Management of chronic gastric problems, due to difficulty in chewing in a case of osteogenesis imperfecta, with a tooth – supported overdenture

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Abstract
The dental problems associated with osteogenesis imperfecta range from discoloration of teeth to malocclusion. A case has been described where an osteogenesis imperfecta patient had chronic gastric problems because of difficulty in chewing and eating as he had a skeletal Class III malocclusion with micrognathia of the maxilla and a reverse overjet. He was unable to chew his food while eating since there was no contact between his upper and lower teeth when he closed his mouth. The challenge was to bring the upper and lower teeth into occlusion. This was done with an overdenture over his teeth in the upper arch. Follow-up was done for 2 years, and the patient had reported to be relieved of his constant gastric problems from which he had been suffering for the past 20 years.

Keywords: Micrognathia, osteogenesis imperfecta, overdenture, skeletal Class III

INTRODUCTION
Osteogenesis imperfecta, which is also known as brittle bone disease, is a group of genetic disorder which affects the connective tissue. This condition is associated with recurrent multiple bone fractures right from childhood, and the bones may break easily often from mild trauma or may be even with no apparent cause. The other abnormalities often present in these patients are hearing loss, blue sclera, weakness, and laxity of joints, defective teeth, osteoporosis, easy bruising, deficient growth, short stature, and spinal curvature. The incidence of osteogenesis imperfecta is 1/20,000–30,000 live births. In 1979, Sillience et al. classified osteogenesis imperfecta into basic Types of I–IV. Ninety percent are classified as Type I or Type II with or without the involvement of teeth.[1] About 50% of the children and adults with osteogenesis imperfecta have dental involvement of varying degrees and severity. Although both dentitions may be affected, severity is more in the primary teeth. Teeth with dentinogenesis imperfecta have features such as bulbous amber-colored grayish-brown discoloration of the crown, constricted cementoenamel junction, narrow root, partial or total obliteration of the pulp chamber, and a root canal with an evidence of periapical radiolucency. Enamel is often normal but may shear off due to the defective dentinoenamel junction resulting in the dentinal attrition and loss of vertical dimension.[2]
Skeletal Class III with micrognathia and a reverse overjet when present, it becomes very difficult to chew the food while eating as there is no contact between the teeth in the opposing arch. Creating contact between the occlusal surfaces of the teeth is a challenge to the treating clinician. In a case of dentinogenesis imperfecta often when there is no skeletal deformity, overdenture or even fixed partial denture in some cases may be considered. When the skeletal deformity is present along with dental abnormality, it is a challenge to treat the condition to create contact between occlusal surfaces.

**CASE REPORT**

A 33-year-old male patient with a medical history of osteogenesis imperfecta was referred by a physician to the dental outpatient department as he had been suffering from chronic gastric problems. The patient had been swallowing his food without chewing as he could not chew his food. The inability to chew his food was considered to be causing recurrent gastric problems due to indigestion, from which he had been suffering for the past 20 years.

The patient wanted some ways to chew his food while eating. He was enjoying his social life, but his quality of life was affected by the oral condition. On examination intraorally, it was found that all the permanent teeth were present in the mandibular arch, whereas his canines were missing in the maxillary arch. The teeth were grayish in color with darker hue present cervically [Figure 1]. Many of the teeth had chipped off and were disfigured, but there was no complaint of any pain or discomfort intraorally. The maxilla was micrognathic, and the patient had skeletal Class III with reverse overjet [Figure 2] with a collapsed vertical dimension, with no contact with the upper and lower teeth when the patient tried to approximate his upper and lower teeth [Figure 3]. An orthopantomogram was made to confirm for any impacted teeth. There were no impacted teeth, and the maxillary canines were missing. In cases where the skeletal relationship is normal, an overdenture or a fixed partial denture could be considered. In the present case, a conventional treatment was not possible. Surgical intervention was ruled out due to his medical condition. The only option available was to fabricate a maxillary complete overdenture so that the vertical dimension could be increased as well as the teeth could be brought into occlusion. Preliminary impression was made with irreversible hydrocolloid impression material (Zhermack, Tropicalgin, New Delhi) and the preliminary cast was obtained. After blocking out the undercuts on the cast, a special tray was made over the wax spacer with autopolymerizing acrylic resin.

The custom tray was tried in the patient’s mouth and adjustments were made. For easy removal by removing the undercuts, border molding was done with polyvinyl siloxane impression material (Soft Putty, 3M ESPE USA). The final impression was made with light body polyvinyl siloxane impression material (3M ESPE, USA). A denture base with autopolymerizing acrylic resin was fabricated after blocking out the undercuts.

The wax occlusal rims were made on the denture base with the rims flaring buccally and labially. Tentative
jaw relation was determined taking into consideration esthetics with adequate lip support and visibility of teeth. Interocclusal distance was determined with the closest speaking space technique. Facebow transfer was done on a semi-adjustable articulator and centric relation records were made and the tentative jaw relation was verified and the casts were articulated. After the teeth arrangement was done, a wax try-in was done, and the necessary modifications were done taking the patient's opinion too into consideration regarding esthetics. The acrylic dentures were processed and finished and were tried on the patient after relieving all the undercuts. The interceptive occlusal contacts in different movements of the mandible were removed after checking with the articulating paper. The denture was then relined with denture reliner (GC Reline soft, Japan) and border molding was done and the patient was made to bring the teeth into occlusion. Once the denture reliner was cured completely, the excess was removed. The patient was asked to wear the dentures while eating initially and if comfortable to continue using it all the time.

The patient was quite satisfied with the outcome as the vertical dimension was restored and the teeth were brought into occlusion [Figure 4]. The primary reason for which the patient had sought treatment was accomplished, as the patient could chew the food with the dentures and he was relieved of his gastric problems. Initial follow-up was done every week for a month, and the denture adjustments were done till he became comfortable chewing with his denture. Later, he was reviewed every 6 months for 2 years. The patient was reported to be completely symptom-free of his gastric problems by then. The improvement in the function as well as esthetics with the treatment provided was quite gratifying.

![Figure 4: Postoperative anterior view with restored vertical dimension and esthetics](image)

**DISCUSSION**

According to the Glossary of Prosthodontic Terms (2017), a conventional overdenture is a removable denture that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and or dental implants. It is a dental prosthesis that covers and is partially supported by natural teeth, natural tooth roots, and/or dental implants, also called as overlay denture or overlay prosthesis.\(^3\) In the present case, the purpose of the denture was to create contact between the maxillary and the mandibular posterior teeth, and hence, the conventional management by doing endodontic treatment of the retained teeth followed by coping was not indicated.

Considering the existing medical condition of the patient, it was not judicious to do endodontic treatment on the already structurally weakened but asymptomatic existing teeth. Overdentures are often done in cases of cleft palate, oligodontia, ectodermal dysplasia, dentinogenesis imperfecta, and cleidocranial dysplasia.\(^4\) Patients with osteogenesis imperfecta often have poor oral health and disharmony of the maxilla and mandible that is considered high risk for developing malocclusion. Dentinogenesis imperfecta when associated with osteogenesis imperfecta is often treated with esthetic restorations such as crowns and fixed partial dentures. This treatment option is considered when the concern is mainly esthetic and is also done when there is partial disfigurement of teeth. When there is generalized involvement of all the teeth, an overdenture after endodontic treatment of the retained teeth is considered.\(^5\)

Dentinogenesis imperfecta in osteogenesis imperfecta may be characterized by opalescent teeth or brittle teeth that may be misshaped or break easily and require special care. About 73.1\% of cases of osteogenesis imperfecta are associated with Angle’s Class III malocclusion, and sometimes, they may be associated with the anterior and posterior crossbite, open bite, and missing teeth.\(^6\) Type I is the mildest form of the disorder; Type II is the most severe and is often better in the perinatal period. Type III is the most severe form of surviving patients. Type IV is of intermediate clinical features between Type I and Type III.\(^7\) The skeletal structure of the patient is affected with a decreased bone density and increased fracture risk. If an orthodontic intervention is done at a young age when developing relatively small maxillary jaw compared to the mandibular jaw, it may help to reduce the need for orthognathic surgery at a later Stage.\(^8\)

A skeletal Class III is present in some cases where the teeth in the opposite arches do not contact. This is because of
the discrepancy in the size of the upper and the lower jaws. The presence of a reverse overjet all around the arch can lead to a complete closed bite with the upper arch encompassed by the lower arch. Over a period of time, this leads to hypermobile temporomandibular joint and can lead to ear pain. The restoration of the vertical dimension is to be taken into consideration during the rehabilitation procedure. Considering all the factors and also giving priority to the patient’s need for rehabilitation which was mainly the inability to chew food, the treatment plan of a complete overdenture over the natural teeth was considered. The chosen treatment plan was found to be effective as well as it satisfied the patient both functionally and esthetically.

CONCLUSION

Osteogenesis imperfecta is often associated with dentinogenesis imperfecta which is often treated with the endodontic treatment of the existing teeth followed by a coping and overdenture. The primary complaint of the patient was the difficulty in chewing his food as the patient had a reverse overjet all around the arch due to the micrognathic maxilla. A removable complete overdenture was fabricated over his existing teeth, and occlusal contact was brought between the maxillary and mandibular teeth. The vertical dimension was restored, and with the new denture, there was an improvement in function as well as esthetics as the patient desired.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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