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Case Report

# Prosthodontic Management of Neurofibromatosis 1 with Mucosal Hyperplasia of Edentulous Alveolar Ridge - Case Report

**Sunila BS[1]*, Avinash BS[2] and Ashwini J[3]**

*[1]Department of Prosthodontics, JSS Dental College and Hospital JSS AHER, Mysuru, India*

*[2]Department of Periodontology, JSS Dental College and Hospital JSS AHER, Mysuru, India*

*[3]Final Year Professional Mysore Medical College and Research Institute , Mysuru, India*

***Corresponding Author:** Sunila BS, Department of Prosthodontics, JSS Dental College and Hospital JSS AHER, Mysuru, India.

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## Abstract

Oral manifestations of Neurofibromatosis 1 although reported in literature, generalised Mucosal hyperplasia presented here is not evidenced. This rare presentation of fibrous hyperplasia of the completely edentulous maxillary and mandibular arch with inadequate Interridge space and intraoral variation of the alveolar ridge was confirmed as Neurofibromatosis 1 after histopathological investigations, panoramic and Radiographic CBCT. Surgical soft tissue recontouring of the maxillary and mandibular ridges were undertaken to accommodate the procedural steps for complete denture fabrication. This case illustrates the importance of a phased treatment approach in NF1 patients, including surgical, prosthetic, and genetic counselling interventions to achieve satisfactory outcomes.

**Keywords:** Neurofibromatosis 1; Edentulous; Prosthodontic Management; Fibrous Hyperplasia

## Introduction

A class of genetically unique diseases known as neurofibromatoses results in nervous system tumors that are typified by the growth of Schwann's cells, perineural cells, and endoneurial fibroblasts. Two distinct forms are generally accepted namely, a peripheral form known as NF1, and a central form referred to as NF2. Von Recklinghausen's disease, or Type 1 Neurofibromatosis (NF1), is the classic form that was first characterized by Recklinghausen in 1882. Its incidence is 1 in every 2000 live births and prevalence is 1 in every 5000 population [1,2].

## Systemic clinical manifestation

Clinical signs of NF1 in the skin include axillary freckling, neurofibromas, and cafe au lait spots or macules. Central nervous system present with vascular abnormalities, brain tumors, macrocephaly and the associated learning impairments, mental retardation, epilepsy, and headaches, Lisch nodules and optic gliomas in the eyes. Hypertension and vasculopathy as well as bone dysplasia and serious gastrointestinal, endocrine, or pulmonary conditions, are also associated with NF1 [2,3].

Considering the genetic nature of NF1 it is evidenced that neurofibromas progress from NF1-homozygous Schwann cell lineage cells and a microenvironment of NF1-heterozygous tumor [4]. The updated international consensus recommendation states that an individual who does not have a parent with neurofibromatosis type 1 (NF1) converges to the diagnostic criteria for NF1 if the following two or more of the conditions are present

For prepubertal individual: six or more café-au-lait macules with a maximum diameter of 5 mm,

For postpubescent

- More than 15 mm, freckling in the inguinal or axillary area,
- Presence of one plexiform neurofibroma or two neurofibromas of any kind, an optic pathway glioma,
- A heterozygous pathogenic NF1 variant with a variant allele fraction of 50% in apparently normal tissue such as white blood cells,
- Two or more iris Lisch nodules detected by slit lamp examination or two or more choroidal abnormalities (CAs), which are observed by optical coherence tomography (OCT)/ near-infrared reflectance (NIR) imaging as bright, patchy nodules and
- A distinctive osseous lesion such as sphenoid dysplasia, anterolateral bowing of the tibia, or pseudarthrosis of a long bone [3].

### Oral manifestations of NF1 in adults:

Oral manifestation frequency in neurofibromatosis varies between 4 and 7% to as high as 72%. The tongue is the most frequently described site of intraoral neurofibromas of the oral soft tissue, which are typically showing up as macroglossia. Involvement of other sites such as the floor of the mouth, alveolar ridge, lips, gingiva, palate, buccal mucosa, and pharyngomaxillary region is evidenced in literature. Other characteristics of neurofibromatosis include intrabony lesions, an enlarged mandibular foramen, and enlargement of the fungiform papillae [5,6].

## Case Report

A female patient in her 50s of Indian origin presented to the Prosthodontics OPD seeking replacement of missing teeth. She reported skin eruptions since her 20s, initially localized to the face and neck, later spreading across the body. Extraoral examination showed multiple nodules on the face and neck (Figure 1a), with café-au-lait macules on the right lumbar region, right elbow, and left arm (Figure 1b).

Dental history revealed periodontal disease with tooth mobility leading to extractions, leaving the patient completely edentulous for 8 months. Intraoral examination showed irregular, enlarged, unfavourable maxillary and mandibular ridges with diffuse, non-inflamed mucosal enlargement (Figure 1e, f). Interridge space measured only 6 mm at rest. Fibrous, well-defined, non-tender soft tissue growths of normal color and consistency were noted on the posterior dorsal tongue (Figure 1c).

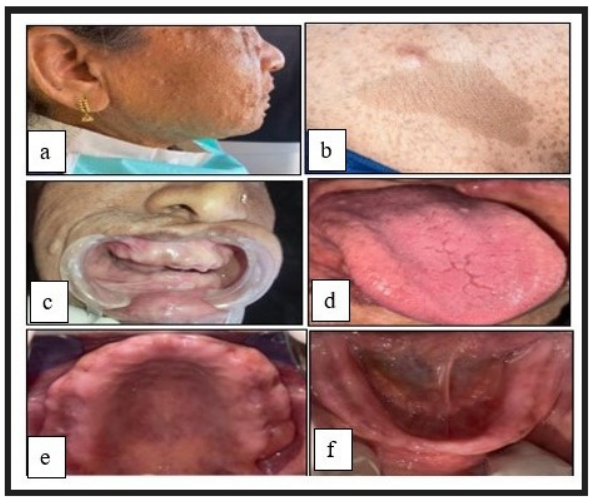


**Figure 1:** a Facial Neurofibromas, b: Café-au-lait macule and spots on right lumbar region, c: Enlarged Ridges with reduced Interridge, d: Localised fibrous soft tissue growth on dorsum of tongue, e: Preoperative Maxillary Edentulous Ridge, f: Preoperative Mandibular edentulous ridge.

Patient claimed to have consulted medical practitioners and was unable to derive at a diagnostic conclusion regarding her systemic condition and was not aware of any histopathology report. She had no history of recent medications for her systemic condition. The patient otherwise had no symptomatic lesions requiring management. There was positive history of similar complaints in her family member.

## Investigations aiding towards Diagnosis:

- **Histopathology:** Excisional biopsy was performed in the right chin region for further histopathological investigation and Intraoral biopsy of the soft and hard tissue was undertaken before rehabilitation.
- **Radiography:** Radiographic Impression of the Panoramic radiograph as in figure 4 of the patient did not present any Pathognomic changes substantiating the diagnosis of NF 1. Thinning and loss of cortication noted in maxilla and mandible with significant loss of density of inferior cortex of mandible. Bilaterally condylar neck showed lengthening and elongation, Grossly, giving presentation of B/L obtuse angle between body and ramus of mandible. Altered trabeculae of maxilla and mandible was noted with trabeculae of maxilla appearing sparse and granular. Trabeculae of mandible appeared small, thin with small marrow spaces. Completely edentulous maxillary and mandibular arches along with radiopaque cortical periphery of maxillary sinuses appeared thin bilaterally. Radiopaque cortical periphery of inferior alveolar canal appeared thin bilaterally in mandible. Radiographically mental foramina were indistinguishable.
- **Radiographic CBCTL:** Crestal Alveolar bone width on cone beam computed tomography (CBCT) images was discerned to be 6.89mm, 6.89mm, 7.32mm, and 6.74mm at Maxillary Molar right and left region and Mandibular Right and left region respectively. Measures of 4.46mm and 3.60mm was noted at the Anterior crestal regions of Maxillary and Mandibular region respectively as in figure 5a,b.

## Diagnosis

Histopathology (Figure 2a-d) revealed unencapsulated dermal nodules of spindle cells with mast cells in collagenous and myxoid stroma with blood vessels, consistent with Neurofibroma type 1. Intraoral biopsy showed fibroepithelial hyperplasia with hyperplastic para-keratinized stratified squamous epithelium, fibroblasts, neurovascular bundles, and mild chronic inflammation (Figure 3a, b). Alveolar bone biopsy displayed normal trabeculae with osteocytes, osteoblast rimming, and fibrous stroma (Figure 3c). CBCT images of Molar right and left and Anterior regions (Figure 5a, b) showed normal alveolar width[21], while wide irregular ridges were attributed to fibroepithelial hyperplasia. These findings directed our plan to address the prosthodontic rehabilitation and to understand the condition of the denture bearing area.

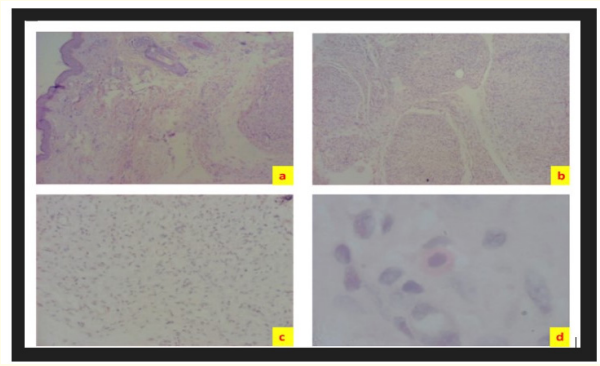


**Figure 2:** a to d: H and E stained sections revealing features of neurofibroma 1.

a) Skin nodule with epidermis and dermis. Dermis consists of non-encapsulated mass of proliferation of the spindle cells in deeper areas. (X40 magnification)

b) Nodules of spindle cell proliferation in the dermis (X40 Magnification)

c) Spindle cells with interspersed mast cells and blood vessels (X100 Magnification)

d) Mast cell in centre of the field (X400 Magnification)

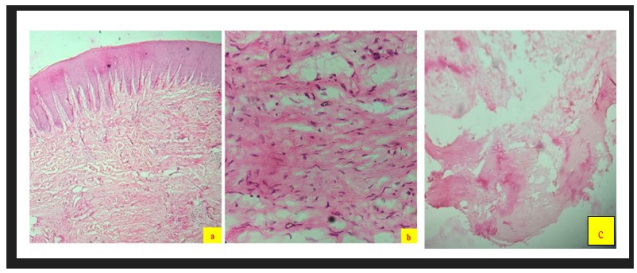


**Figure 3:** a) Hyperplastic epithelium and fibrous connective tissue. (H and E, 40X). b) Fibroblasts in a collagenous stroma with mild inflammatory cell infiltration. (H and E, 100X). c). H and E stained decalcified sections of the alveolar bone biopsy revealed normal vital bone trabeculae with osteocytes and osteoblast rimming and fibrous connective tissue stroma.

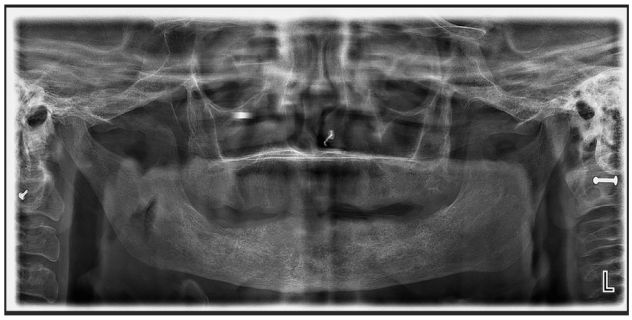

**Figure 4:** Panoramic radiograph.

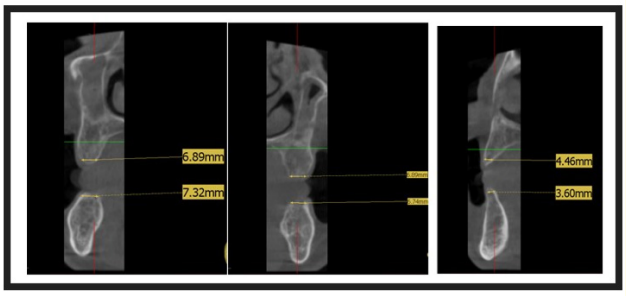


**Figure 5:** CBCT images depicting crestal bone width a. Molar Region Right and b. Left, and C. Anterior Region.

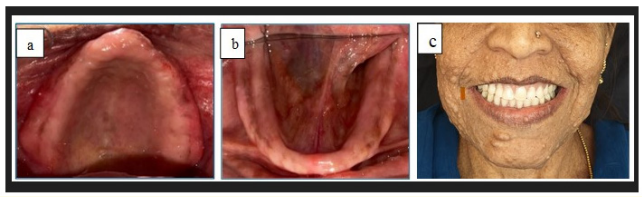


**Figure 6:** a: Postoperative view of maxillary Ridge b: Postoperative view of mandibular Ridge c: rehabilitation with complete dentures.

## Treatment

Surgical soft tissue recontouring of the maxillary and mandibular ridges were undertaken and after uneventful healing post 8weeks procedural steps for complete denture fabrication as according to the Histopathological and Radiographic interpretations was considered. Postoperative view is depicted in figure 6a. and 6b. Routine Procedural steps of complete denture fabrication were followed, and patient was rehabilitated with Acrylic (Lucitone) Removable complete Denture Prosthesis as shown in figure 6c.

## Outcome and follow-up

Patient was reviewed for follow up after 48 hours and across the subsequent one year to confirm the patient's compliance and tolerability to the prosthodontic rehabilitation with prosthesis. It was noticeable that intraoral examination did not show adverse and unanticipated events such as relapse of the tissue overgrowth across the edentulous ridges. As this is the first of its kind report in the literature, we could not justify this finding with other literature reports.

## Discussion

This study highlights the unique clinical presentation of an edentulous patient with Neurofibromatosis 1(NF1). The patient's presentation reported in the present study did mirror the NIH revised diagnostic Criteria for NF1 with clinical diagnosis and was also supported by the histopathological investigation [3]. The challenge was the absence of comparable cases in the literature to evaluate clinical signs and treatment outcomes.

Systemic manifestations, such as multiple café-au-lait spots, Lisch nodules, skeletal abnormalities, are well-documented in NF1. Given the genetic nature of NF1 and the 50% likelihood of transmission, genetic counselling [6] and regular follow- up is important. Our patient's family history, including similar clinical features in offspring, emphasizes the importance of long-term follow up and genetic education to manage disease progression.

Considering Oral findings: The high frequency of neurofibromas on the tongue and buccal mucosa [7,8,] are reported in studies. The literature indicates that neurofibromas commonly affect the tongue, palate[9], floor of the mouth [10], gingiva [11] and periodontal manifestation [12,13], impacting not only function but also contributing to esthetic concerns [10]. Additionally, the enlargement

of fungiform papillae [7], as noted in other studies, was a feature observed in our patient as well.

Although the systemic manifestations did not directly impact the prosthetic treatment, the patient's medical history highlighted the necessity of a multidisciplinary approach. Case presented in this article emphasizes the complexity of managing a patient with NF1 who sought prosthetic rehabilitation for a completely edentulous maxillary and mandibular arch. Intraoral findings included the presence of altered maxillary and mandibular alveolar ridge morphology and a reduced interridge space. The diffuse fibrous overgrowth on the ridges initially mimicked a bony enlargement. Fibrous hyperplasia, specifically in the mucosa, as a common oral manifestation of Neurofibromatosis type 1 (NF1 in edentulous maxillary and mandibular ridges is not evident in the literature. Noticeable variation found in this case of Neurofibromatosis 1 was the marked fibrous hyperplasia appearing as soft tissue nodules of mucosal tissue giving the irregular enlarged ridge appearance of the maxillary residual alveolar ridge. This is discerned to be characterized by an increase in connective tissue in the oral mucosa supported by the soft tissue biopsy as depicted in figure 5a. and the figure 5b CBCT images Histopathology of the Incisional biopsy indicating a fibroepithelial hyperplasia paved way for confirmatory diagnosis of the denture bearing area ruling out the bony enlargement. Careful selection of treatment versus observation with Multidisciplinary approach [15] for this patient was important to maximize benefit and minimize risk. Conservative surgical soft tissue contouring was considered to cater to the anatomical challenges to optimize interridge space and reduce unfavourable undercuts after obtaining patients informed consent. The prosthetic phase involved careful execution, from impression-making to the final denture insertion, with adjustments made to ensure optimal esthetics, phonation, and function. Reduced interridge space of 8 to 10mm in this patient was accommodated by trimming the ridge lap area of all artificial teeth.

A review of the literature with particular focus on the bone changes as they relate to the mandible revealed indicated NF1 to be associated with lower bone mineral density, which increases the risk of weak bones, known as osteoporosis [15]. This case reported altered trabecular pattern and thinning of the cortical periphery of maxillary sinuses and periphery of inferior alveolar canal bilaterally in mandible. Radiographically mental foramina were indistinguishable.

In NF1, the temporomandibular joint may also be affected, and bone abnormalities including kyphoscoliosis or pseudoarthrosis may manifest [16]. Nearly 40% of patients with NF1 have skeletal involvement, with scoliosis being the most prevalent skeletal disease which was not observed in our case. Intracranial nerves involvement leading to deviation of tongue to one side nor patient experiencing altered sensation were not noticed in this case.

## Conclusion

- This case illustrates the importance of a need for multidisciplinary care and phased treatment approach in NF1 patients, including surgical, prosthetic, and genetic counselling interventions to achieve satisfactory outcomes.
- It was noticeable that patient compliance for Maxillary and mandibular Complete denture was good on follow up without interfering with the Intraoral disease progression. Long-term follow-up is deemed important.
- Further research on the impact of neurofibromatosis on edentulous oral tissues and prosthetic treatment outcomes is essential to enhance management strategies for NF1 patients.

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