

Implantation on the maxillary anterior region in the cleft palate & alveolus patient : A case report

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I . INTRODUCTION

Cleft palate and alveolus patients require long periods of treatment from birth to adulthood by specialists in various fields. Patients with cleft palate & alveolus frequently have missing teeth, particularly often including the lateral incisor. Orthodontic treatment aims to close this frontal gap by moving the posterior teeth forward after bone grafting of the alveolar cleft. But in patients who are missing more than one tooth, successful treatment by only orthodontics is often very difficult or impossible. Prosthetic treatment is required in the final stages of treatment in patients having edentulous space, even after completion of orthodontic correction combined with orthognathic surgery.

Since Verdi et al.¹⁾ reported first case, several papers have discussed implant treatment for such situations²⁻⁸⁾. A prerequisite for successful implant rehabilitation is an appropriate anatomy of both soft and hard tissues at the insertion site through a reconstruction. Bone grafting is an essential step in the overall management of patients with clefts of palate and alveolus. Among the many materials available for grafting and reconstruction of the facial skeleton, autogenous bone is considered the most reliable. For augmentation procedures, rib

and iliac⁹⁾ crest bone are the prime choices for onlay or interposition grafts.

It was the purpose of the present study to evaluate cleft patient who received dental implants after cleft site had been closed with bone grafts and to present the results of the follow-up.

II . CASE REPORT

A 47-year-old man had come to the LivingWell dental hospital for overall dental treatment. Intraoral and radiographic examination of patient showed cleft palate on the right maxillary anterior region and missing state of #11, #12, #36, #37, #46 and #47 teeth(Fig.1). He had also heavy calculus deposition and periodontitis on the overall dentition. He had non-specific findings of medical history.

Before prosthetic procedures on the anterior maxillary region, the posterior dentition had been rehabilitated by implantation of 8 fixtures(Fig.2).



Fig.1. Clinical & Panoramic radiographic findings showed cleft palate on the right maxillary anterior region and missing state of #11 & #12 teeth

The patient went through 3 times operation for implantation of #15, #46, #47, #36, #37, #26 and #44 teeth with ramus bone graft.

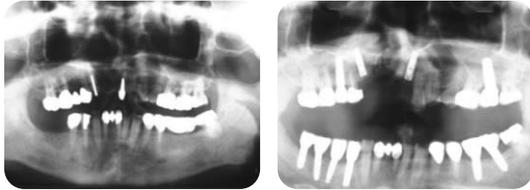


Fig 2. Before prosthetic procedures on the anterior maxillary region, the posterior dentition had been rehabilitated by implantation of 8 fixtures (Pitt-easy™, Innova, Germany and TSV™, Zimmer, USA).

In third operation, iliac bone graft for reconstruction of cleft palate area and closure of oro-nasal fistula were undergone at the same time. It was gone through under general anesthesia and before the surgery the bony defect was measured 18mm (Width) x 12mm (Height) x 12mm (Depth) in size by CT images obtained from using Dental CT (i-CAT™, ISI, USA) and 3-D image analysis done by image reformation software (V-works™, Cyber-med, Korea) (Fig.3). A block bone was harvested from iliac bone and after bone shaping, the bone block was located on the cleft region (Fig.4). In post-op. 3-D CT image, grafted bone materials noted on the cleft region (Fig.5).

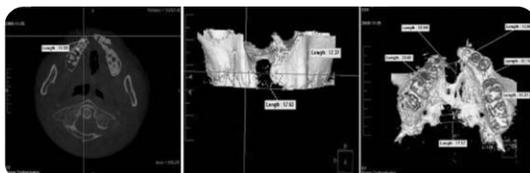


Fig.3. CT images obtained from using Dental CT (i-CAT™, ISI, USA) and 3-D image analysis done by image reformation software (V-works™, Cyber-med, Korea). The bony defect was measured 18mm (Width) x 12mm (Height) x 12mm (Depth) in size.

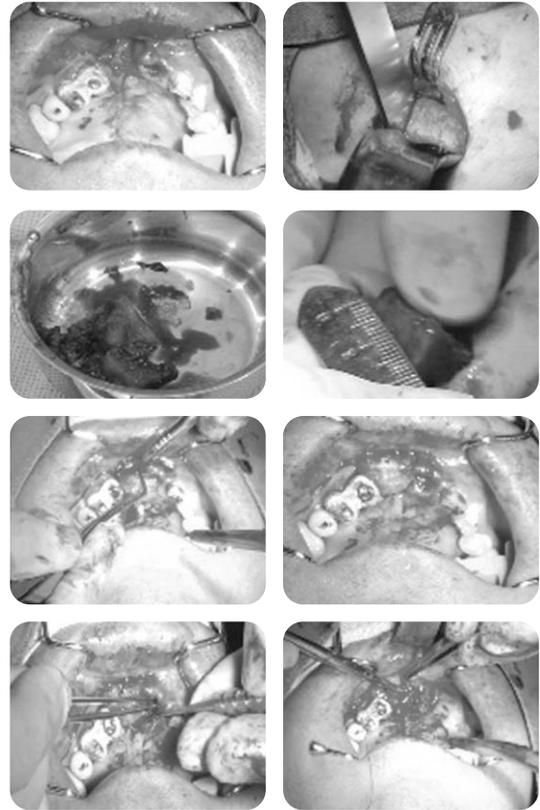


Fig 4. A Block bone was harvested from iliac bone under general anesthesia. After bone shaping, the bone block was located on the cleft region.

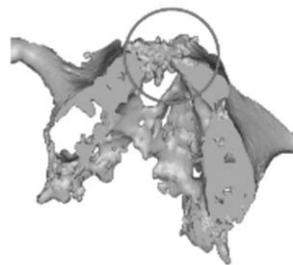


Fig. 5. In post-op. 3-D CT image, grafted bone materials noted on the cleft region.

Seven months later, implants of #12 were placed on the cleft region with ramus bone and cerasorb graft. In spite of 3 times trials, osseointegration had been failed on #12 area. And due to secondary dental caries, #13 tooth was extracted

and immediate placement of implant was done on that area (Fig.6).

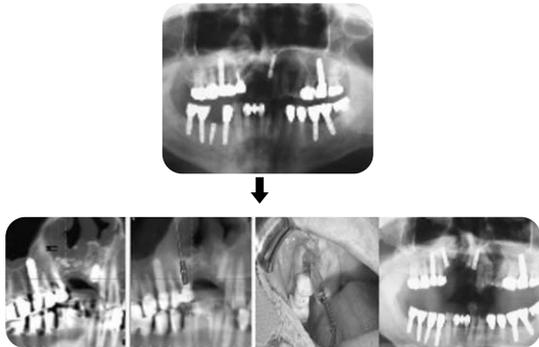


Fig. 6. In spite of 3 times trials, osseointegration had been failed on #12 area. And due to secondary dental caries , #13 tooth was extracted and immediate placement of implant was done on that area.

Vestibuloplasty and screw exposure was conducted by using CO₂ laser in 2nd phase surgery (Fig.7). After healing of surgical site, prosthesis were placed on these area (Fig.8).

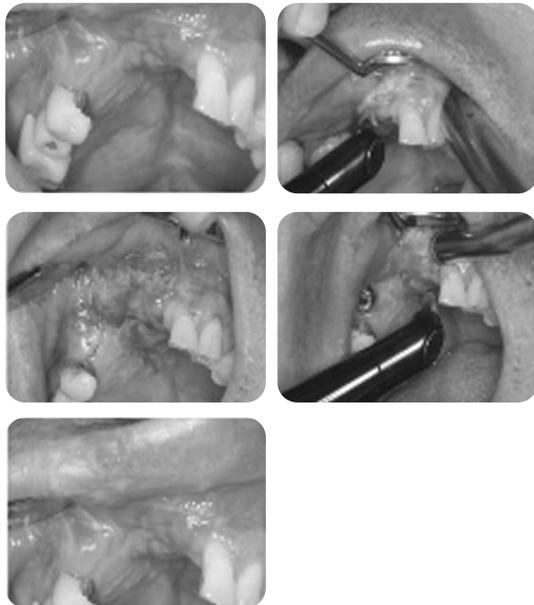


Fig. 7. Vestibuloplasty and screw exposure was conducted by using CO₂ laser in 2nd phase surgery.



Fig. 8. Prosthesis were placed on these area.

III. RESULTS

The defect of cleft palate and alveolar ridge was reconstructed by autogenous bone graft. At the same time, we achieved complete closure of oronasal fistula by mobilization of elevated mucoperiosteal flap. In surgical procedure, a block bone that was harvested from iliac bone was used as grafting material. And through the information of CT images obtained from using Dental CT (i-CAT[™], ISI, USA) and 3-Dimensional image analysis done by image reformation software (V-works[™], Cyber-med, Korea), surgical site was evaluated in preoperative and postoperative phases. After ramus bone and cerasorb graft mixed with PRP, simultaneously implant of Rt. lateral incisor was placed on the cleft region three times. Although osseointegration failed on this area, functional and structural rehabilitation of defect area was nevertheless established successfully. As a result of block bone graft and oronasal fistula closure, reconstruction and repair of complete dental arch furnished prosthetic restoration with stable constituent.

IV. DISCUSSION

Before the prosthetic restoration, an intraoral examination of cleft palate and alveolus patients begins with the identification of the teeth present. The quality and position of the teeth influence the type of prosthesis utilized. The integrity and amount of attached gingiva has to be recorded, and the position and size of any mucosal defects, the presence of oro-nasal and naso-labial fistula also has to be noted.

The use of dental implants combined with autogenous bone grafts as part of a cleft patient rehabilitation program and as a safe alternative to orthodontic techniques of dental gap closure. Onlay grafting provides for appropriate alveolar bone height and width in patients with alveolar local bone defects. In patients with insufficient alveolar bone width, onlay bone grafting should be performed before implantation. The procedure described is effective in that the alveolar bone height may be increased simultaneously with insertion of the implant.

On the other hand, Skoog et al.^{10,11} suggested that periosteoplasty procedure which leads to the formation of new bone within the alveolar cleft area in spite of the fact that no bone graft is used. The new bone induced by the local periosteum in the alveolar cleft are after delayed periosteoplasty had the qualities of alveolar bone. The periosteal continuity is established between the maxillary segments by transferred local periosteal membranes.¹²

In the alveolar cleft, combined grafting with PRP also may enhance accelerated bone remodeling in the early phase. Chio et al.¹³ reported that when

considering the cleft types, a desirable effect of PRP on bone density was observed in patients with UCLA (uni-lateral cleft lip and alveolar process). PRP exerts a useful effect on the narrow cleft type.

In this case for evaluation of pre-operatively bone defect and postoperatively bone graft state, CT-based three-dimensional navigation system was used, in which the three-dimensional software enabled visualization of the bone transplant three dimensionally on the workstation. Information on the amount of bone, especially in the buccopalatal direction, is essential to treatment planning. CBCT has fewer metal artifacts than CT and is successful in clinical use, e.g., in patients with cleft lip and palate orthodontic treatment. Articles about the use of CBCT for surgical navigation mainly report the use in dental implant placement.

Kramer et al.⁸ reported that implant survival was less in cleft palate patients (resulting in an implant survival rate of 82.2%) when compared to implant insertions in a non-cleft control group, but improved when compared to patients with bone grafting for other indications. It was concluded that implants combined with bone grafting can offer a reliable alternative in patients with cleft palate.

There is several factors that influence increasing of success rate when implants placed into the grafted cleft site. A review of the literature suggested that primary stability at placement is the key to treatment success.^{14,15} Kearns et al.¹⁴ indicated that the longer the interval between the bone graft and implant placement, the greater the likelihood of alveolar bone resorption. But implants placed immediately together with bone grafting were less successful than implants placed at 3 to 6

months after bone grafting.^{4,8,14} Implant length has also been reported to be a prognostic factor. Longer implants had significantly better survival rates; other parameters such as age, gender or different implant characteristics had no significant effect on implant survival. Kramer et al.⁸ reported that implant length of 13mm or more give a significantly enhanced survival rate (93.1%) when compared with shorter implants (62.1%).

Hartel et al.⁵ said that a dental implant in the alveolar cleft may be lost because of its unfavourable location in terms of stability and function. Placement in unfavorable positions and directions probably influence marginal bone loss, as chronic inflammation tends to occur near such implants, and also scars resulting from previous surgery can also play a role in the failure of an implant.

In our study, implant placed on #12 area was failed repeatedly in spite of 2 times re-implantation. It shows that re-implantation on the fail site was unpredictable in the cleft palate case possessing the possibility of marked scar formation. But we not only eliminated oronasal fistula, but also obtained functional and structure rehabilitation. It was result from success of block bone graft by using iliac bone.

V. CONCLUSIONS

Implant treatment at the cleft site offers a reliable choice with sufficient bone volume in an adequate position and direction for implant placement. In the presented case, we could reconstruct the cleft and alveolus successfully, by onlay graft harvested from iliac and vestibuloplasty. But implantation on

the cleft area was challenging due to dealing with scar tissues.

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Abstract

구개열 환자에서의 상악전치부 임플란트 식립 : 증례보고

김윤선, 손효정, 장호열, 이장렬, 김현철, 이상철

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목적 : 구개열 환자의 경우, 치아 상실을 포함한 다량의 골조직 및 연조직 결손을 나타낸다. 상실치 치아 수복은 수술과 교정이 완료된 치료의 마지막 단계에서 생각되어야 하는데 임플란트 식립을 통한 수복은 적절한 방법 중 하나이다. 성공적인 임플란트 식립을 위해서는 골이식이 선행되어야 하는데 자가골이 추천되어진다. 이에 저자들은 구개열 환자의 결손부위 재건과 상악 전치부 임플란트 식립을 통한 치아 수복 증례를 통하여 구개열 결손부의 골이식을 동반한 재건과 임플란트 식립에 대해 보고하고자 한다.

증례 : 47세 남자환자로 전체적인 구강검진 및 치과진료를 주소로 본원에 내원하였다. 상악 전치부 상실 및 구개열을 보였고 가치가 장착되어 있었으며 하악 우측 구치부 대구치 상실 및 만성치주염이 관찰되었다. 전신병력 상 특이사항은 없었다. 상악전치부 수복에 앞서 하악 좌, 우측 구치부 임플란트 식립 및 보철치료를 진행하여 구치부 수복을 먼저 시행하였다. 이후 전신마취하의 장골이식을 통하여 구개열 부위 결손을 재건하고 약 7개월뒤 해당 부위에 상악 우측 측절치 임플란트 식립을 시행하였다. 임플란트 식립 후 임플란트 실패로 인한 재식립, 재실패 과정을 거쳐 약 1년뒤 통상의 보철물을 수복하였다.

결론 : 구개열과 치조골 결손부는 자가골 이식을 통해 재건되었고 동시에 구강-비강 누루관 또한 폐쇄되었다. 자가골 이식 술식은 술전 술후 3-D CT를 이용해 정확하게 계획, 평가되었으며 PRP를 동반한 장골이식을 통해 이루어졌다. 구개열 결손부의 임플란트 실패와 재식립에도 불구하고 연조직 성형을 위한 치은점막수술 시행과 최종 보철 수복물 장착을 통해 성공적인 결과를 얻을수 있었다.