

Recurrent Schwannoma of the Brachial Plexus: Surgical Management of a Case and Review of the Literature

Mhacks M¹, Lounceny FB^{1*}, Bijoux M², Mbaye T¹ and Momar CB¹

¹Department of Neurosurgery, Fann University Hospital Center, Senegal

²Department of Anesthesia and Reanimation, Fann University Hospital Center, Senegal

*Corresponding author:

Barry Louncény Fatoumata,
Department of Neurosurgery, Fann University
Hospital Center, Dakar, Senegal,
Tel: +221 781390566;
E-mail: drlcbarry@gmail.com

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1. Abstract

1.1. Introduction: The brachial plexus tumors constitute about 5% of primary tumors of the upper limbs and can develop from the nerve sheath (schwannoma) or nerve fibers (neurofibroma). We report a case of recurrent schwannoma of the brachial plexus, presented by two homolateral tumors of the left brachial plexus, one cervico-clavicular and the other axillary.

1.2. Observation: This is a 36-year-old woman, in whom a biopsy of a mass in the left axillary region was performed in 2006, followed by an excision of the same mass in 2008, which was reviewed in 2020 for a recurrence of the mass in the left axillary and cervical-clavicular region without neurological deficit, requiring surgical excision with simple post-operative follow-up without surgical complications. Anatomopathological examination had revealed a schwannoma of the left brachial plexus.

1.3. Conclusion: The brachial plexus schwannomas are rare, their removal requires the mastery of the complex anatomy of the region.

2. Introduction

The tumours of the brachial plexus are relatively rare and represent a therapeutic challenge for the neurosurgeon [1]. They make up about 5% of primary tumors of the upper limbs and can develop from the nerve sheath (schwannoma) or nerve fibers (neurofibroma) [2-4].

Clinic is variable, ranging from the presence of a mass to neurological deficit, and tumor resection or simple biopsy is accompanied by the risk of neurological deficit [5]. The challenge for

the neurosurgeon is therefore to remove the tumor as completely as possible while maintaining normal nerve function. The management of these tumors requires not only a good mastery of the complex anatomy of the brachial plexus but also of the surgical approach [6].

We report a case of recurrent brachial plexus schwannoma, presented by two homolateral tumors of the left brachial plexus, one cervical-clavicular and the other axillary.

3. Observation

This is a 36-year-old woman who had a left axillary mass biopsied in 2006 and removed in 2008. Pathology examination revealed a schwannoma of the left brachial plexus. It was reviewed in 2020 for the management of a recurrence of the mass in the left axillary and cervical-clavicular region.

The clinical examination revealed a firm, painless, fixed, deep-plane fixed left cervical-clavicular mass and another homolateral, painless, firm, axillary mass with very little mobilization (Figure 1) without associated sensory-motor deficit.

Left cervical-brachial Computed Tomography (CT) scan and cervical Magnetic Resonance Imaging (MRI) revealed a double process of encapsulated left cervical-clavicular tissue lesion, with a clear and heterogeneous enhancement after contrast injection, measuring 103 X 66.9 X 66 mm and another left axillary mass measuring 142 X 138 X 89.3 mm, adjacent to the humeral cortex (Figure 2).

In July 2020, she underwent surgical removal under general anesthesia in the supine position, through the anterior supra- and infra-

clavicular route. An arciform incision of about 30 cm was made at the axillary level (infraclavicular route), followed by rigorous hemostasis, dissection of the subcutaneous plane and then of the tumor capsule, allowing identification of the local vascular-nervous structures (axillary artery and brachial plexus), dissection of the tumor adhesions to the bone and to the branches of the brachial plexus, and then block removal of the axillary mass (Figure 3). Satisfactory check of humeral and radial pulses followed by progressive and satisfactory hemostasis, abundant rinsing and aspirative drainage. At the cervical level, a linear incision of approx-

imately 20 cm was made (supra clavicular route), hemostasis and subcutaneous dissection of the tumor capsule, identification and digital palpation of the cervical vascular bundle, tumor removal by fragmentation, then hemostasis and closure in two planes with aspirative drainage. The duration of the operation was 5 hours and the postoperative follow-up was good. The post-operative chest X-ray did not show any tumor residue (Figure 4). The pathological examination came back in favor of a schwannoma of the brachial plexus (Figure 5). Progression at 6 months was good without tumor recurrence or neurological deficit.



Fig. 1: a and b: left axillary mass



Fig. 2: a : Left cervico-brachial CT scan, coronal section: double cervico-clavicular tissue lesioning process 103 X 66.9 X 66 mm and left axillary measuring 142 X 138 X 89.3 mm, adjacent to the humeral cortex; b: Cervical MRI, axial section: cervico-clavicular tissue lesioning process in hypersignal in T2.

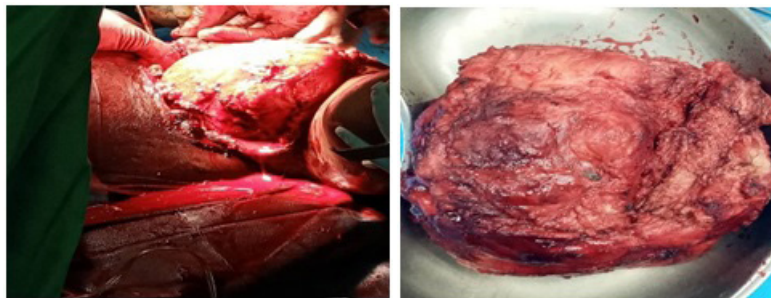


Fig. 3: Resected mass.



Fig. 4: Postoperative chest radiograph with frontal incidence: no tumor residue

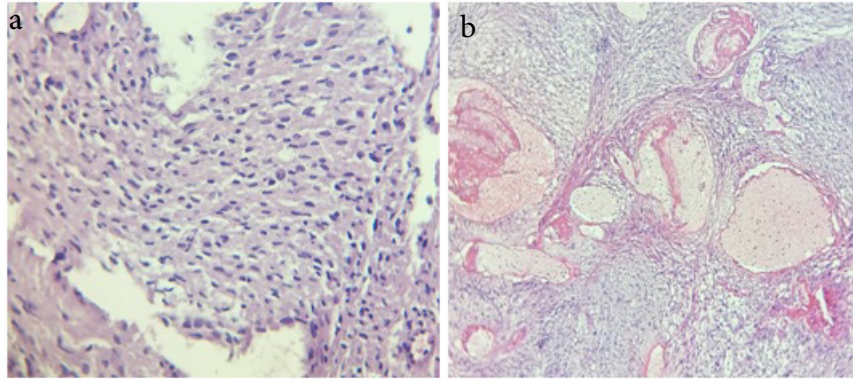


Fig. 5: Anatomopathological result: a: Antoni A zone; b: Antoni B zone

4. Discussion

A diverse group of tumors, both intrinsic and extrinsic to neuronal elements, both benign and malignant, can affect the brachial plexus [1]. Benign tumors affecting the brachial plexus offer the surgeon not only the opportunity to intervene while maintaining nerve function but often also the reward of controlling or curing the tumor [7]. Even in those with malignant lesions, the neurosurgeon plays a role in achieving tumor control or palliating associated symptoms [1, 8].

Clinic is often variable, in our review of the literature, neurofibromatosis was associated in most reported cases [1, 2, 4, 9,]. These are often young people between 19 and 40 years of age [3, 4]. Clinical features are summarized in the presence of a mass, paresthesia's/ numbness, radiating pain, local pain and weakness [4, 5]. The duration of symptoms varies from 2 months to 10 years before treatment, rarely with incidental findings [1]. In our case, we were dealing with two left cervical-clavicular and axillary masses, with no sensory-motor deficit.

MRI is, in the case of brachial plexus lesions, the examination of choice to delineate the margins of the tumor from the surrounding tissues. Almost all brachial plexus tumors show a well-defined mass with the long axis aligned with the original nerve path, a homogeneous intermediate signal intensity on T1-weighted sequences, hyper intense on T2-weighted sequences and a strong enhancement after contrast administration [2, 10]. Schwannomas show a globoid mass with good demarcation of the surrounding nerves, eccentrically suspended from the tumor, while neurofibromas show a fusiform and elongated hypertrophy [9, 11]. Simple radiography may show apical lung lesions potentially involving the brachial plexus [10]. CT scan is optimal to reveal bone erosion around the spine or changes in neural foramina [1, 2, 12]. In our case, diagnosis and surgical planning involved MRI and CT.

The surgical management of brachial plexus tumors in general requires a thorough understanding of regional anatomy. Approaches to the brachial plexus are typically anterior and named in relation to the clavicle. They include the supra clavicular, infra clavicular, trans clavicular, sub clavicular and combined (supra and infra clavicular) approaches [1-3, 5-7]. The choice of approach is in-

fluenced by the location and size of the lesion [1]. Advantages of this earlier approach include the extent of access to the plexus and nerve roots C5 to T1, nerves and trunk [5, 6]. The supra clavicular approach allows exposure of the spine roots, trunks, supra scapular nerve, accessory spinal nerve and phrenic nerve, ligation of the external jugular vein, skeletonization of the anterior and medial scalene muscle by dividing the omohyoid muscle, careful tracing of the phrenic nerve upward into the C5 and C6 roots [3]. The infraclavicular approach makes it possible to expose the terminal divisions, cords and branches, especially after division in the pectoralis minor muscle, to identify the lateral cord, the musculocutaneous nerve, the posterior cord, the radial nerve, and the median nerve, which become accessible especially after checking their anatomical structures with the nerve stimulator [5]. The posterior approach has also been used to approach the axillary region; the cutaneous incision used is parallel to the posterior edge of the deltoid muscle [5]. However, it has some drawbacks, in particular the difficulty of visualizing lesions near the clavicle. The therapeutic approach to malignancies depends mainly on the origin and location of the lesion [12]. Although total tumor resection is the goal of surgery, its realization is often impossible in plexus malignancies because of the risk of neurovascular injury and significant functional loss. Removal is rarely indicated as first-line therapy in these cases, rather permanent sample sections from several sites are obtained and examined, not only to confirm the diagnosis of malignancy but to assess the extent of invasion of adjacent structures [1]. In our case, we proceeded with an anterior approach, infra clavicular for the axillary lesion and supra clavicular for the cervical-clavicular lesion allowing complete resection.

Histologically, Schwannomas are composed of Schwann cells mixed in an irregular connective tissue stroma. They are architecturally heterogeneous tumors, characterized by the presence of two histological types (Antoni Type A and Type B). Type A tissue is composed of spindle cells arranged in an irregular flow and compact in nature while type B has a looser organization, often with cystic spaces mixed in the tissue [9]. The protein S100 in immunohistochemical studies is the witness of a neuroectodermal differentiation, its positivity therefore points towards a schwannoma. It is positive in schwannomas and neurofibromas, but tends to be

more intensely present in schwannomas [1, 9]. In our case, it was a benign schwannoma.

Serious complications due to brachial plexus surgery are rare. The main risk is neurological dysfunction caused by interruption of the motor branches of the arm and hand. Vascular damage to the right subclavian artery during tumor mobilization may be observed [2]. In our case, as in most cases in the literature [2, 3, 9], the evolution was globally satisfactory without any recorded surgical complications.

5. Conclusion

Schwannomas of the brachial plexus are rare, and their management, like most tumors in this region, is a neurosurgical challenge requiring mastery of the complex anatomy of the region.

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