CASE REPORT

Rehabilitation of atrophic mandible with implant retained overdenture: Modified occlusal concept

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ABSTRACT

Implant-stabilized overdentures can be used successfully to restore the atrophic edentulous mouth, and there are many good reasons why this treatment should be selected in preference to using fixed dentures. This article describes surgical and prosthetic rehabilitation of atrophic mandible with modified occlusal concept.

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Case History

The 72 year old patient complained of inability to chew properly, and the existing denture moved during mastication and normal tongue movement. Further, there was a problem with retention and stability of the denture causing recurrent tissue trauma. The patient denied a history of smoking, betel chewing, or alcohol consumption. The patient was physically healthy and was free from any medical history of systemic diseases. The laboratory data of routine blood and serum biochemical analysis were within normal limits. The mouth was completely edentulous with increased interocclusal space with low lip line. The maxilla demonstrated a bowl-shaped resorption pattern with only a partially preserved ridge contour. The atrophic ridge in the mandible had reduced to the basal bone level with only a thin band of non keratinized gingiva. [Fig 1]

Radiographic Examination

Three dimensional 3D diagnostic and treatment planning showed a resorbed mandibular ridge anteriorly with mental foramen reaching the crest bilaterally, the posterior ridge showed a distance of about 6 mm from the inferior alveolar nerve to the alveolar crest. Wical KE et al¹ developed a useful system to determine and classify the amount of mandibular resorption by measuring the distance from the inferior border of the mandible to the inferior border of the mental foramen and then multiplying by three, a reliable estimate of the original height of the alveolar ridge can be obtained. The amount of resorption can be easily calculated and classified into 3 patterns. Approximately two thirds of the mandibular alveolar bone is presenting the class 1 (mild) resorption pattern. A class 2 (moderate) resorption pattern occurs when approximately one third to two thirds of the mandibular alveolar bone remains. Approximately one third or less of the mandibular alveolar bone remains in a
class 3 (severe) resorption pattern. Our patient can be
classified as in between class 2 and class 3 as per
panoramic evaluation. Maxilla had severe resorption of
alveolar ridge and complete pneumatization of maxillary
sinus.[Fig 2,3,4]

Fig 1: Atrophic Edentulous Mandibular Ridge

**Implant Selection Rationale**

The selection of the implants was done on the basis of
2mm osteoplasty procedure, width gained was 5.5mm in
between the foramania region. Four implants of 4.3 mm
by 13 mm were placed in A,B,D and E positions of
edentulous mandible. This was according Misch’s
treatment planning concept of edentulous mandible for
implant retained overdenture. Research has suggested
that short implants experience lower survival (higher
failure rates) when compared with longer implants. It has
been recommended that root form implants be as long
and as wide as possible, within the anatomic limitations
of the patient. This does not mean that the use of short
implants is contraindicated. As long as bone volume is
reasonable, and the patient has a favorable medical
history, looks reasonably healthy, does not smoke, drink,
or use illicit drugs, and satisfactory home care can be
expected, there is nothing contradictory about using short
implants.

**Surgical and Prosthetic Report**

The diagnostic template fabricated from existing denture
was transformed into a surgical template for implant
surgery. The surgical template helped to identify the
tooth positions and their location on the mandible. Under
infiltration anesthesia, a crestal incision was made that
split the tissue between the mental foramina. Care was
taken when approaching the foramen and blunt
dissection was used to locate the openings. Four internal
hex regular-platform implants, 4.3 mm in diameter and
13 mm in length, were inserted (Uniti, Equinox). The
inter foramen area was 44 mm in length and the ridge
was 5.5 mm. This dimension was adequate for four 4.3
mm implants by 11 mm. As the arch form was ovoid,
implants were equidistant from each other, that was
about 5 mm [Fig 5]. One implant failed after one month
which was changed with wider implant and of short
length. Postoperatively patient was kept on antibiotics
and anti-inflammatory drugs for seven days and patient
was told not to wear the lower denture for two weeks.
After three months prosthesis fabrication started with
proper verification with radiographs and percussion of
implants. Indirect impression transfers were attached on
implants, angulations, axial loading and final restoration
outline were verified. Custom trays were fabricated and polyether impression material was used because of its hydrophilicity for border molding and final impression. Abutments were seated on the implants and verified with radiographs, vertical dimension was established along with centric records, this will also establish maxillary occlusal base. Tooth shade and shape selection was done along with face bow and protrusive bite registration. Teeth were arranged and occlusion was established according to the concept of anterior protective occlusion. Occlusal scheme with no anterior contact in centric relation position and minimal anterior contact in excursions; and posteriors will be in medial positioned lingualized occlusion, further reducing the combination syndrome effect. This concept was important to protect the maxillary bone as there will be continuous maxillary ridge width reduction independent of prosthesis type. In the laboratory connecting bar was waxed to reside within the contours of the lower denture and attachments positioned several millimeters below the teeth. Casting was with cobalt chromium molybdenum, the bar was completely parallel to the plane of occlusion without any cantilever with height of 2mm. This will further reduce the loading forces and the clips were positioned on the intaglio surface of the denture with spaces around them[Fig 6]. The prosthesis designed was bar and clip with a low profile type 2 attachment.[Fig 7,8,9,10,11]

Discussion
Several studies have said that overdenture supported by two implants or three or even four implants, the success rate of the prosthesis or the patient acceptance level is not much of a difference. Recently some authors have reported that single implant is adequate for an over

Fig 4: Cephalogram

Fig 5: Four Implants in the mandible equidistant from each other

Fig 6: Intaglio Surface of the denture with clips

Fig 7: Bar screwed on the abutments

Fig 8: Radiograph with the bar

Fig 9: Bar and clip with a low profile type 2 attachment
denture retention and can result in high success rate comparable to over denture supported by multiple implants. However quality and shape of mandibular bone determines the position and number of implants that can be placed. For present case four implants with acceptable platform were easily placed in between foramen. Approximately 17 years ago Steenberghe et al proposed possibility of using over denture supported by two Branemark implants to treat mandibular denture problems with 98% success rate, he further elaborated of placing fewer implants in advantageous sites rather than placing as many implants in limited space to completely rehabilitate an edentulous ridge for fixed or overdenture prosthesis. Four implants with a bar are the best method for rehabilitation of complete atrophic edentulous mandibular arch. The functional requirement with the chosen prosthesis will increase biomechanical support for patient’s poor anterior and posterior lower ridges. Maxillary denture was tissue supported without use of implants. The reason for this type of chosen prosthesis was for the best satisfaction to the patient, a design which can satisfy functional as well as esthetic, social needs of the patient to great extent. However a study conducted by Feline et al said that contrary to expectations, masticatory function of subjects with implant retained overdenture was no less effective than in subjects with fixed prosthesis. Thiel et al recommended no anterior contact in centric relation position and minimal anterior contact in mandibular excursive movements. The vertical movement of the prosthesis was mainly in anterior aspect. Thus described occlusal concept was considered important to preserve maxillary bone.

**Conclusion**

There was complete change in patient’s feelings towards the prosthesis; the feeling of fixed teeth in the mouth was overwhelming. Mandibular overdenture showed higher patient satisfaction than complete dentures. Occlusal concept with minimal or no anterior contact in centric
relation was considered important to preserve maxillary bone in mandibular excursive movements.

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