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Primary Failure of Tooth Eruption (PFE) - An Important Differential Diagnosis that an Oral and

# Maxillofacial Surgeon Should Be Aware Of

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## Introduction

The term "Primary Failure of Tooth Eruption" (PFE) refers to the presence of one or more primary non-ankylosed teeth which, due to a disruption in the eruption mechanism, do not or only partially erupt on their own. After the resorption of the coronal alveolar bone, these teeth do not fully erupt despite the absence of a mechanical obstruction. PFE with pathogenic mutations in the PTHR1 gene, located on chromosome 3 (3p22-21.1), is characterised by a defect in the periodontium. Vertical growth ceases at a certain point, causing the teeth to exhibit progressive infraposition and eventually re-submerge beneath the mucosa. Orthodontic movement of such teeth is not possible as they behave like osseointegrated implants and cause infraposition in unaffected teeth as well. Variants of eruption disorders with a similar phenotype, but without evidence of a pathogenic PTHR1 mutation, also exist.



A 20-year-old patient with typical Primary Failure of Tooth Eruption (PFE) following the completion of orthodontic treatment (performed elsewhere) presents with a pronounced phenotype. Characteristically, 1. Case Study



Fig. 2: Clinical Findings

Despite previous orthodontic therapy, there is a catastrophic occlusion with a bilateral open bite in the posterior tooth area. Pure orthodontic movement of these teeth into vertical alignment with the occlusion is generally not possible. At a later stage, surgical intervention with augmentative measures and subsequent implantation in the posterior tooth area is required to establish sufficient support. Alternatively, segmental distraction could be an option.

Fig.1: Panoramic Radiograph - Initial Findings A 14-year-old patient (Z. C.) presenting for an initial orthodontic evaluation.



Fig.1: Panoramic Radiograph

the first molars are also affected in this case.







Fig.3: Panoramic Radiograph - Interim Findings In addition to the molars, the premolars also exhibit a vertical growth deficiency during their development





Fig.2: Clinical Findings Initial situation before orthodontic treatment.

### Fig.4: Clinical Findings during MB Therapy

After six months of persistent difficulties in the vertical alignment of the occlusion with an open bite in the affected region, there is a suspicion of Primary Failure of Eruption (PFE). The patient's father has a history of tooth retention in the posterior region, while the mother did not have any eruption disturbances.

## **Discussion and Conclusion**

In the last five years, we treated four PFE patients in collaboration with orthodontists. In all cases, the affected teeth were surgically removed to allow for the insertion of implants after the completion of growth or subsequent orthodontic space closure. A therapy using segmental osteotomy or single-tooth distraction would theoretically be possible but is complex and does not provide proportionate results. For teeth that fail to erupt despite the absence of obstacles, PFE should always be considered to take appropriate therapeutic measures and avoid treatment errors.

### Literatur:

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