

CASE REPORT

Interdisciplinary Oral Rehabilitation Of A Teenage Patient With Down Syndrome: A Case Report

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Abstract

The present case report aimed to share the dental rehabilitation of a teenage patient with Down Syndrome and to guide clinicians on the treatment options for young syndromic patients with various dental problems. The clinical and radiographic examination of a 17-year-old male teenager with Down Syndrome, who applied to the University of Health Sciences, Department of Prosthodontics, with aesthetic complaints, revealed the necessity of oral rehabilitation. The aesthetic requirements were considered, and a treatment plan was made with the Department of Pediatric Dentistry. After extracting the patient's persistent anterior primary teeth that could not be treated, the missing teeth were corrected with a fixed partial denture. Onlay restorations made of 3D-printed resins are planned for infra-occluded primary molars. Anterior maxillary teeth were restored with aesthetic strip crowns following the root canal treatment. Maxillary permanent canine teeth were also restored in premolar forms with strip crowns to support the occlusion. In conclusion, the patient's treatment was completed, his function and phonation were maintained, and the desired aesthetic goals were achieved.

Key words: 3D printing; cad; dental esthetic; down syndrome; mouth rehabilitation

Introduction

Down Syndrome (DS) is characterized by an extra chromosome 21, the most common chromosomal abnormality in humans.¹ The syndrome's etiology is considered multifactorial, although the formation mechanism has not been fully explained. Maternal age, drug and alcohol use, radiation, and thyroid antibodies are accepted as the etiological factors.²⁻⁴ The most critical risk factor is thought to be advanced maternal age. It is known that the incidence of DS increases with the mother's age.^{3,4} Mental retardation is mainly seen in individuals with genetic translocation.^{5,6}

The phenotype of individuals with DS is typical. Short neck and stature, small hands and feet, and small head dimensions are observed. A large tongue that curves outward, low-set and small-sized ears, small and upward slanting eyes, loose muscle tone, flat nasal bridge, and flattened face can also be seen. The other phenotypical features are the simian palm line and Brushfield spots on the iris.^{3,7} Mandibular prognathism, mouth breathing, skeletal open bite, macroglossia, fissured tongue, hypotonic perioral muscles, and angular cheilitis are among the intraoral findings of individuals

with DS. Halitosis, gingivitis, rapid periodontal destruction, congenital tooth deficiency, dental agenesis, eruption delays in both primary and permanent dentitions, and microdontia can also be detected through the intra-oral examination.⁸

Before treating patients with DS, the need for endocarditis prophylaxis and the patient's compliance should be determined. Anxiety and fear may be more severe in mentally disabled patients compared to the others. In the dentist's approach to the patients who need special care, practices such as introducing the environment and dental tools, practice appointments before the actual treatment, and the tell-show-do technique are essential. Dental treatments can be performed under general anesthesia and sedation with uncooperative syndromic patients.⁹

The present case report aims to share the interdisciplinary oral rehabilitation of a 17-year-old patient with DS who applied to our clinic with aesthetic complaints. It also aims to guide clinicians in planning and treatment options for similar situations in their daily clinical practice.

Case Report

A 17-year-old male patient with DS applied to the University of Health Sciences, Gülhane Faculty of Dental Medicine, Department of Prosthodontics, with aesthetic complaints. The patient was short-statured and observed to reveal the general phenotypical features of a patient with DS (Short neck, small head dimensions with development deficiencies, loose muscle tone, flat nasal bridge and upward-slanting eyes) (Figure 1). He displayed speech difficulties.¹⁰ As a result of the anamnesis, it was learned that the patient was under follow-up in the cardiology department with normal vitals and did not use any medication. The patient's cooperation level score was determined as 3 (Positive; acceptance of treatment, cautious behavior at times, willingness to comply with the dentist, following the dentist's directions cooperatively) according to the Frankl Behavioral Rating Scale.¹¹

Maxillary retrognathia, mandibular prognathism, mouth breathing, hypotonic perioral muscles and angular cheilitis were noticed on extra-oral examination. The radiographic examination showed hypodontia and microdontia. Bone loss in edentulous areas was also observed (Figure 2). High palatal arch, macroglossia, hypodontia, microdontia, and persistent deciduous teeth were noticed on intra-oral examination. It was determined that there was no tooth contact except the right upper lateral- the lower canine and the left upper deciduous canine- the lower premolar. Crossbite/non-occlusion was detected in the right and left posterior areas. The teeth 32-33 and 43 were protrusive due to tongue thrust and malocclusion. Permanent tooth deficiency and persistent primary teeth were observed. Intra-oral examinations also showed that patients' oral hygiene was insufficient, and gingivitis with dental plaque accumulation was also detected (Figure 3).

The treatment procedure was initiated with the periodontal treatment approaches. After the scaling and root planing, a follow-up session was scheduled. Then, the patient was examined, and periodontal healing was detected. Before the treatment, the patient's maxillary-mandibular relations were recorded with an intraoral scanner (Trios 4, 3Shape; Copenhagen, Denmark). The jaws were scanned separately. However, since no occlusion plane could be detected with the intraoral scanner in the occlusion relationship recording, necessary registrations could not be made in the images (Figure 4).

Teeth 71 and 81 were extracted under prophylaxis (Amoxicillin-2000 mg). For persistent teeth 55,65,85, premolar formed onlays were designed (3Shape; Copenhagen, Denmark) and printed by a 3D printer (MAX UV DLP; Asiga, Sydney, Australia), using a commercial 3D printing resin material (Saremo Print, Crowntec, A2 shade; Switzerland). The printed restorations were luted with the "G-CEM ONE" system (GC Dental; Tokyo, Japan).

Strip Crown restorations with composite were preferred for 11, 12, 21, and 22, aiming for aesthetic arrangements in the maxillary anterior region. Teeth 13 and 23 were also restored as upper premolars with strip crowns. Endodontic treatment of tooth 53 was completed, and crown discoloration and shape anomalies in teeth 53-63 were masked with strip crowns. Fissure sealant applications were performed on teeth 17-27-37-47, and the composite restoration of tooth number 46 was also performed (Figure 5) (Figure 6) (Figure 7). Metal-supported fixed prostheses were designed for teeth 32, 34, 36, 43, and 44 (Figure 4).

The treatment of our 17-year-old DS patient, who applied to our clinics with aesthetic complaints, was completed, and he achieved the aesthetic appearance he wanted. At the same time, the treatment planning contributed to the patient's occlusion, and the maintenance of function and phonation was ensured. At the six months follow-up examinations, no discoloration or defect was detected on the surface of composite and onlay restorations. The partially fixed prostheses were also intact, and no plaque accumulation was detected visually (Figure 8). The periodontal examinations were also carried, and Plaque Index (PI, Silness and Løe, 1964), Gingival In-



Figure 1. Frontal and lateral view

dex (GI, Løe-Silness, 1963), and Probing Pocket Depth Index (PPD) were measured.^{12,13} Accordingly, the mean PI score was 0,97 while the mean value for GI was 1,48. Probing pocket depth was detected as lesser than 3 mm.¹⁴ Gingival inflammation has been noticed, particularly in the neighbourhood of fixed prosthetic restoration, and bleeding on probing at a ratio of 10% has also been observed.¹⁵ Although the patient's oral hygiene was inadequate before the dental treatments, it was detected that better oral hygiene was ensured in the six months follow-up session. The patient was motivated to provide essential oral hygiene habits. However, additional recommendations on oral care were also given to the patient, and dental scaling was performed as a process of prophylactic periodontal treatment.

Discussion

Various malocclusions such as open bite, crossbite, and deep bite are observed in individuals with DS due to the maxilla's horizontal and vertical growth retardation. Macroglossia, mouth breathing, oligodontia, microdontia, shape anomalies, and persistent primary teeth might also have seemed.¹⁶ In the literature, implant-supported fixed or removable dentures are the most common treatment method for replacing lost teeth of individuals with DS.¹⁷⁻²⁰ Although individuals with DS are in an increased risk group for dental implant use due to their susceptibility to periodontal diseases, it is stated that there is no significant difference in the success rates of the treatments when compared to the general population, with correct planning, correct patient selection and the patient's ability to provide optimum oral hygiene.^{21,22} Lustig et al. stated that tooth-supported fixed partial dentures could also be used as an alternative to the implant-supported prosthesis. However, the teeth used as bridge abutments should have an acceptable crown-root ratio and healthy periodontal tissue.²³ Although implant-supported fixed prosthetic restorations are the first treatment option in the literature for the oral rehabilitation of individuals with DS, in the recent case, missing mandibular teeth were replaced with a fixed partial denture. The implant planning was left after possible tooth loss in the future due to the young age of the patient. In the maxilla, anterior aesthetic restorations were provided with strip crowns since it is a less traumatic, minimally invasive, and much faster method for patients with special needs.

The preference for 3D applications among clinicians in dentistry has increased over recent years. Computer-Aided Design and additive manufacturing have the advantages of personalized Design and manufacturing, short chair time, and infection control by eliminating laboratory processes, high accuracy, and fit to the oral tissues. Furthermore, 3D systems are more economical than CAD (Computer-Aided Design)-CAM (Computer-Aided Manufacturing) applications.²⁴ Accordingly, considering the economic reasons, onlays in the form of premolars were designed and printed with a 3D Printing System for persistent primary molar teeth remaining in infra occlusion.

Although the posterior disocclusion due to skeletal malocclu-



Figure 2. Panoramic view of the patient before treatment



Figure 3. Intraoral view of the patient before treatment

sion could not be eliminated after the restorations, the crowns were lengthened to help the function. The aesthetic expectation of the patient was met with strip crowns on the upper anterior teeth. Splinting was provided with a fixed partial prosthesis in the lower anterior teeth to increase the survival time of the teeth in the mouth; at the same time, the existing tooth deficiencies were eliminated.

At the end of the treatments, adequate occlusal rehabilitation could not be provided. Considering the micrognathia in the maxilla, functional orthodontic treatments were indicated. These treatments could have been more effective if the patient was applied to our consultation in earlier periods of his life. The delay and the patient's wish not to go under orthodontic treatments resulted in the decision to perform the patient's oral rehabilitation with restorative and prosthodontic approaches. The inadequate oral hygiene profile of the patient has caused delays in the treatment period. These can be listed as the limitations of the recent case report.

Conclusion

The literature shows that implant-supported prostheses are the most common treatment method used for the oral rehabilitation of



Figure 4. a.The image of the jaw relations of the patient scanned with the 3shape Trios 4 system before the treatment. b.The image of bite recording.

individuals with DS. However, tooth loss may also be observed due to the increased risk of periodontal disease in individuals with DS. This case report shows that both tooth-supported fixed partial dentures and aesthetic composite applications can improve the function of existing teeth if the teeth have an acceptable crown-to-root ratio and healthy surrounding tissues. 3D Printing Systems can also be preferred to restore persistent primary molars for economic reasons and to decrease the number of clinic sessions, the chair-side time, and the length of the treatment.

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Figure 5. Panoramic view of the patient after treatment



Figure 6. Post-treatment intraoral view of the patient



Figure 7. The image of the jaw relations of the patient scanned with the 3shape Trios 4 system after the treatment

Author Contributions

All authors have contributed to; conception and design of the study, data collection and analysis, writing the manuscript, approval of the final version to be submitted.

Conflict of Interest

Authors declare that they have no conflict of interest.



Figure 8. Intraoral view of the patient at 6 months follow-up session

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