



TREATMENT OF ANODONTIA IN A PATIENT WITH ECTODERMAL DYSPLASIA BY FULL MOUTH IMPLANTS REHABILITATION AFTER 3-DS RIDGE AUGMENTATION, NASAL FLOOR ELEVATION AND BILATERAL INFERIOR ALVEOLAR NERVE TRANSPOSITION.

Dental Science

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ABSTRACT

Ectodermal dysplasia(ED) is a hereditary disorders involving absence or Deficiency of tissues and structures derived from the embryonic ectoderm. Tooth agenesis is a common occurrence in patients with ED. Dental implants are an acceptable and safe rehabilitation solution in the adult patients, but usually need bone grafting as a first stage.

Patient and methods: A 23-year-old male presented with anodontia and severe atrophy of the alveolar ridges associated with ectodermal dysplasia. He was treated with 3Ds bone augmentation of the maxilla and the anterior mandible. Bone blocks were harvested from the anterior iliac crest. Bilateral inferior alveolar nerve transposition of the posterior mandible were performed at this surgery. Seventeen implants were placed, eight in the maxilla and nine in the mandible. A Cement - retained full mouth implants full zirconia were fabricated 4 months after the implants placement. Results: the outcome of the treatment provided the patient oral rehabilitation with fixed prosthesis over dental implants that enhanced the patients function and esthetics. The treatment may have a great impact at the patient quality of life and the self- esteem. This patient is followed for 22 months.

Conclusions: the combination of 3Ds bone augmentation, nasal floor elevation and bilateral inferior alveolar nerve transposition can give the adult patients with ectodermal dysplasia the opportunity to have full mouth rehabilitation over dental implants.

KEYWORDS

Ectodermal dysplasia, Anodontia, bone augmentation, nerve transposition, nasal floor augmentation.

INTRODUCTION

Ectodermal dysplasia(ED) is a hereditary disorders involving absence or Deficiency of tissues and structures derived from the embryonic ectoderm (1). Tooth agenesis is a common occurrence in patients with ED. The congenital absence of teeth have significant impact upon oral health-related quality of life (2). Furthermore tooth agenesis may lead to reduced alveolar bone growth, and those cases usually have atrophied jaws.

Oral rehabilitation of ED patients has historically involved partial or complete removable prostheses supported by tissue. The development and acceptance of endosseous dental implants has provided an additional treatment modality for these patients (3). In order to place dental implants in accurate functional and esthetic locations, majorbone augmentation procedures are usually required.

Many reconstructive augmentation procedures have been suggested for the atrophied maxillae and the atrophied mandible before implant placement (4-10). Rehabilitation of edentulous posterior mandibular regions with severe ridge atrophy using implants is subject to anatomical, surgical, and biological difficulties, and poses a challenge to the dental team. In that situation, reconstructive options include the use of short implants, guided implants insertion, inlay/onlay bone grafting to increase the ridge height and width, distraction osteogenesis, and inferior alveolar nerve transposition (11).

Inferior alveolar nerve transposition for endosseous implants has been used more than 30 years(12). This procedure is sometimes the only option to rehabilitate severely atrophied posterior mandible with fixed prosthesis over implants.

The advantage of IAN transposition include the ability to place longer fixtures and to engage two cortices for initial implant stability. Apart from longer implants, IAN transposition allows first for the use of greater number of implants, which improves the overall strength of the final prosthesis (11,12).

The aim of this paper is to introduce a modality for treatment of a patient with ectodermal dysplasia that suffered of severely atrophied jaws and teeth agenesis.

Case Report

A23-years old male was referred to our department for rehabilitation with fixed prosthesis over implants at his both jaws. The patient had tooth agenesis due to ectodermal dysplasia.

Extraoral examination revealed a decreased lower face height,

edentulous appearance, and protuberant lower lip (fig 1a). Phonetic problems were also obvious. Slight mandibular prognathism was also observed (fig 1b).

Intraoral examination revealed an edentulous mandible. At the maxilla two maxillary first molars were found. A prominent view of severely atrophied jaws was observed (fig 1c and 1d). On the radiographic examination, complete edentulous the both jaws except of two molars at the maxilla (fig 1e). Cone Beam Cross Sectional Computed Tomography (CBCT) was performed to assess the bone dimensions of the jaws, and revealed that the ridges in both the maxilla and the mandible were extremely atrophied horizontally and vertically with knife edge (fig 1f to 1j).

The patient treatment plan included reconstruction of the atrophied ridges in three dimensions, nasal floor elevation, and bilateral inferior alveolar nerve transposition at the posterior mandible. Placement of dental implants in good anatomical locations to give the ability for final rehabilitation with fixed prosthesis over the inserted implants. The treatment plan employed a staged approach and was divided in three stages. After written informed consent. At the first stage the patient underwent maxillary three dimensional bone augmentation with onlay autogenic bone blocks and nasal floor elevation(fig 2a and 2b). The anterior mandible was accessed extraorally via submental incision and onlay autogenic bone blocks were also used to augment the anterior mandible between the two mental foramina(fig2c and 2d). The patient right anterior crest was addressed for harvesting of bone blocks (fig2e and 2f). The radiographs obtained after this stage demonstrated the bone grafted regions (fig 3a and 3b).

Four months after the first surgery the patient sent to CBCT, that revealed a good new bone gain at the augmented sites (fig 4a to 4f).

At the second stage surgery, the patient underwent placement of 8 implants between the pre-existing first molars (fig 5a and 5b). At his mandible 9 implants were placed. At the posterior sites bilateral inferior alveolar nerve transposition was performed simultaneously with the implants insertion (fig 5c to 5j). The panoramic radiograph after the second surgery showed the satisfied implants locations and dimensions (fig 5h). At three months after the second surgery the patient was referred to his prosthodontics for fixed prosthesis over the implants (fig 6a to 6e). The patient is followed 22 months with excellent esthetic and functional outcomes. He stated a huge improvement in his quality of life, he can eat, smile, and speak clearly.

RESULTS

The recovery of the patient from the first surgery was uneventful, and

excellent bone gain that was obtained. The horizontal bone gain at the maxilla and the mandible was 5-7mm, and the nasal floor augmentation enhanced the bone height at the maxilla. The second surgical procedures healed with minor complications. The inferior alveolar nerve transposition allowed the insertion of long implants at the posterior mandible. The recovery of the nerves was completed after 3 month with complete resolution of the paraesthesia.

Seventeen implants were placed in the both jaws with good dimensions (mean length 13mm, mean width 3.75). The implants were inserted in good anatomical locations.

The outcome of the treatment provided the patient oral rehabilitation with fixed prosthesis over dental implants that enhanced the patients function and esthetics. The treatment had a great impact at the patient quality of life and the self- esteem. This patient is followed till now for 22 months.

DISCUSSION

Dental implants are increasingly being used in the management of ED in adult patients that complete their growth (13, 14) Due to tooth agenesis, the bone height and width will not be sufficient for implant insertion without advanced surgical procedures. Our patient, has a mild form of ED with minor extraoral manifestations. He suffered from teeth agenesis, and had only two first maxillary molars. There was severe atrophy of the both jaws and edentulous appearance.

Marked atrophy of the both jaws was obvious intraorally and confirmed by the CBCT. The case required major bone augmentation procedures that were combined by special procedures. In the maxilla nasal floor elevation and augmentation were performed to improve the implants length at the anterior maxilla. At the mandible two special procedures were performed. The first was bone augmentation of the anterior mandible at the inter-foraminae area, and this was performed via extraoral approach in order to prevent incisions inside the mouth at this region. In this way the danger of wound dehiscence over the augmented area was avoided, and the augmented bone blocks were well integrated during the healing period. The external scar was hid under the chin in a skin fold. It heals very well and left invisible.

There are several reports of successful dental implants reconstruction in patients with ectodermal dysplasia. Although most of the reports have addressed implant reconstruction in the severely atrophic maxilla, few have addressed reconstruction of the both maxilla and the mandible(15,16). Further, only a few authors reported the use of implants in the treatment of adult patients with ED and reports on bone augmentation are lacking (15,17).

In this case, the severely atrophied jaws required special procedures to reconstruct both maxilla and mandible. 1- Three dimensional bone augmentation with onlay bone blocks. The mandibular rami and chin are usually utilized as donor sites for bone blocks in bone augmentation(18,19), but in our patient those areas were not an option due to the severe atrophy of the entire mandible.

The donor site for the autogenous corticocancellous block graft was the anterior iliac crest and provided the desired bone volume (20). The surgery to harvest the bone was completed with minor complications.

2- The patient had a wide nose variant. Nasal floor augmentation was performed to increase the length of the future implants that should be inserted at the anterior maxilla. The maxillary sinuses were left intact for utilizing in case the patient needs retreatment with implants in the future.

3- The decision to perform bilateral inferior alveolar nerve transposition for dental implants placement at the patient posterior mandible was made due to severe atrophy of his posterior mandibular ridges with mean bone height above the mandibular nerves of 2- 3mm, the superior location of the inferior alveolar nerves, and the good mandibular height. Long implants were inserted in one stage(mean length 13mm). Nerve transposition has not been well embraced because of the high risk of damaging the inferior alveolar nerve. In systematic review of neurosensory complications, Abayev and Juodzbalys in 2015 found that 99.47% of the cases had transient sensation changes for 1-6 months, and only 0.53% had permanent sensation disturbances (21). In the present case the post- surgical

paraesthesia was the major complication of this surgery but was completely resolved after three months.

The success of the first surgery was good and an excellent bone volume was achieved. Dental implants were placed in the second surgery with good dimensions (mean length 13mm, mean width 3,75mm). The final rehabilitation was performed after successful osseointegration of the implants and completed with two fixed prosthesis over the implants, at the both maxilla and mandible. The final outcomes were satisfied, and excellent function and esthetic were achieved. The most satisfied complement for the outcomes was the comments of the patient "First time in my life I can bite and chewing my food, and I can smile free".

CONCLUSIONS

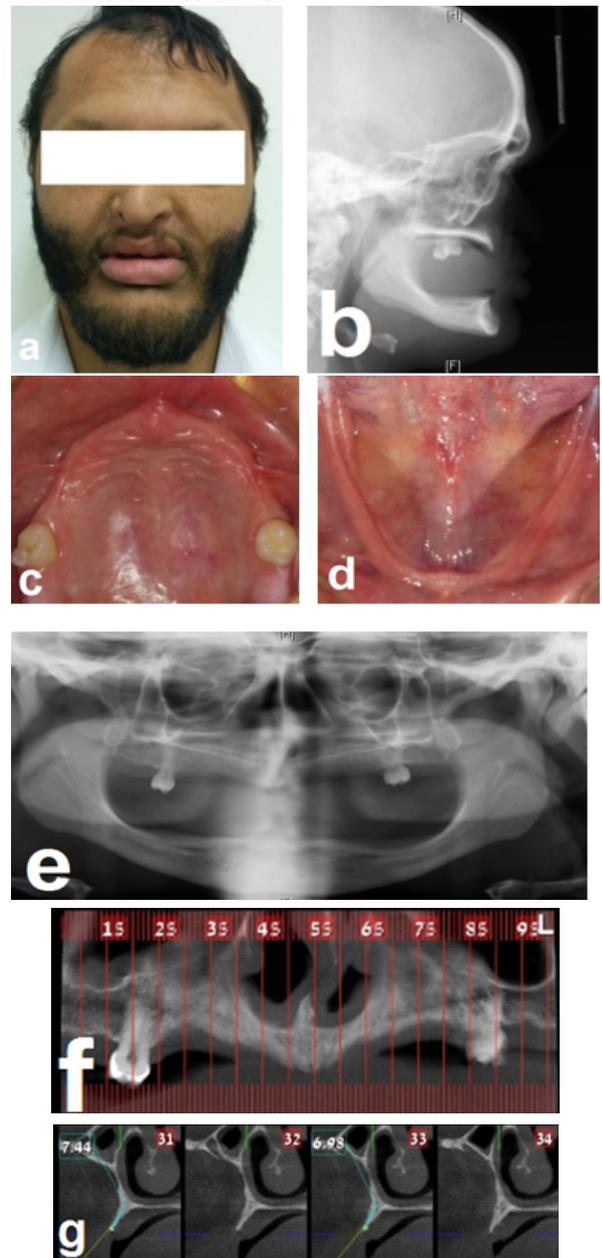
The combination of 3Ds bone augmentation, nasal floor elevation and bilateral inferior alveolar nerve transposition can give the adult patients with ectodermal dysplasia the opportunity to have full mouth rehabilitation over dental implants with final outcomes that improve the patient quality of life.

ACKNOWLEDGEMENT

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Conflicts of interest

There are no conflicts of interest



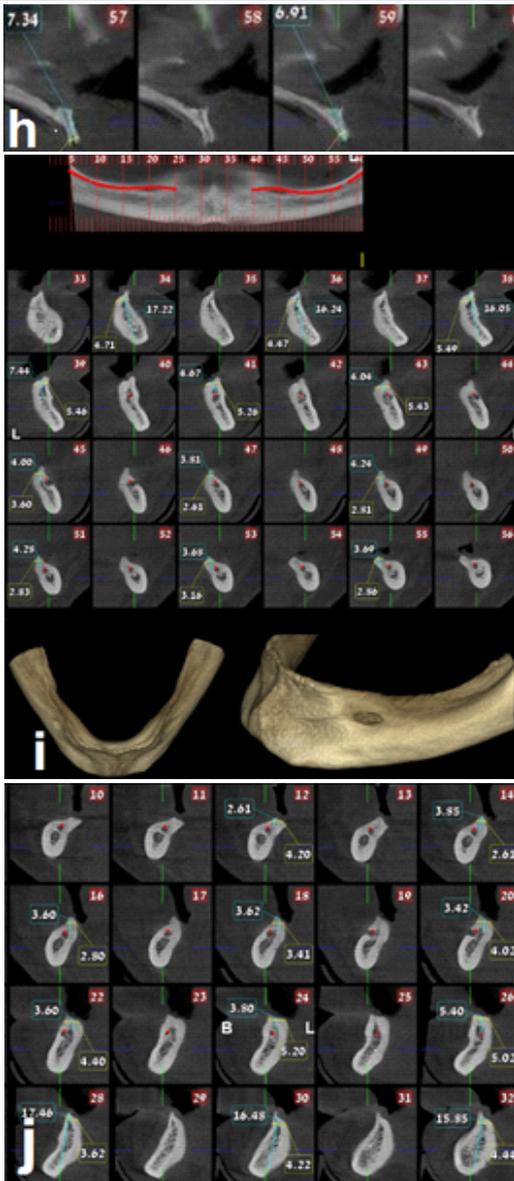


Fig 1a – Clinical view of the patient.
 Fig 2a – Lateral Cephalograph of the patient.
 Fig 1d – Clinical view ; Maxilla with severe atrophy.
 Fig 1e – Panoramic view –
 Fig 1f to 1h – CBCT Maxilla.
 Fig 1i and 1j – CBCT Mandible

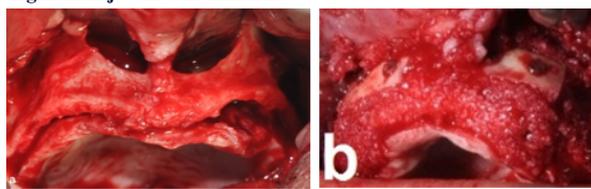


Fig 2 – First Surgery ; Intraoperative views
 Fig 2a - Severe atrophy of the maxilla, nasal floor was elevated.
 Fig 2b – Onlay bone blocks at the maxilla, nasal floor grafting.



Fig 2c – Extraoral Approach to the anterior mandible.
 Fig 2d – Onlay bone blocks at the anterior mandible.

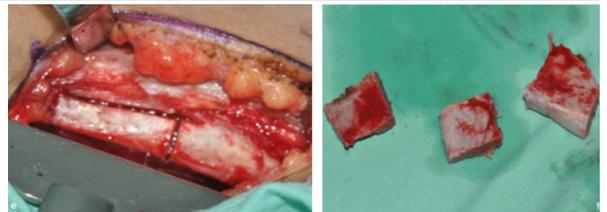


Fig 2e – The anterior iliac crest, the donor site for the bone blocks.
 Fig 2f – The bone blocks harvested from the iliac crest.

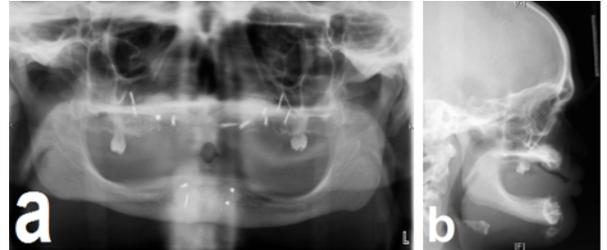


Fig 3 – Radiographic views after the first surgery.
 Fig 3a – panoramic view demonstrates the augmented sites.
 Fig 3b – Lateral cephalogram demonstrates the improvement of the maxillary-mandibular relationship.

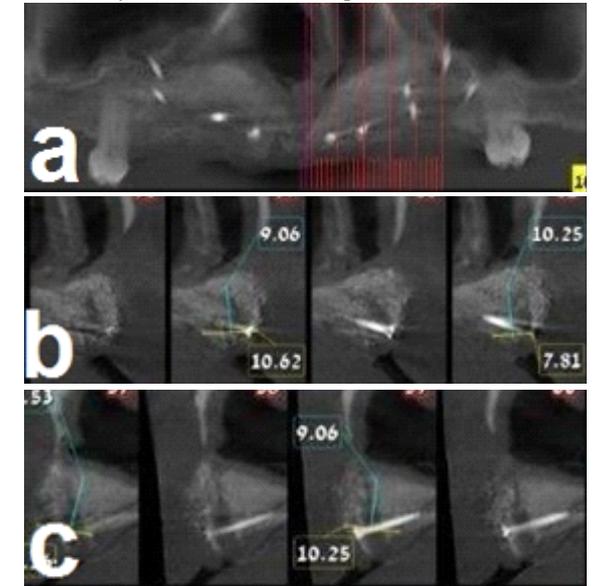


Fig 4 – CBCT four months after the first surgery demonstrates the excellent bone gain of the augmented regions.
 Fig 4a to 4c – Maxilla.

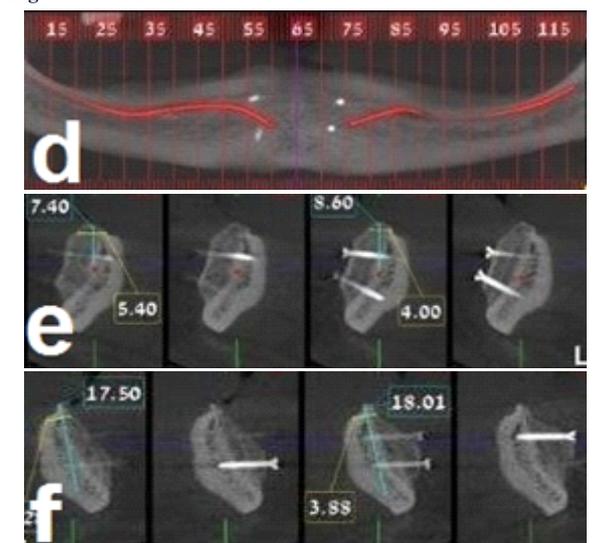


Fig 4d to 4f – Mandible.

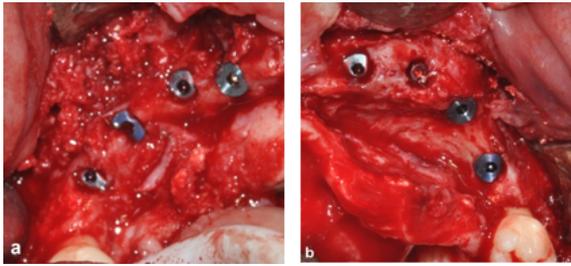


Fig 5 – Intraoperative views during the second surgery
Fig 5a – Implants insertion right maxilla.
Fig 5b – Implants insertion left maxilla.

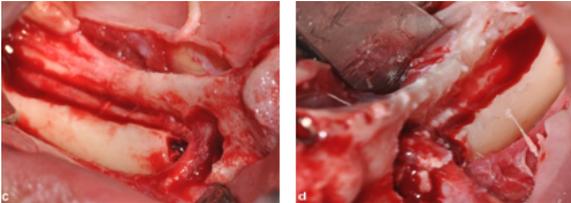


Fig 5c and 5d – Posterior mandibular ridges, the both inferior alveolar nerves were exposed
Right side(5c), Left side(5d).

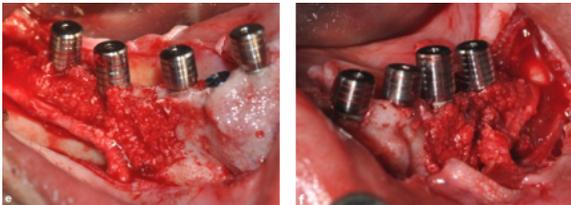


Fig 5e and 5f – Implants insertion, and nerve repositioning; Right side(5e), Left side(5f).

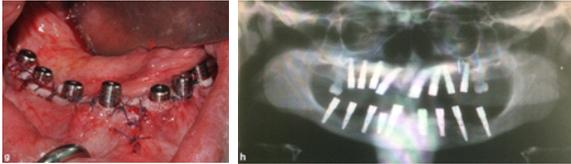


Fig 5g – Clinical view of the implants at the mandible.
Fig 5h- Panoramic radiograph with full mouth implants at the end of the second surgery.



Fig 6 – Full mouth rehabilitation with fixed prosthesis over the implants(one year follow up)
Fig 6a – Extraoral view, harmonic facial profile.



Fig6b to fig 6e – Fixed prosthesis over the implants, intraoral views; Occlusion(6b), Maxillary arch(6c), Mandibular arch(6d).

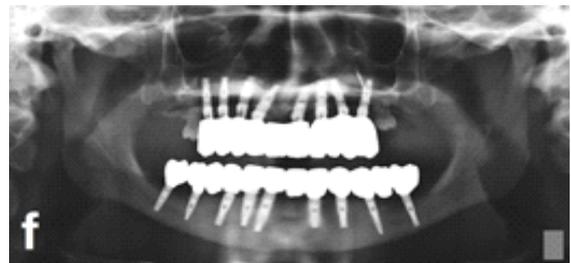


Fig 6e – Panoramic radiograph of the final outcome 12 months follow up.

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