Multiple tooth aplasia - a treatment concept. Autologous transplantation of teeth combined with dental ceramic implants

Benjamin Kurfürst[1]

The treatment of aplasia in combination with displaced teeth, especially milk teeth that are ankylosed and in infraposition is a significant challenge for the attending dentist and orthodontist. Chewing function and esthetic problems that go untreated are very difficult to address in adults, as vertical and horizontal growth of bones and soft tissue in the areas concerned has been impossible. The rehabilitation of the esthetics and chewing function in these patients requires extensive surgery once they have reached adulthood.

Abstract

This case report from Dr. Benjamin Kurfürst, Dr. Lea Hoffmann and Prof. Dr. Dr. Dirk Nolte describes the oral rehabilitation of a patient who had hypodontia, with four missing premolars and ankylosed and infra-position deciduous molars as well as two impacted, displaced canines, which were found to be ankylosed on exposure. The asymmetry of this dentition made it difficult to treat; treatment was approached in close collaboration between the orthodontist and maxillofacial surgical team.

In adolescence, techniques of autologous premolar transplantation and surgical luxation were selected to resolve the defects in the upper and lower jaw. This allowed the orthodontist to restore symmetrical distribution of the existing teeth and to prepare the dentition for later implant treatment once the patient reached adulthood.

Once skeletal growth was completed, the orthodontic therapy had progressed to the point that after the appropriate prosthetic planning, the remaining gaps were prepared for later insertion of ceramic implants.

The follow-up time for the patient case is now 8 ½ years since the start of therapy.

With early interdisciplinary planning and treatment intervention, the patient's complex malocclusion could be treated successfully both in terms of function and esthetics using the aforementioned surgical techniques.

Introduction

The male patient was 14 years old when he first presented to us in 2013. His general health was unremarkable, and he is not known to have any syndromes. There were also no known cases of craniofacial growth abnormalities in his family, and specifically no information on oligodontia.

The orthopantomogram (OPG, Fig. 1a) showed aplasia of teeth 34, 35, 44 and 45 (n=4). Teeth 13 and 33 are impacted and displaced; they were already exposed at a different clinic and orthodontic extrusion therapy showed that they were ankylosed

[1] Benjamin Kurfürst
Oral surgeon; since 2015 employed at "Praxisklinik für Mund-, Kiefer-, Gesichtschirurgie" of Professor Dr. Dr. Dirk Nolte and Dr. Dr. Robert Linsenmann in München/Germany. From 2009 to 2015 studies and state examination at the Ludwig-Maximilians-University of Munich; 2015 doctorate at the Institute of Anatomy and Cell Biology LMU Munich; founding member: Oral Surgery Network Association of Specialized Dentists e.V.

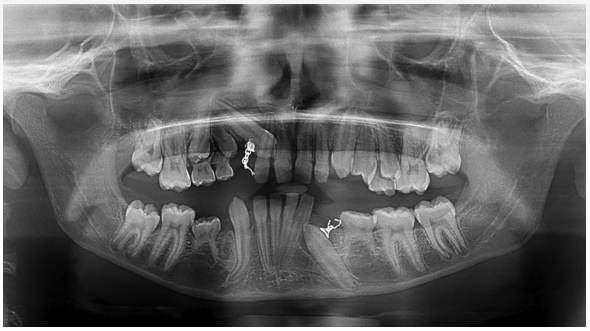

Fig. 1a: Panoramic X-Ray, preoperative, initial presentation.

Fig. 1b: Initial clinical situation, preoperative.

Fig. 1c: Clinical situation preoperatively, initial presentation.

(developmental disorder total: n=6). Both canines still have brackets and wires (Fig. 1b and c). The orthodontist discontinued treatment to move the canines and an alternative treatment route was explored. It was documented that this orthodontic treatment attempting to adjust the position of the canines had taken 1.5 years.

Treatment

After extensive consultation exploring all treatment alternatives, surgery was performed in 2013 in close collaboration with the attending orthodontist.

The treatment consisted of a combination of various surgical techniques.

First the deciduous molars 55, 65, 75 and 85 were extracted, teeth 13 and 33 were luxated or transplanted, while teeth 15 and 25 were transplanted into the mandible in regions 34 (25 > 34) and 45 (15 > 45) so that each quadrant had an equal number of teeth. The procedure was performed under general anesthetic. In regions 13, 33 and 34, the transplanted teeth were splinted intraoperatively to their adjacent teeth with a semi-rigid 0.2 mm titanium trauma splint (Medartis®) using an acid-etch technique (Ivoclar Vivadent® Bleach flow).

Due to the root morphology of tooth 43, the transplant in region 45 could not be placed in approximal contact to tooth 43. A neo-alveolus had to be created to rule out the risk of iatrogenic injury to tooth root 43. This meant that the transplant in region 45 could not be held in position with a TTS splint, but was rather secured against aspiration with sutures (Fig. 2).

The titanium trauma splint was removed postoperatively after 3 weeks. This meant that the next treatment step could start and the patient was then referred back to the attending orthodontist for further therapy.

The upper and lower jaws were subsequently orthodontically shaped, and the transplanted tooth 13 was adjusted. Tooth 14 is still impacted and has yet to erupt. Figures 3 a and b show progression 3 months postoperatively with ongoing orthodontic treatment with removable braces.

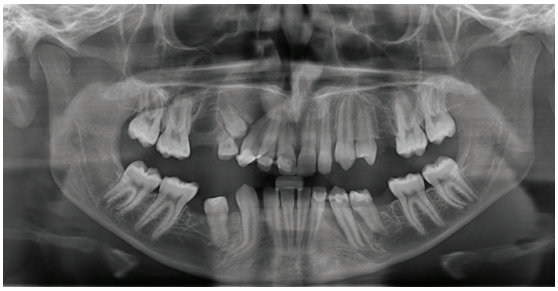

Fig. 2: Panoramic X-Ray, postoperative.

Fig. 3a: Clinical situation three months post-op.

Fig. 3b: Clinical situation three months after surgery.

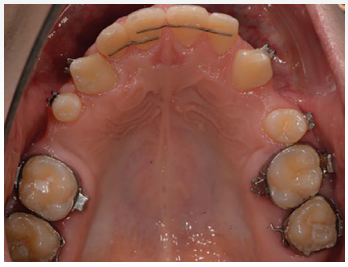

Fig. 4a: Clinical situation with ongoing orthodontics, five and a half years post OP.

Fig. 4b: Clinical situation with ongoing orthodontics, five and a half years post-op.

Fig. 5: Panoramic X-Ray, after insertion of the implants, eight years follow-up of the grafts.

Fig. 6a: Clinical situation one week after exposure of the implants with gingiva formers in situ.

Fig. 6b: Clinical situation one week after exposure of the implants with in situ gingiva formers.

To ensure full rehabilitation, the aim was to keep the interdental gaps in regions 15, 24, 35, 44 open so these could then be closed with implants when the patient reached adulthood. Figures 4a and b show the orthodontic treatment after what was by that point 5.5 years following surgery. The slightly hypoplastic tooth 14 has since then also emerged and can be included in the orthodontic therapy.

Over the course of treatment, the gaps in 15, 24, 35 and 44 were prepared for later implantation. The orthodontic retention phase then started. The patient is now 21 years old and is prepared for the pending dental implantation with his definitive prosthetic restorations. The oro-vestibular and vertical dimensions of the bony bed of both the upper and lower jaw are radiographically and clinically suitable for implantation.

The final step in the therapy was then to close the gaps with implants. The bony dimensions of the hard tissue allowed safe insertion of dental ceramic implants with a primary stability of 35 Ncm (Straumann® PURE Ceramic, diameter 4.1 mm, L 10 mm, RD, two-part) in regions 15, 24, 35 and 44 (Fig. 5).

X-rays of the transplants in regions 34 and 45 showed pulp canal obliteration, which can be interpreted as a vital sign[1], with positive cold sensitivity testing. Teeth 13 and 33 also showed no signs of resorption - despite extended orthodontic extrusion therapy[2]. Figures 6a and b show the clinical situation 3 months post-implantation when all four implants were exposed. The gingiva is stable and the adult dentition completely rehabilitated. After 12 weeks the implants were prosthetically treated with the definitive full ceramic screw-fit crowns (Figs. 7a-c).

With a combination of autologous tooth transplantation in adolescence and dental implantation in early adulthood, a reliable, esthetically pleasing rehabilitation with chewing function could be achieved in all four quadrants. (Fig. 8 and b) Chewing function[3] is achieved up to the second molar without shortening the row of teeth. The patient has now been followed up since the start of his surgical therapy over 8½

Fig. 7a: Tooth film regio 15 with impression posts

Fig. 7b: Clinical situation and soft tissue view with impression post in situ.

Fig. 7c: Implant prosthetics before insertion.

Fig. 8a: Clinical situation eight and a half years after surgery with definitive prosthetic restoration.

Fig. 8b: Clinical situation eight and a half years after surgery with definitive prosthetic restoration.

years ago. Regular recalls to our clinic show the transplants and implants to be stable in situ with good chewing function and esthetics. The gingiva are not irritated and all four implants have osseointegrated (see e.g. Fig. 7a)

Discussion

Patients with complex growth disorder in the dental region must be managed by interdisciplinary consensus[4]. These include (pediatric) dentistry, speech therapy, orthodontistry, oral surgery and maxillofacial surgery. While autologous tooth transplant is especially suitable for dentition that is still growing, enossal implants should ideally not be placed until the jaw has finished growing. The complexity of the cases and individual nature of treatment require long treatment times because of the different sequential steps involved. This often requires a great deal of patience and compliance from the patient and practitioner alike. Awareness of the various treatment options allows the best possible rehabilitation of the adolescent patient with complex deformities of this kind.

Conclusion:

Autologous dental transplantation is a reliable surgical technique[5,6,7] and should certainly be considered as a treatment option in adolescents with severe developmental disorders of the jaw and teeth. The osteoinductive function of this method[8] supports bone and soft tissue especially while the patient is growing. Orthodontic treatment can continue unrestricted over the periodontal ligament of the grafted tooth, which also supports the horizontal and vertical development of the patient's maxillary and mandibular dental arches. The combination of autologous dental transplantation, orthodontic therapy and subsequent dental implantology, as presented in this case report, allows reliable rehabilitation of patients with complex deformities such as agenesis of multiple teeth with/without eruption disorders of the teeth[9,10,11]. This saves the patient the ordeal of complex, augmentative bony treatment in adulthood.

Parts of this publication already appeared on the DGI Wiesbaden 2021. Image and text rights belong to the author. Clinical images with the kind permission of the Polyclinic forOrthodontics, LMU Munich, Goethestraße 70, 80336 Munich;
Director: Prof. Dr. Wichelhaus
Dental work: Kolgeci Zahntechnik GbR, Würmtalstraße 113, 81375 Munich

Reprinted with permission from youTooth 28 April 2022