Implant-Prosthetic Rehabilitation of a Patient with Nonsyndromic Oligodontia: A Clinical Report

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Oligodontia is defined as the absence of 6 or more permanent teeth due to the hypodevelopment of tooth germs. This familial abnormality is attributable to various mutations or polymorphisms of genes and associated with malformative syndromes. This clinical report presents the multidisciplinary dental treatment planning for a 27-year-old woman who exhibited oligodontia. After radiographic and clinical evaluations, 7 retained primary teeth and 2 mandibular third molars were extracted. Three dental implants were placed into the maxillary alveolar process. After the osseointegration period, complete-arch fixed prostheses in both maxilla and mandible, supported by a combination of implants and teeth, were fabricated. Osseointegration of the implants, peri-implant mucosa health, and prosthesis function were assessed every 6 months. At the end of the 3-year clinical follow-up, the patient was satisfied with the esthetics, function, and phonation of her prosthesis. To attain the best esthetic and biological results, an interdisciplinary approach could be used to synergistically combine surgery and restorative dentistry for the restoration of maximal esthetics and function.

Key Words: dental implants, oligodontia, implant-supported prosthesis

INTRODUCTION

Congenital absence of teeth is considered to be common, and the prevalence in the population ranges from 0.08% to 1.1%, excluding the third molars.1,2 The situation results from disturbances during the initial stages of tooth formation: initiation and proliferation.3 A number of terms have been used to describe the congenital absence of teeth in the primary or permanent dentition.4 Agenesis of 6 or more permanent teeth, defined as oligodontia, is a common developmental dental anomaly in human beings.1,3,4

Oligodontia can be found as an isolated nonsyndromic trait or as part of a malformative syndrome, such as ectodermal dysplasia, Bloch-Sulzberger, Down, Robinson’s, Gorlin’s, hypertrichosis, orofaciodigital, chondroectodermal dysplasia, Rieger’s, and PHC syndrome.1,3,5 So far, mutations in the MSX1 or the PAX9 genes have been identified as a possible cause for nonsyndromic oligodontia.6 In most cases, it is transmitted as an autosomal dominant, autosomal recessive, or X-linked genetic condition.3,7,8 Additionally, oligodontia may result in such anomalies as delayed tooth formation, taurodontism, and, eventually, deciduous retained teeth, atrophy of the alveolar ridge, and aberrations of teeth dimension and shape.1,7

Patients with oligodontia may have psychological, esthetic, and functional problems.4,7 Thus, early diagnosis and treatment are important, though treatment options depend on the severity of the case.9 Correction of this anomaly aims for complete esthetic and functional rehabilitation and takes an interdisciplinary approach, including various prosthetic, orthodontic, and surgical treatments.3 Prosthetic treatments, including implants, removable prostheses, fixed dentures, and adhesive techniques have been proven effective in the management of these patients.7

Insertion of dental implants in children or adolescents before the regular growth process of...
the craniofacial skeleton results in ankylosis, disrupts normal development of the jawbones, and interferes with the position and the eruption of adjacent tooth germs.\textsuperscript{10,11} Thus, installation of an implant should usually be postponed until after puberty or after the child’s growth spurt.\textsuperscript{11} To overcome problems associated with definitive implant treatment, provisional implants could be used in the rehabilitation of growing patients.\textsuperscript{12}

After tooth loss caused by any variety of reasons, height and width deficiencies in the alveolar ridge bone limit the use of endosseous dental implants. To reconstruct a full-thickness alveolar defect, autogenous onlay bone grafts have traditionally been performed.\textsuperscript{13} Furthermore, the size of the edentulous space between existing teeth should be precise in accordance with the planned implant treatment. If this is not the case, uprighting of the adjacent teeth might be critical because of the subsequent implant placement.\textsuperscript{2} Accordingly, collaboration among the maxillofacial surgeon, orthodontist, and prosthodontist permits the evaluation of the different therapeutic aspects of oligodontia and represents the nexus of therapeutic planning.

The following clinical report illustrates the therapeutic planning, surgical treatment, and rehabilitative procedures conducted for a patient affected by oligodontia.

**CASE REPORT**

A 27-year-old woman reported to the Gazi University Department of Prosthodontics with a chief complaint of small teeth and congenitally missing teeth. Her general medical and dental histories were nonsignificant, and she had no family history of any oral or dental anomaly. She was in a healthy condition and had a normal physical body appearance, which ruled out ectodermal dysplasia as the etiology. Furthermore, her parents were dentally and medically normal, and she had no history of trauma and tooth extractions.

Extraoral examination showed a reduction of the lower facial height and protuberant lips, caused by the loss of vertical dimension as a result of oligodontia. Oral hygiene and gingival status were good, and no caries was observed. The intraoral and radiographic examination corroborated that 13 teeth were developmentally missing: maxillary lateral incisors (#7 and #10), maxillary left canine, first and second premolars (#11, #12, and #13), maxillary first molars (#3 and #14), mandibular second premolars (#20 and #29), mandibular lateral incisors (#23 and #26), and the 2 mandibular central incisors (#24 and #25) (Figures 1a and 1b). Thus, the patient was diagnosed as having nonsyndromic oligodontia. No significant external root resorption was observed in the retained primary mandibular incisors (#24, #25, and #26), maxillary left canine and first premolar (#11 and #12), and mandibular second premolars (#20 and #29) (Figure 1a).

With these objectives in mind, a treatment plan was formulated that required communication between the surgeon and the prosthodontist. To assist the interdisciplinary consultation process, a diagnostic setup was prepared by the prosthodontist (Figure 1c). Informed consent was obtained from the patient before beginning the treatment.

**SURGICAL PROCEDURE**

Decisions regarding implant length and width were based on an examination of periapical and panoramic radiographs of the maxillary bone. Mounted diagnostic casts were used to fabricate a guide for implant placement by the surgeon. The implant surgery was undertaken under local anesthesia and following the guidelines determined by the manufacturer. The surgical procedure started with an intraoral crestal incision followed by subperiosteal dissection of the mucoperiosteum; flattening of the alveolar crest was performed with a bur and under copious sterile saline irrigation. During bone healing, a temporary prosthesis was not delivered to the patient. At insertion, the implants were placed at a depth according to the guidelines given by the manufacturer (ITI Implants, Straumann, Basel, Switzerland). After 3 implants were placed into the #6, #5, and #4 regions (the implant at region #6 was 4.1 mm in diameter and 10 mm long; the implants at regions #5 and #4 were 4.1 mm in diameter and 12 mm length) (Figures 1d and 1e), 7 retained primary teeth and 2 mandibular third molars (#17 and #32) were extracted. Postoperative treatment consisted of the standard analgesics, chlorhexidin 0.2% mouthrinses, antibiotics, and nonsteroidal analgesics for 3 consecutive days. Sutures were removed 1 week after surgery. Standard oral hygiene instructions, including brushing of the healing abutments, were given to the
FIGURE 1. (a) Radiograph of the patient before treatment. (b) Intraoral view of the patient before treatment (view of maxilla and mandible). (c) The diagnostic set-up of the patient.
patient immediately after surgery. After a bone healing period of 6 months, a second-stage surgery was undertaken; the healing abutments were connected and left in place for 3 weeks for periimplant soft-tissue healing.

The proper vertical dimension of occlusion is determined by using the physiologic rest position of the mandible as a guide and noting the existing interocclusal distance. It was decided that the extracted teeth #20 and #29 would be restored with fixed partial prostheses instead of implants to reestablish the vertical dimension. After all of the teeth preparations, the impression copings were placed. Definitive impressions of the maxillary and mandibular teeth and abutments were made with a polyether impression material (Impregum, 3M Espe, Seefeld, Germany). The impression copings were fixed onto the abutment analog. Then, cement-retained prostheses were completed on abutment-level models from a base metal alloy (Master-Tec, Ivoclar Vivadent AG, Schaan, Liechtenstein) and porcelain (VITA VM 13, VITA Zahnfabrik, Bad Säckingen, Germany) and cemented to the abutments (Figure 2). Compared with the pretreatment profile (Figure 3a), the posttreatment facial photographs (Figure 3b) showed a marked improvement in the facial profile.

**Follow-up and criteria for success**

The patient was followed up 3, 6, and 12 months postoperatively and then annually with visual and radiographic examinations. For the first year after treatment, the patient was followed for routine hygiene and assessment of long-term outcome. The patient acknowledged having improved function and esthetics, and she was pleased with the results.

Criteria for success included effective placement and primary stability of the planned implant, stability of the implant (lack of mobility) and absence of pain or any subjective sensation at each visit, lack of peri-implant infection with suppuration, and lack of continuous radiolucency around the implant. Routine radiographs consisted of pano-
FIGURES 2 AND 3. **Figure 2.** (a) Intraoral view of the patient at the end of the prosthodontic treatment. (b) The patient’s smile at the end of treatment. **Figure 3.** Posttreatment facial photographs showing the marked improvement in the facial profile. (a) Before treatment. (b) After treatment.
In the present clinical report of a female patient, the mandibular second premolars, maxillary lateral incisors, maxillary second premolar, and mandibular central incisors were absent.

Patients with this anomaly often seek treatment because of an unpleasant appearance, impaired mastication, and speech difficulties. Additionally, the lack of uniformity of the occlusal plane, supereruption, loss of vertical dimension, and bone morphology in edentulous areas may cause prosthetic challenges.

The use of osseointegrated implants to aid in restoring missing teeth has become the treatment of first choice, especially for adult patients, in consideration of optimal esthetic characteristics and long-lasting stability. Moreover, an orthodontic appliance or removable denture represents a second-option treatment that should be considered for patients with mixed teeth or limited agenesis. In growing patients with oligodontia, definitive therapies, such as surgical positioning of implants, could determine a risk of developmental deficiencies of local bone ridge. Thus, previous studies suggested postponing surgical positioning of implants to the end of dental growth. In the present case report, the patient was 27 years old and the growth process was completed.

Conventional prosthetic rehabilitation is well suited in patients in which the condition is not too severe and in places where advanced oral and maxillofacial deformity surgery is not available. However, no more implants than necessary should be inserted, or it could be difficult to achieve a satisfactory esthetic result with the prosthetic. Therefore, in the present clinical report, the definitive therapeutic approach was carried out using endosseous implants and a conventional, cement-retained, fixed prosthesis to allow normal masticatory and phonetic function. The patient’s esthetics, facial profile, oral function, speech, and psychological status were significantly improved after the treatment. This was a result of coordinated efforts between the surgeon, prosthodontist, and laboratory technician. With an interdisciplinary approach and communication between the specialists during and after treatment, fewer compromises occur and more ideal restorations can be developed in the patients with oligodontia.

A previous study by Fekonja evaluated the hypodontia in orthodontically treated children and...
indicated that patients with severe oligodontia showed a tendency to a Class III relationship and increased overbite. Similarly, in the present clinical report; the patient had a Class III molar relationship, with tet-a-tet incisors (Figure 1e). Moreover, her facial profile photo showed the tendency to a Class III relationship (Figure 3a). At the end of the prosthetic rehabilitation, both the facial appearance and the occlusion were improved (Figures 2a and 3b). Regular clinical and radiographic reviews (third and sixth month and first, second, and third year) were performed for long-term dental management. Function, phonation, and esthetic expectations of the patient were carried out. In the radiological and clinical examination, no problem was seen in the soft tissue and in the maintenance of implants. This case presentation showed how important it is to treat patients with developmental anomalies not only from the functional point of view but also with regard to the patient’s appearance and the effect of the treatment on his or her psychology. Moreover, dental practitioners should keep in mind that conventional prosthetic treatment may often be all that is needed for patients with oligodontia.

**CONCLUSION**

The type of malocclusion, degree of oligodontia, age of the patient, and psychosocial aspects should help the clinician plan and manage the treatment.

**REFERENCES**


