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Case Report

Temporary clipping of the external carotid artery in the resection of a massive facial neurofibroma: a case report

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ABSTRACT

Temporal clipping of the external carotid artery for tumor resection is rarely documented in our country; nevertheless, it proves to be an effective and safe alternative therapeutic approach for reducing blood flow to the tumor and facilitating complete resection. This study presents a clinical case of a patient with a large facial neurofibroma where this technique was successfully employed without complications.

Keywords: Neurofibroma, External carotid, Resection

INTRODUCTION

Plexiform neurofibroma is a complex tumor, usually congenital, that involves nerve, muscle, connective tissue, vascular elements, and skin.[1] Approximately 90% of cases occur sporadically, while the remaining cases are associated with neurofibromatosis type 1 or 2.[2] Patients with neurofibromas are often asymptomatic; however, irritation, mild itching, pain, or paresthesia may occur. These tumors can lead to significant anatomic distortion at their location, causing serious aesthetic and medical problems.

In most cases, complete surgical excision is the preferred treatment. Neurofibromas do not always rely exclusively on a single arterial branch, so the risk of bleeding must be considered.[3]

Therefore, intraoperative control of bleeding during the removal of large tumors is crucial for safe and efficient surgery.

CASE REPORT

A 61-year-old male patient with a history of chronic degenerative diseases and hypertension, managed with enalapril and hydrochlorothiazide, has undergone surgical procedures including the excision of a neck lipoma in 2007 and uncomplicated resection of a right supraorbital tumor. He reports no known allergies.

In 2007, he first noticed swelling in the right temporal region, initially disregarded until the onset of right-sided hearing loss, prompting referral to an otolaryngologist. Physical examination reveals atrophy of the right temporal muscle extending from the zygomatic area, along with redundant skin in the temporal region causing inferior displacement of the right auricle (Figure 1a and b). The redundant skin obstructs the external auditory canal, leading to conductive hearing loss, and is associated with a thready pulse in the temporal artery. Otoscopy of the right ear confirms a patent external auditory canal and intact tympanic membrane. Additionally, fibromas are noted on the chest (Figure 2) and left lower extremity. Examination of the chest and abdomen reveals multiple

café-au-lait spots larger than 15 mm in diameter (Figure 3a and b).

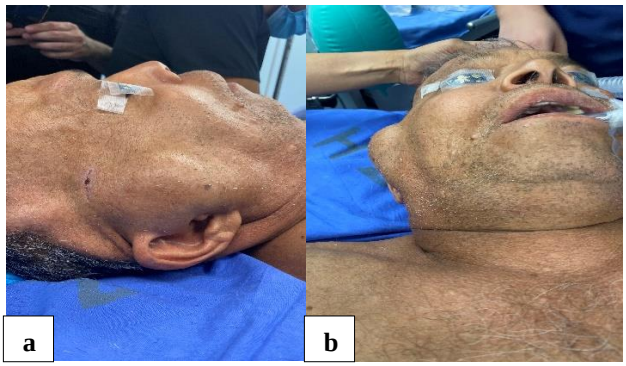

Figure 1 (a and b): Tumor in the temporal region causing inferior displacement of the earlobe.

Figure 2: Presence of fibromas in the thoracic region.

Figure 3 (a and b): Café-au-lait spots larger than 15 mm on the chest and abdomen.

On 20 September 2023, a contrast-enhanced computed tomography (CT) scan was performed, revealing a venous malformation in the right parotid gland. Surgical intervention took place on 24 November 2023, for the exploration of a right temporal tumor by the otolaryngology service. The tumor showed an increased volume extending towards the auricle in the retro-auricular region, characterized by a liquid consistency. During dissection, a hemorrhage of 300 cc occurred, which was promptly controlled, leading to the suspension of surgery pending further imaging for precise surgical planning.

An angiotomography of the head and neck was conducted on 01 December 2023, revealing a lobulated, well-defined mass with soft tissue density. The mass exhibited heterogeneous vascularized density and showed enhancement following contrast administration (50 HU). Its dimensions measured 84×60×65 mm, located within the right parotid gland region (Figure 4).

Figure 4: Angiotomography showing a mass in the location of the right parotid gland.

Figure 5: Horseshoe-shaped incision suture and anterior cervical approach.

The patient was evaluated by neurosurgery, which recommended a right anterior cervical approach with clipping of the external carotid artery, combined with a horseshoe-type incision 25 mm above the superior temporal line. On 08 December 2023, a surgical procedure was performed jointly by neurosurgery and otolaryngology for tumor resection and external carotid artery clipping. The procedure was conducted under general anesthesia with orotracheal intubation.

The surgical procedure began with an anterior cervical incision, meticulously dissecting up to the border of the sternocleidomastoid muscle to access and confirm the common carotid artery and its external branches. Subsequently, a horseshoe-shaped cranial incision was made 25 mm above the superior temporal line, followed by careful dissection of the temporal muscle, revealing abundant mixed vascularization, predominantly venous in nature. The external carotid artery was delicately clipped, significantly reducing blood flow to the superficial temporal artery. Successful tumor resection followed, with controlled bleeding totaling 700 cc. The surgical wound was meticulously managed, including precise trimming of wound edges and removal of redundant skin. The wound was closed, resulting in elevation of the auricle and achieving the desired outcome without complications (Figure 5-7).

In addition, a fibroma removed from the left foot underwent pathological examination. The patient was discharged three days post-surgery without complications, showing improved auditory function and enhanced physical appearance. The pathology report confirmed two spindle cell tumors consistent with neurofibromas.

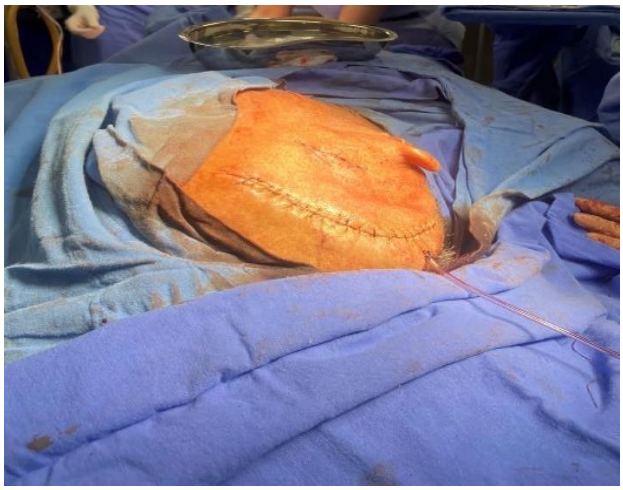

Figure 6: Superior view of horseshoe approach.

Figure 7: Lateral view of horseshoe approach.

DISCUSSION

Neurofibromas are the most common benign tumors affecting the peripheral nerve sheath. They are characterized by benign hamartomatous growths composed of Schwann cells, fibroblasts, perineural cells, and mast cells in a variably myxoid background. Neurofibromas are caused by a mutation in the neurofibromatosis type 1 (NF1) gene. There are three primary types: localized (the most frequent), diffuse, and plexiform. While most neurofibromas occur sporadically with a very low risk of becoming malignant, plexiform neurofibromas are distinctive to NF1 and pose a higher risk of malignancy in adults, approximately 3.5%.[4,5]

Patients with neurofibromas are often asymptomatic; however, they may experience irritation, mild itching, pain, or paresthesia. These tumors can cause significant distortion at their location, leading to serious aesthetic and medical issues. Plexiform neurofibromas most frequently occur in the head/neck, trunk, and limbs.[7] Massive facial plexiform neurofibromas typically originate in the orbito-temporal region, affecting the orbit, eyes, eyelids, lips, oral commissure, facial muscles, nerves, and bones.[8]

Depending on their specific location, plexiform neurofibromas can induce a diverse array of symptoms, such as visual or auditory impairment, airway obstruction, difficulty in speech and swallowing, motor dysfunction, bowel or bladder dysfunction, disfigurement, and other related symptoms. Preoperative planning typically involves computed tomography (CT) and magnetic resonance imaging (MRI) scans to evaluate bone and soft tissue involvement, which are also essential for postoperative monitoring.

In most scenarios, complete surgical excision is the preferred treatment. In rare instances involving diffuse or plexiform neurofibromas where complete excision is not viable, lesions are often partially excised to achieve cosmetic or symptomatic relief.[9] Due to their variable arterial supply, the risk of bleeding must be considered, necessitating prepared blood products and careful intraoperative bleeding management.[10]

Effective control of intraoperative bleeding during the removal of large tumors is crucial for safe and efficient surgery. Preoperative embolization is the preferred treatment to reduce vascularity; however, this option is unavailable in our facility.[11] Temporary clipping of the external carotid artery reduces blood supply to all structures, including the scalp, skull, dura mater, and tumor, thereby minimizing total blood loss during surgery and eliminating the need for an interventional radiologist, facilitating complete resection.

CONCLUSION

Temporary clipping of the external carotid artery is seldom documented in Mexican studies. In reported literature,

preoperative embolization is favored for controlling intraoperative bleeding by reducing vascularity, typically emphasized in meningioma resections. However, our hospital, like many others, lacks this capability. Considering arterial anatomy and associated risks, we opted for temporary clipping of the external carotid artery in our patient's case. This approach serves as an alternative therapy allowing the surgeon to release the clip promptly if flap vascularity appears compromised. This method helps prevent neurological deterioration due to tumor size increase secondary to hemorrhage and necrosis observed after preoperative embolization.

This approach facilitated a complete resection of the neurofibroma with minimal bleeding (700 ml), significantly less than the anticipated 600 to 1400 ml in patients without clipping. The procedure was successfully performed without intraoperative or postoperative complications, leading to improved quality of life in terms of physical appearance and hearing for the patient.

In conclusion, temporary clipping of the external carotid artery for resecting massive facial neurofibromas and other tumors dependent on branches of this artery proves to be an effective and safe alternative method for reducing blood loss and surgical duration.

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