marked exacerbation during positional maneuvers such as the 3-min elevated arm stress test (EAST). The vascular TOS, namely compression of one or more veins and arteries, is characterized by spontaneous swelling of the entire arm, cyanotic discoloration, heaviness, pain, weak or no pulse in the affected arm, tiny black spots on fingers. Recognition and conservative management of these problems make the necessity for surgery a rare event. Decompression of the brachial plexus, with or without 1st rib resection, is a technically demanding surgical procedure requiring expertise in peripheral nerve, vascular and thoracic surgery.

The clinical pattern in our patient and the typical localization of the mass were strongly consistent with a thoracic outlet syndrome since a neurovascular compression in the upper extremity was present following a pressure on the nerves and vessels in the thoracic outlet area. To the author's best knowledge this is the 2nd published case of TOS caused by a subpectoral lipoma [7] but greater in size and with infraclavicular extension. Many lesions of the subcutaneous region come to surgical pathology labeled as lipomas; and, not uncommonly, a portion of these actually turn out to be something more interesting. Normally, lipomas have a low degree of cellularity and no nuclear atypia; the presence of either is cause for concern. Sometimes increased cellularity is due to a diffuse low-grade form of fat necrosis as in our case.

The exact etiology of lipomas remains disputed and endocrine, dysmetabolic, genetic and traumatic factors have been often considered [1]. A lipoma characteristically grows by simple expansion in a well encapsulated fashion with no tissue infiltration that is more characteristic of liposarcomas [9]. Despite their benign nature lipomas may be a challenge to the surgeon for their anatomic setting.

The most popular surgical approach for TOS is transaxillary 1st rib resection (TAR) where a transverse incision is made over the 3rd rib just inferior to the axillary hairline and deepened between the pectoralis major and the latissimus dorsi muscle. The scalene muscle attachments to the 1st rib are released and the rib is excised extraperiosteally from the chondrosternal articulation to the costotrasverse articulation. The rationale for this approach is that 1st rib resection permits the widening of both the interscalenic triangle and the costoclavicular space. Other procedures include supraclavicular incision, preferred by neurosurgeons or posterior subscapular approach which is reserved to more complicated TOS [10–12].

Our surgical approach was suggested by the age of the patient and anterior location of the mass. Differently from standard transaxillary procedure it did not require release of scalene muscle attachments nor 1st rib resection even though the careful caudocranial separation of the neurovascular bundle was technically demanding. Moreover, the benign pathological outcome supported our strategy.

4. Conclusion

Benign subpectoral infraclavicular masses should be taken into consideration when evaluating a possible thoracic outlet syndrome in patients with brachialgia, loss of strength and Raynaud's phenomenon. A thorough radiological assessment, preferably by MRI with fat suppression technique as in our case, is mandatory to ascertain neurovascular compression by large lipomas.

Conflicts of interest

No conflicts of interest to declare.

Funding

No sources of funding for our research.

Authors' contribution

Stefano Elia: study design, data collections, data analysis, writing.

Alessandra Cerioli: data collections, data analysis, writing.

Valeria Fiaschetti: data analysis.

Alessandra Vittoria Granai: study design, data collections.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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