CLINICAL CASE REPORT: RECONSTRUCTION OF A LARGE MAXILLOFACIAL DEFECT USING AN ANTEROLATERAL THIGH FREE FLAP AFTER NEUROFIBROMA RESECTION

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ABSTRACT

Objective: To describe the clinical and paraclinical characteristics of large neurofibromas in the maxillofacial region and propose an effective treatment approach for patients. ***Clinical case:*** A 53-year-old female patient presented with a progressively enlarging tumor on the left side of her face. She had a history of undergoing partial tumor resection at the age of 14. Upon examination, the tumor had infiltrated and caused deformities in the left temporal region, orbit, cheek, and scalp. Histopathological findings confirmed plexiform neurofibroma. The patient underwent near-total tumor resection, followed by reconstruction using an anterolateral thigh free flap. Postoperatively, the patient received proactive blood transfusions, and no complications occurred. Immediate postoperative and long-term follow-up at one year demonstrated that the flap successfully covered the extensive defect while achieving satisfactory functional and aesthetic outcomes. ***Conclusion:*** Large neurofibromas in the craniofacial region cause significant facial deformities and impact both function and aesthetics. Proper preoperative planning and the selection of an appropriate reconstructive technique can ensure surgical safety and provide satisfactory aesthetic and functional restoration.

Keywords: *Facial neurofibroma, plexiform neurofibroma, anterolateral thigh flap, free flap*

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I. INTRODUCTION

Neurofibromatosis type 1 (NF1) is a rare autosomal dominant genetic disorder (1 in 3,000 individuals) caused by mutations in the NF1 gene located on chromosome 17q11.2. It is classified as a neurocutaneous syndrome, characterized by multiple skin manifestations and lesions affecting various organs. Plexiform neurofibroma (PNF) is an uncommon variant of NF1, in which neurofibromas arise from multiple nerve branches, forming bulky, deforming masses involving connective tissue. Clinically, these lesions are often described as having a "bag of worms" appearance. PNF has a risk of transformation into malignant peripheral nerve sheath tumors (MPNSTs), occurring in 2%–16% of NF1 cases[2]. NF1-associated tumors affect both soft tissue and bone, with a high prevalence in the head and neck region. Large tumors can cause significant facial deformities by stretching soft tissues and disrupting anatomical landmarks[3]. Surgery remains the primary treatment for NF1-associated tumors; however, determining the extent of resection and selecting an optimal reconstructive approach remain significant challenges for surgeons. Surgical resection of neurofibromas can be classified into two levels: partial resection and near-total resection. Partial resection itself is divided into two categories: resection of 50%–90% and debulking resection

(<50%), the latter of which typically involves direct closure to restore approximate anatomical landmarks of the face but carries a high risk of recurrence. Total or near-total resection (>90%) is a complex procedure that often involves significant blood loss, potential injury to functional anatomical structures, and the need for extensive reconstructive materials[4,5]. Several studies worldwide have reported the use of free flaps for facial defect reconstruction following neurofibroma resection. However, limitations remain regarding the assessment of patients' aesthetic and functional outcomes[6,7]. In this report, we present a clinical case of a patient with a large neurofibroma causing severe deformity of the left hemiface. The patient underwent near-total tumor resection, followed by reconstruction using an anterolateral thigh (ALT) flap. The procedure was completed without complications, and postoperative results demonstrated successful reconstruction.

II. CLINICAL CASE:

A 53-year-old female patient presented with a progressively enlarging tumor on the left side of her face since childhood. She had a history of facial tumor surgery at the age of 14, with no significant family history. The diagnosis was plexiform neurofibroma.

Physical examination: The patient exhibited facial deformity affecting the left orbit, temporal region, and cheek. The tumor was firm, non-tender on palpation, and measured approximately 27 cm × 14 cm (Figure 1). The patient was unable to elevate her left eyelid due to tumor-induced traction, resulting in eyelid ptosis and facial distortion, though her vision remained unaffected. Additionally, part of her ear was involved, but her hearing was not impaired.

Figure 1: **Preoperative image showing a massive tumor involving the left temporal, orbital, and cheek regions**

Radiological examination

Magnetic resonance imaging (MRI) clearly demonstrated extensive subcutaneous involvement of the left hemiface, with tumor infiltration into the bone but no intracranial extension (Figure 2).

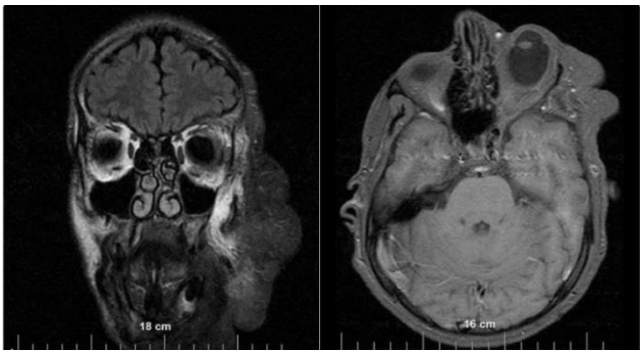

Figure 2: **MRI images:**
A- Coronal view: Tumor originating from the left hemiface
B- Axial view: Tumor causing significant facial deformity

The patient was planned for complete resection of the neurofibroma, followed by defect coverage using an anterolateral thigh (ALT) free flap. During surgery, a tumescent solution was injected into the tumor before skin incision, and controlled hypotensive hypothermia was applied to minimize intraoperative bleeding. A near-total tumor resection was performed. Postoperative histopathology confirmed the diagnosis of Plexiform neurofibroma. The resulting defect exposed a portion of the skull and the left zygomatic-temporal bone. A 13 cm × 26 cm ALT flap was harvested (Figure 3B), and its vascular pedicle was anastomosed to the ipsilateral facial artery. The patient experienced an estimated blood loss of 2000 mL but had no intraoperative complications.

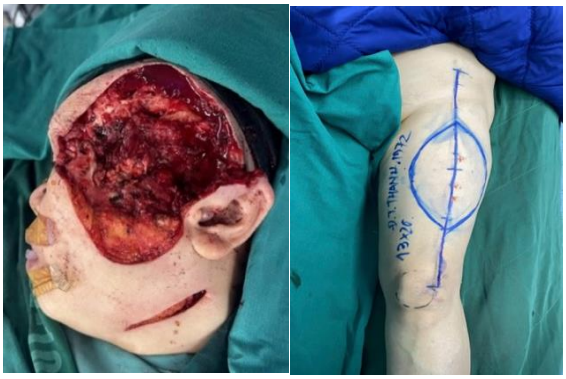

Figure 3: **Intraoperative images:**
A - Defect after tumor resection
B- Anterolateral thigh flap design

Postoperatively, the patient received fluid replacement and was proactively transfused with 2 units of packed red blood cells (350ml each). Wound healing progressed well, with complete flap survival, and the patient was discharged 12 days after surgery. At one-year follow-up, the scar was aesthetically acceptable, and facial motor function was nearly normal. The only drawback was a mismatch in skin color between the flap and the surrounding facial skin.

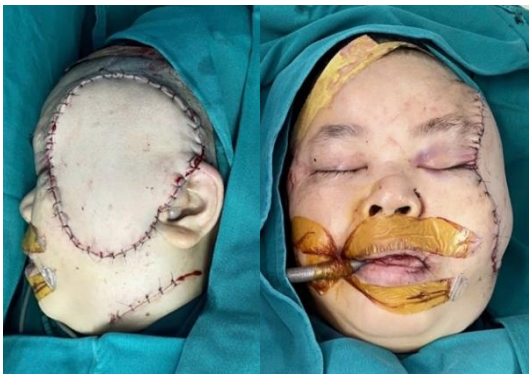

Figure 4: **Immediate postoperative result**

Figure 5: **Postoperative day 10**

Figure 6: **One-year postoperative outcome**

III. DISCUSSION

Plexiform neurofibromas are slow-growing tumors that develop over an extended period. These tumors often cause pain, motor and sensory dysfunction, and significant soft tissue infiltration, leading to severe anatomical deformities. Giant neurofibromas are defined as tumors involving more than 25% of the patient's face[8]. Managing giant neurofibromas presents a significant surgical challenge, particularly in the head and neck region, where numerous critical structures and symmetrical landmarks must be preserved. Surgeons must carefully consider surgical indications, the appropriate age for

intervention, the extent of tumor resection, potential intraoperative and postoperative complications, and the feasibility of defect coverage and reconstruction, especially in cases involving extensive tumor removal. Partial resection is more commonly performed due to its technical simplicity and lower complication rates. However, it carries a high risk of tumor recurrence.

The patient in our study had a tumor measuring 14 × 27 cm, occupying 25% of the maxillofacial region. According to the classification of neurofibromas, this case qualifies as a giant neurofibroma. Complete tumor resection posed significant challenges, including massive intraoperative blood loss, the need for extensive reconstructive material, and potential damage to critical functional structures such as the eyes, ears, and facial motor and sensory functions after tumor removal[7,9]. Uncontrolled bleeding is one of the primary concerns during the resection of giant facial neurofibromas. Studies have shown that patients with large plexiform neurofibromas are at high risk of significant blood loss. A patient is considered at high risk for transfusion if the tumor exceeds 13 cm in total length, has a malignant transformation risk (MPNST), or requires complex reconstruction techniques, such as free flap transfer or bone intervention[9]. Preoperative preparation should always include blood reserve planning, along with various intraoperative bleeding control strategies, such as preoperative embolization via angiography, induced hypothermia and hypotensive anesthesia, and Tumescent solution injection into the tumor. In our study, the patient underwent preoperative blood reservation and intraoperative Tumescent solution injection, along with hypothermic and hypotensive anesthesia to minimize blood loss. Embolization was not chosen, as free flap reconstruction with vascular anastomosis was planned. The bleeding control strategy proved highly effective, with the total intraoperative transfusion requirement limited to two units of packed red blood cells (350 mL per unit).

The selection of reconstructive material for large maxillofacial defects remains a significant challenge for surgeons. According to various studies, the anterolateral thigh (ALT) flap is a suitable option for covering extensive soft tissue defects following neurofibroma resection due to its large size, long vascular pedicle, and versatility. The ALT flap can incorporate multiple tissue components, such as skin, fascia, and muscle, and can be thinned or split to conform to the aesthetic subunits of the face. In this case, we selected a skin-fascia ALT flap measuring 13 × 26 cm, precisely matching the defect size left after tumor resection. The flap successfully covered the defect with a highly appropriate thickness, as evaluated at three postoperative time points: immediately after surgery, 10 days postoperatively, and one year postoperatively (Figures 4, 5, and 6).

The patient in our study had a tumor classified as giant, causing deformation of anatomical landmarks such as the left eye, cheek, oral commissure, and left ear. The patient was unable to elevate the left eyelid, with ptosis leading to facial distortion but no impact on vision. A portion of the ear was also affected but without hearing loss. The tumor's location raised concerns about potential invasion of the facial nerve (cranial nerve VII), though a comprehensive assessment was difficult due to its large size and weight-induced deformation. Cranial nerve VII damage after resecting large

tumors is generally irreversible[6]. However, in our patient, 10 days postoperatively, there was only mild asymmetry of mouth movement during maximum effort, and complete eyelid closure was achieved (Figure 5). According to the House-Brackmann facial nerve grading system, the patient's facial palsy was classified as Grade II[7,10]. While this represents the early postoperative outcome, patients typically experience significant improvement compared to preoperative conditions. However, their primary concern in the long term remains both functional and aesthetic recovery, often necessitating multiple revision surgeries. In our case, based on the Global Aesthetic Improvement Scale (GAIS), the patient self-rated as Grade II, indicating a marked improvement[9]. Moreover, no additional corrective surgeries were required, and the patient was highly satisfied with the surgical outcome.

IV. CONCLUSION

Large craniofacial neurofibromas cause severe facial deformities while also impacting both function and aesthetics. Careful preoperative planning, thorough preparation, and selecting an appropriate reconstructive approach are crucial for achieving safe surgical outcomes and satisfactory aesthetic restoration.

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