Multidisciplinary Approach in the Treatment of a Patient with Cleft Lip and Palate: A Case Report

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ABSTRACT

Treatment of the patient with cleft lip and palate represents a real problem from both functional and esthetic points of view. Today a functional result is not enough. An esthetic result is both necessary and possible to improve the quality of life. The direct placement of an implant in the grafted alveolar cleft is not the ideal choice.

Using a rational, multidisciplinary approach, it is possible to obtain esthetic results in these patients. In our case study, a 17-year-old patient previously treated for a unilateral cleft lip and palate and agenesis of the right lateral incisor was given an osseointegrated implant. Computer-assisted dental design (Procera® CAD/CAM software, Nobel Biocare AB, Gothenburg, Sweden) was used for the prosthetic rehabilitation, and the end of growth was determined prior to placing the implant.

No sign of failure or mobility after loading has been detected at the time of this writing, 8 months after the procedure's completion, and the esthetic result is considered satisfactory by the patient and practitioners.

CLINICAL SIGNIFICANCE

When a multidisciplinary approach is used, it is possible to provide functional and esthetic results in the rehabilitation of the patient affected by cleft lip and palate.

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One of the most gratifying aspects of implant dentistry is the ability to replace missing teeth in an esthetic and predictable manner.[1] In the patient with a cleft palate, it is important to consider that the creation of a harmonious facial form together with an attractive smile is an important goal in improving the quality of life.[2]

The cleft lip/palate is a condition with an incidence of 1 in 500 to 1,000 live births worldwide.[3] The traditional prosthodontic procedures propose rehabilitating the missing teeth by means of fixed or removable prostheses.[4] With the introduction of osseointegrated implants, treating full or partially edentulous patients with dental implants, as well as single-tooth replacements, has resulted in a high degree of success.[5–7] The first report concerning the use of these implants in patients with cleft lip and palate was published in 1991.[8] Since then several reports on the use of such implants in alveolar clefts—mostly grafted sites—have been published in the literature.[9,10]

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Many systems contain standard prosthetic components to ensure that the outcome of rehabilitating missing teeth is pleasing to the eye.[11] Customized abutments have been developed to offer a more regular abutment contour and margin with an improved esthetic appearance in the case of single-implant restorations. The latest abutment of this kind to be developed is the Procera® abutment (Nobel Biocare AB, Gothenburg, Sweden). This abutment was designed with computer-aided design/computer-aided manufacturing (CAD/CAM) technology combined with the spark erosion technique.[12]

We present the case of one patient affected by the sequelae of a cleft lip and palate and the results of her treatment by means of an oral osseointegrated implant and a Procera abutment and crown.

CASE REPORT

The patient was a 17-year-old female with a treated unilateral cleft lip and palate and a congenitally missing right lateral incisor (Figure 1). The orthodontic treatment was started at the time of mixed dentition and finished at the age of 17 years. The right permanent canine was orthodontically positioned at the site of the missing lateral incisor, and a deciduous canine was maintained in its original position (Figure 2). The Risser test, followed by the taking of two cephalograms, was performed prior to the placement of the implant to determine the end of skeletal growth. The Risser test is a radiologic test most commonly used in orthopedics to determine the ossification of the iliac crest from the anterior iliac spine to the posterior iliac spine. Ossification is scored on a scale of 0 to 5, with scores of 0 to 2 indicating relative immaturity and 3 to 5 indicating that growth is nearly complete.

In July 2002 the deciduous tooth was extracted and replaced with a 3.75 × 13 mm Brånemark System® Mk III implant (Nobel Biocare AB). Owing to the anatomic conditions of the alveolar crest, the surgeon placed the implant in a slightly buccal position.

Excellent clinical primary stability was observed, and the decision was made to go ahead with a one-stage operative technique. A healing abutment was screwed onto the implant on the day of surgery. A provisional crown was then made and screwed in 1 month after the surgery. An impression (Coltène® President, Altstätten, Switzerland) of the implant head was made using an individual tray 2 months after the implant's placement. No signs of pain, inflammation, or infection were detected throughout this period.

In the Procera CAD/CAM technique, the fixture replica obtained on the master cast is the starting point for the creation of an individually designed abutment to correct the implant's angulation. With the Procera software, the entire finished abutment can be visualized on the

Figure 1. View of the patient showing a missing right lateral incisor and an alveolar cleft.

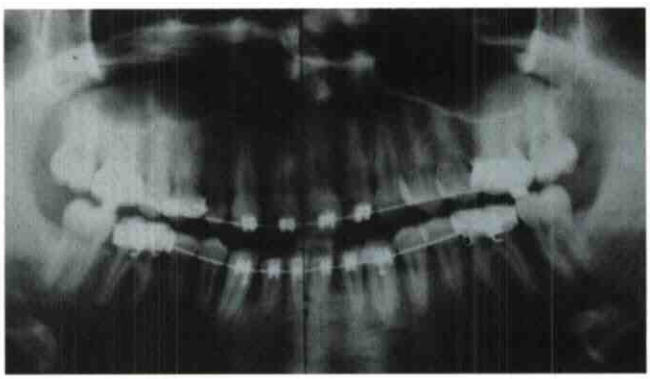

Figure 2. Preoperative panoramic radiograph.

screen in three dimensions and from all angles during the design session. When the creation of the abutment is finished, all the data are sent to the production unit by modem.

In this case the manufacturer delivered the machined individualized densely pure aluminum oxide abutment within 72 hours after the healing period of 6 months (Figures 3 and 4). Digitization of the abutment surface with the Procera scanner made it possible to obtain a Procera AllCeram coping. This operation ensured a perfect fit between the two components.[13] The final abutment was sterilized and inserted, and the screw was tightened to a torque of 32 Ncm (see Figure 4). A radiographic examination was performed after the insertion to evaluate the fit. The final crown was cemented using Harvard Cement® (Richter and Gottman, Berlin, Germany), and the occlusion was adjusted (Figures 5–8). Checks were performed at 1 week and 1, 2, and 3 months after the placement of the crown. No signs of mobility or infection were detected (Figure 9).

DISCUSSION

The multidisciplinary approach in the treatment of patients with cleft lip and palate is important. In this case the orthodontic decision to displace the definitive canine in the zone of the treated cleft and congenital agenesis permitted the placement of the implant in nongrafted bone. Bone augmentation by bone grafting of a resorbed or deficient process can be frustrated by a limited capacity for wound closure, relative osseous avascularity, delayed endosteal proliferative response, or instability of graft fixation.[14] Moreover, the reconstructive procedures with endosseous implants in a grafted bone give unsatisfactory success rates for implant placement in a *classic* edentulous zone.[15,16]

The early insertion of implants in growing patients is not recommended. The behavior of implants placed before complete skeletal growth is unpredictable.[17] Scientific studies have shown that implants inserted in a growing maxilla can remain apically ankylosed, creating periodontal, prosthetic, and esthetic problems at the time of prosthetic rehabilitation and years later.[18,19] Thus, the use of clinical tests to determine the end of skeletal growth is greatly encouraged.

The implant placed directly in the growing and grafted cleft zone can certainly be functional but is not always the correct choice from an esthetic point of view. The Procera abutment enabled us to offset the screw's access hole and then change the abutment's coronal angulation. The use of a densely pure aluminum oxide abutment in conjunction with an all-ceramic crown contributed to a highly esthetic result. The optical properties associated with a color that is close to that of natural teeth ensure high esthetic performance in the case of single-tooth restorations.[20–23]

The results of this case report suggest that the orthodontic displacement of a definitive tooth in the grafted zone and the placement of an implant in the zone of the displaced definitive tooth may be a good method for avoiding future esthetic problems in the gingival margin.

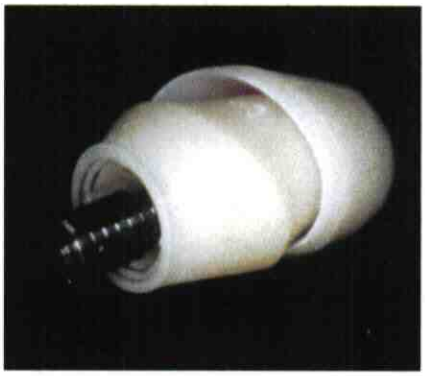

Figure 3. The final Procera abutment and coping.

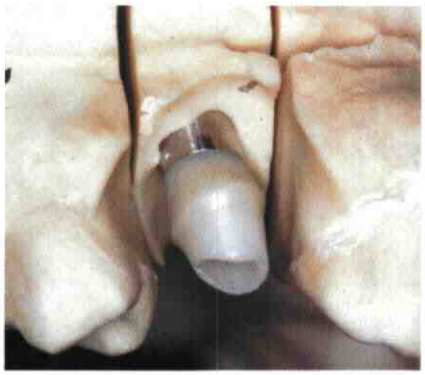

Figure 4. The final abutment screwed on the master cast.

Figure 5. Intraoral condition after placement of the pure aluminum oxide abutment.

Figure 6. Intraoral view after placement of the definitive crown.

Figure 7. Final occlusion after prosthetic rehabilitation.

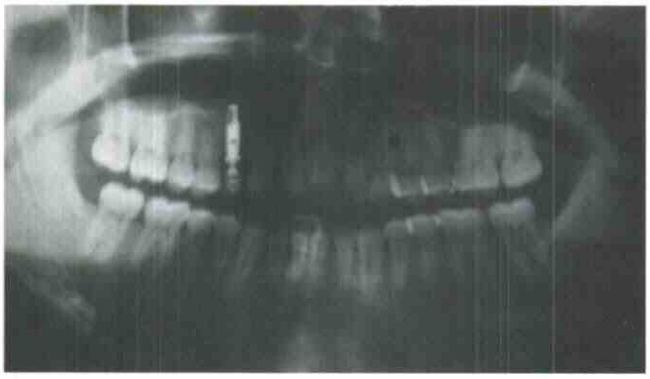

Figure 8. Panoramic radiograph after implant and crown placement.

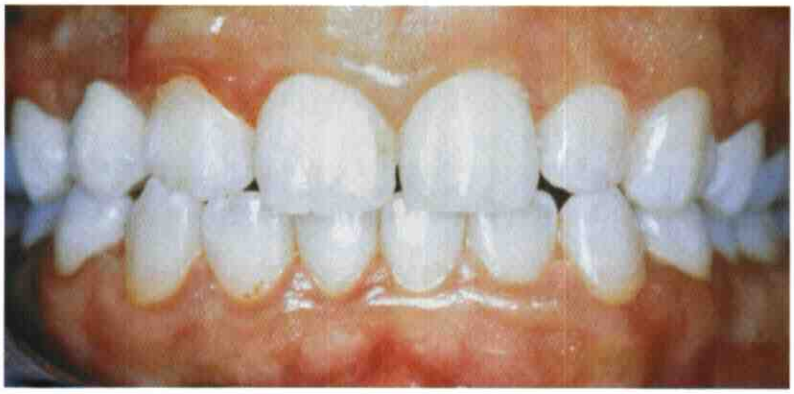

Figure 9. Final view of the patient and prosthetic rehabilitation.

CONCLUSION

Rational multidisciplinary management of the patient with a cleft lip and palate with correct application of predictable, documented treatments gives a functional and esthetically pleasing result.

DISCLOSURE

The authors have no financial interest in any of the companies whose products are mentioned in this article.

REFERENCES

1. Klokkevold PR, Newman MG. Current status of dental implants: a periodontal perspective. Int J Oral Maxillofac Implants 2000; 15:56–65.
2. Yamada T, Mori Y, Minami K, Mishima K, Tsukamoto Y. Three-dimensional analysis of facial morphology in normal Japanese children as control data for cleft surgery. Cleft Palate Craniofac J 2002; 39:517–526.
3. Hanson JW, Murray JC. Genetics aspects of cleft lip and palate. In: Bardach J, Morris HL, eds. Multidisciplinary management of cleft lip and palate. Philadelphia: WB Saunders, 1990:121–124.
4. Gardner LK, Parr GR. Prosthetic rehabilitation of the cleft palate patient. Semin Orthod 1996; 2:215–219.
5. Naert I, Koutsikakis G, Duyck J, Quirynen M, Jacobs R, van Steenberghe D. Biologic outcome of single-implant restorations as tooth replacements: a long-term follow-up study. Clin Implant Dent Relat Res 2000; 2:209–218.
6. Lekholm U, Gunne J, Henry P, et al. Survival of the Brånemark implant in partially edentulous jaws: a 10-year prospective multicenter study. Int J Oral Maxillofac Implants 1999; 14:639–645.
7. van Steenberghe D, Lekholm U, Bolender C, et al. Applicability of osseointegrated oral implants in the rehabilitation of partial edentulism: a prospective multicenter study on 558 fixtures. Int J Oral Maxillofac Implants 1990; 5:272–281.
8. Verdi FJ Jr, Lanzi GL, Cohen SR, Powell R. Use of the Brånemark implant in the cleft palate patient. Cleft Palate Craniofac J 1991; 28:301–303.
9. Lilja J, Yontchev E, Friede H, Elander A. Use of titanium dental implants as an integrated part of a CLP protocol. Scand J Plast Reconstr Surg Hand Surg 1998; 32:213–219.
10. Hartel J, Pogl C, Henkel KO, Gundlach KK. Dental implants in alveolar cleft patients: a retrospective study. J Craniomaxillofac Surg 1999; 27:354–357.
11. Binon PP. Implants and components: entering the new millennium. Int J Oral Maxillofac Implants 2000; 15:76–94.
12. Kucey BK, Fraser DC. The Procera abutment—the fifth generation abutment for dental implants. J Can Dent Assoc 2000; 66:445–449.
13. May KB, Razzoog ME, Lang BR, Wang RF. Marginal fit: the Procera® AllCeram Crown. J Dent Res 1997; 76:311. (Abstr)
14. Jensen OT, Greer R, Johnson L, Kassebaum D. Vertical guided bone-graft augmentation in a new canine mandibular model. Int J Oral Maxillofac Implants 1995; 10:335–344.
15. Tolman DE. Reconstructive procedures with endosseous implants in grafted bone: a review of the literature. Int J Oral Maxillofac Implants 1995; 10:275–294.
16. Malevez C, Hermans M, Daelemans P. Marginal bone levels at Brånemark System implants used for single tooth restoration. The influence of implant design and anatomical region. Clin Oral Implants Res 1996; 7:162–169.
17. Oesterle LJ, Cronin RJ Jr, Ranly DM. Maxillary implants and the growing patient. Int J Oral Maxillofac Implants 1993; 8:377–387.
18. Thilander B, Odman J, Grondahl K, Lekholm U. Aspects on osseointegrated implants inserted in growing jaws. A biometric and radiographic study in the young pig. Eur J Orthod 1992; 14:99–109.
19. Odman J, Grondahl K, Lekholm U, Thilander B. The effect of osseointegrated implants on the dento-alveolar development. A clinical and radiographic study in growing pigs. Eur J Orthod 1991; 13:279–286.
20. Prestipino V, Ingber A. Esthetic high-strength abutments. Part I. J Esthet Dent 1993; 5:29–36.
21. Prestipino V, Ingber A. Esthetic high-strength abutments. Part II. J Esthet Dent 1993; 5:63–68.
22. Prestipino V, Ingber A. All-ceramic implant abutments: esthetic indications. J Esthet Dent 1996; 8:255–262.
23. Hegenbarth E. Use of the Procera CAD-CAM System for metal-free crowns on single-tooth implants. Quintessence Dent Technol 1998; 1:27–37.

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