



Prosthetic Rehabilitation of A Patient with X-Linked Hypophosphatemia Using Full-Arch Fixed Implant-Supported Prostheses

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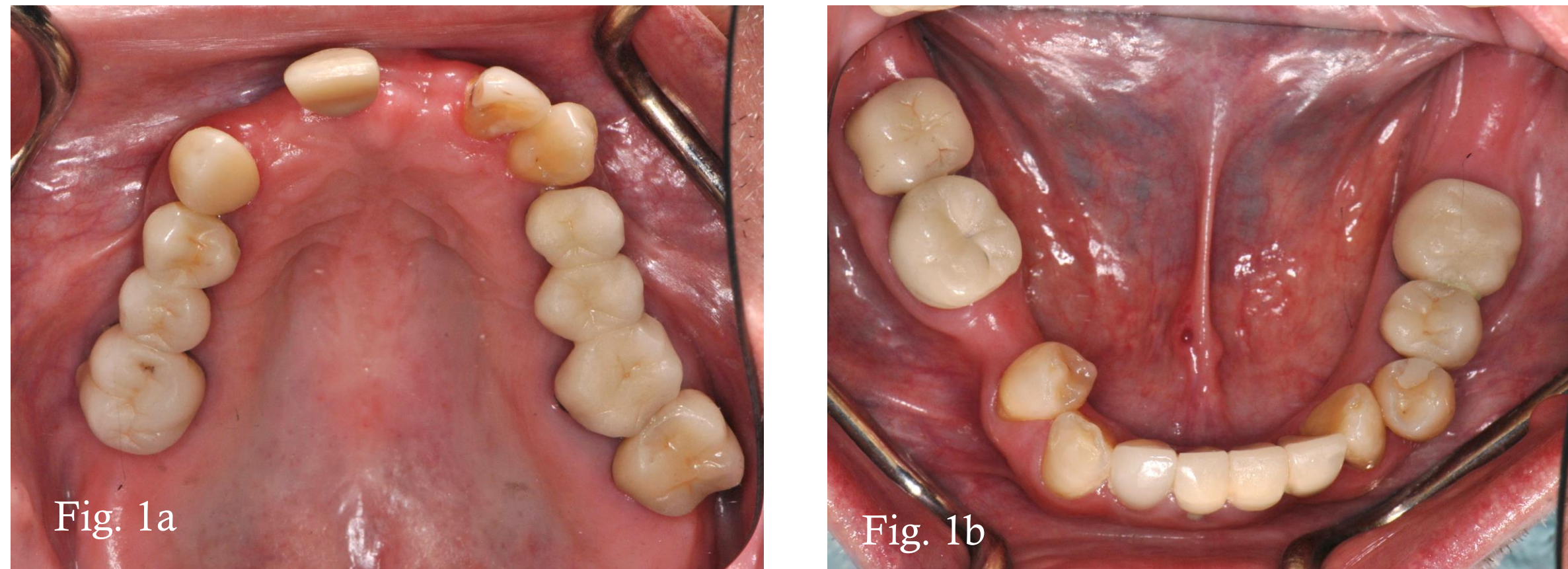
INTRODUCTION

X-linked hypophosphatemia (XLH), first described by Albright in 1937 as Vitamin D-resistant rickets, is the most common hereditary metabolic rickets with a prevalence of 1:20,000. It is caused by **mutations in the PHEX gene**, leading to phosphate wasting, resulting in rickets and osteomalacia (Nesbitt, T et al., 1999).

Dental manifestations of XLH include poor mineralization of dentin and cementum, frequent dental abscesses, and enlarged pulp chambers with prominent pulp horns (Laurent MR et al., 2023. Over 60% of adults with XLH have had five or **more abscesses** (Connor J et al., 2015).

A major cause of tooth loss in adults with XLH is also periodontitis with nearly 80% of XLH adults having **moderate or severe periodontitis** (Biosse Duplan M et al., 2017). The presence of large pulp chambers and in many cases the reduced periodontium contraindicate the use of fixed or removable partial dentures to replace the missing teeth, therefore, due to this, there is a strong need for dental implant therapy. (Biosse Duplan M et al., 2021).

It is not known whether successful implant therapy can consistently be achieved in XLH patients. The application of full-arch fixed implant-supported prostheses in XLH patients is under-researched, with existing literature limited to a few case reports. **The purpose of this case report** is to demonstrate the treatment of an XLH patient using full-arch fixed implant-supported prostheses.



CASE PRESENTATION

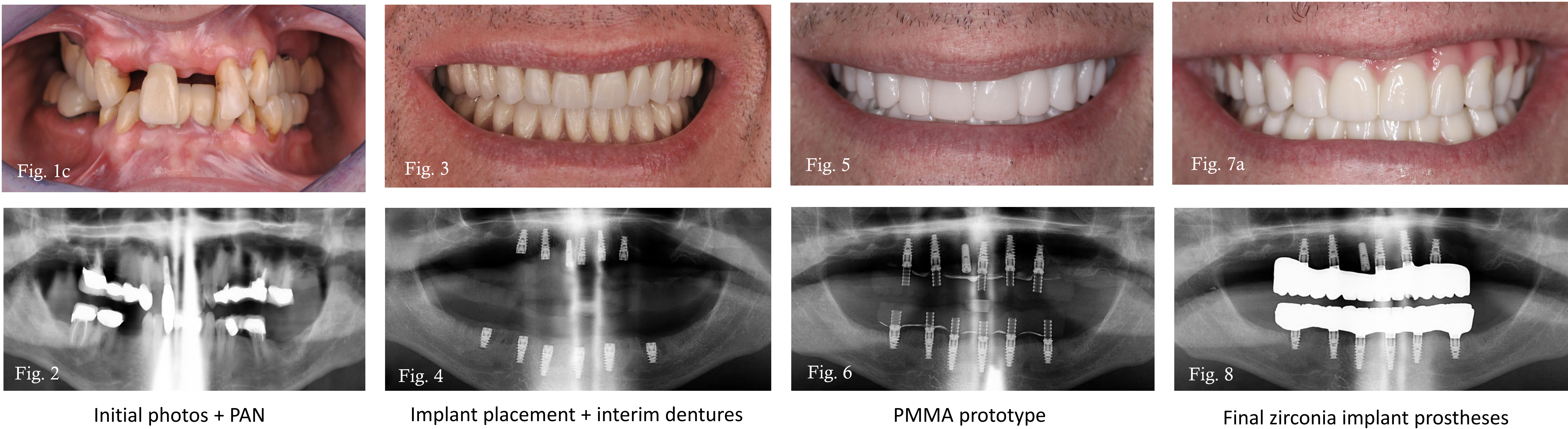
A 63-year-old male presented for a prosthodontic consultation with the **chief complaint: "All my teeth are failing, and I need a new smile."**

Medical History: The patient, along with his sister, had been diagnosed with XLH from a very young age. He had been taking oral phosphate supplements and calcitriol since childhood and had also undergone multiple surgical procedures to correct bowing of his legs and problems associated with fused vertebrae. **Dental manifestations:** The patient presents with a complex dental history including multiple extractions, implant restorations, crown restorations, and periodontal issues. The intraoral examination reveals **missing teeth, deep overbite, plaque buildup, and significant periodontal involvement (Fig. 1a, 1b, 1c)** such as horizontal bone loss and furcation involvement in several teeth. Notable findings include a fractured distal root on tooth #30, furcation involvement on teeth #3, #14, #15, #19, #30, and #31, and an enlarged periodontal ligament space on tooth #5. Photographs and dental radiographs were taken. Diagnostic casts were made. After thorough clinical and radiographic examination (**Fig. 2**), the patient was diagnosed with terminal dentition.

Full-mouth extractions were performed along with grafting and immediate denture delivery (**Fig. 3**). Four months later, the patient's existing maxillary and mandibular dentures were relined using a chairside hard reline material. Radiographic markers were added to the dentures, and CBCT scans were taken both with the dentures inside and outside the mouth. Implant positions were planned in DTX Implant Studio, and surgical guides for the maxilla and mandible were fabricated. During surgery, the guides were securely placed using retention pins. Five implants were placed in the maxilla and six in the mandible (**Fig. 4**). Cover screws were inserted, and primary stability was achieved.

Four months later, healing abutments were placed during the second stage. Maxillary and mandibular polyvinyl siloxane open tray splinted impressions were taken, poured, and verification jigs were fabricated to check for passivity. Screw-retained occlusal rims were used to establish the vertical dimension of occlusion. Denture teeth were set, and a stable try-in was completed. The lab fabricated poly-methyl methacrylate (PMMA) prototypes for both arches (**Fig. 5 & Fig.6**).

Following this, full-arch implant-supported monolithic zirconia fixed prostheses were fabricated (**Fig. 7a, 7b, 7c**). The patient was given an occlusal splint and placed on a 4-month recall schedule. Follow-up radiographs showed maintained bone levels and prosthesis stability (**Fig. 8**).



DISCUSSION

- Literature on dental implants in patients with XLH is limited to a few case reports. Resnick D. reported a successful single implant placement with bone augmentation with no complications after 40 months.
- James M. and Roudsari R.V. reported over 10 years of follow-up for three implants in XLH patients, but no long-term data exists on dental implants restored with full-arch fixed prostheses in XLH
- In the case presented, we have a 2.5-year follow-up from implant placement and a 1.5-year follow-up from the delivery of the final full-arch implant-supported monolithic zirconia prosthesis, with radiographs showing stable marginal bone levels. The patient follows a 4-month recall schedule and wears an occlusal splint every night. Although we initially planned to include implant #8 in the new prosthesis, its extreme buccal inclination prevented its use, and a cover screw was placed instead.



CONCLUSION

This case demonstrates that despite the medical complexity of an XLH patient, successful prosthetic rehabilitation with full-arch fixed implant-supported prostheses can be achieved with thorough patient selection, planning, execution and maintenance, yielding satisfactory and predictable outcomes.