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Case Report

CBCT Guided Implant Supported Overdenture with Balanced Occlusion - A Case Report

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Abstract: An implant-supported overdenture may be practically advantageous over conventional complete denture and removable partial denture. They reduce bone resorption and has greater prosthesis stability, improved maintenance and better esthetics. Implant supported overdenture may reduce the amount of soft-tissue coverage and extension of the prosthesis. Hygiene condition and home maintenance procedures are improved with the overdenture compared with fixed prosthesis. Implant supported overdenture limits lateral movements and consequently minimize soft-tissue trauma. Greater stability of implant-supported overdenture drives from mechanical attachment of the implant support system retaining the restoration. In severe resorption cases, this is a better alternative than the fixed restoration.

Keywords: CBCT, Implant Supported Overdenture (ISO), Ball abutment, O-ring.

INTRODUCTION

Edentulous patients are a diverse group comprised of those who are anatomically deficient, medically compromised, economically depressed, geriatric, congenitally deformed, genetically affected, as well as the general population that, for a number of other reasons, have been rendered edentulous.

With the continued advancements in dental implant therapy, it is becoming increasingly easier for the clinician to provide treatment solutions that can effectively meet functional, economic and social expectations of each individual patient [1, 2].

Also upgrading awareness about guided implant surgery is important as it has many discernable advantages over conventional implant placement. In the current scenario many patients approach dentists with expectations ranging from painless surgery, aesthetics, retention and short treatment times and so on. We present here, a case report of one such patient with the aim of explaining the clinical protocol to the implant dentist and the general dentist.

CASE REPORT

A 57 Year old male patient, came to the department of prosthodontics, Sree Mookambika Institute of Dental Science, Kulasekharam, Kanyakumari, Tamilnadu, India. with severe periodontal degradation and mobility along with unrestorable root caries. Tooth extraction was the only treatment option possible. The patient was explained about an implant supported complete denture as treatment solution as he was found medically fit. Once the patient accepted the treatment plan and understood the time frame and the procedure involved , all teeth were sequentially extracted over a period of one month.

DIAGNOSTIC TOOL

The growing inclination for the selection of dental implants as a viable alternative to replace missing teeth has necessitated a reliable technique capable of obtaining highly accurate measurements to avoid likely damage to vital structures during implant surgery. Anatomic structures such as the inferior alveolar nerve, maxillary sinus, mental foramen, and adjacent roots are easily viewed using Cone Beam Computed Tomography. Further, these specific CBCT

images permit precise measurement of distance, area, and volume. In this case report CBCT analysis have been done [3, 4].

CBCT-ANALYSIS

- 3-D image of both maxilla & mandible (fig 1).
- Image of maxillary full arch with available bone width & height (fig 2).
- Image of mandibular full arch with available bone width & height (fig 3).
- Favorable region for implant placement (table no-1)

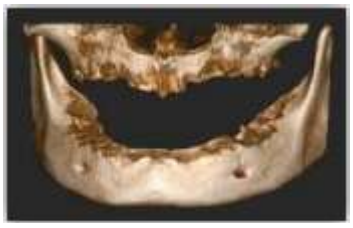

Fig-1: 3-D image of both maxilla & mandible

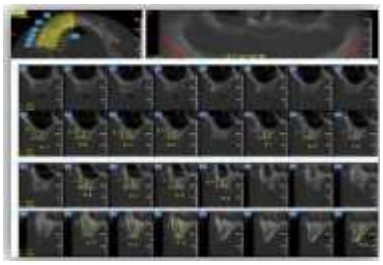

Fig-2: Image of maxillary full arch with available bone width & height

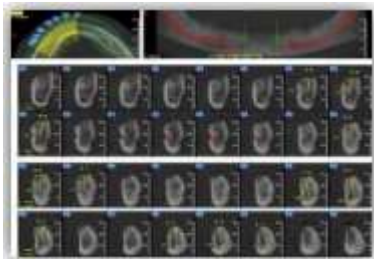

Fig-3: Image of mandibular full arch with available bone width & height

Table 1: Favorable region for implant placement

ANALYSIS OF BONE

MAXILLA				MANDIBLE			
Region	Section no	Height (in mm)	Width (in mm)	Region	Section no	Height (in mm)	Width (in mm)
11	62	11.8	5.7	31	84	17.0	6.7
12	56	13.3	5.2	32	89	16.0	5.6
13	51	13.9	5.7	33	93	12.3	6.3
14	45	6.0	8.4	34	98	12.4	7.2
15	39	7.1	8.8	35	103	13.5	7.6
16	34	6.4	9.0	36	112	12.9	10.3
21	68	18.6	2.7	41	79	9.2	6.4
22	73	10.5	4.7	42	74	17.7	6.2
23	78	11.1	5.5	43	69	17.4	6.2
24	83	10.9	8.9	44	64	19.8	8.7
25	88	6.6	6.0	45	57	12.0	8.4
26	93	4.6	7.2	46	48	12.1	8.4

PHASES OF TREATMENT

- Denture fabrication
- Implant placement
- Abutment placement
- O rings attachment
- Denture insertion

DENTURE FABRICATION

A bilateral balanced complete denture has been fabricated with the help of semi-adjustable articulator (Hanau Wide Vue).

Importance of balanced occlusion in implant overdenture

- Combined tissue and implant supported denture.
- Bilateral balanced occlusion.
- Horizontal axis of rotation of the denture base reduced.
- Very minimal bone resorption
- Increase in retention, stability and support.
- Improved chewing efficiency.
- Improved speech [5, 6].

DENTURE FABRICATION TECHNIQUE

1. Secondary impression has made using c-silicone impression material using special tray fabricated from the primary cast (fig 4).
2. Face bow transfer done later it was transferred to the hanau wide vue semi-adjustable articulator (fig 5).
3. With the help of Gothic arch tracing both centric and protrusive records were obtained to find horizontal condylar angle and Bennett angle (fig 6&7).
4. Teeth arrangement has been done in bilateral balanced occlusion (fig 8).

Fig-4: Secondary impression

Fig-5: Facebow transfer

Fig-6: Gothic arch tracing

Fig-7: Centric and protrusive records

Fig-8: Bilateral balanced teeth arrangement

IMPLANT PLACEMENT

Flapless implant placement in maxillary arch in relation to 13, 11 & 23 (fig 9).

Flap was reflected in mandibular arch in relation to 32 & 42 (fig 10).

Fig-9: Implant placement in maxillary arch

Fig-10: Implant placement in mandibular arch

Fig-11: Post surgical evaluation

After a period of 3 months, post surgical evaluation done (fig 11) re-try in verified (fig 12), to recheck the occlusion before denture fabrication by conventional method using heat cure acrylic resin (fig 13)

Fig-12: Re-try in

Fig-13: Final prosthesis

ABUTMENT PLACEMENT

Ball abutment placed after removing the cover screw in both maxillary and mandibular arch, which act as a male component.

O RING ATTACHEMENT

O rings with plastic sleeves are fixed to the ball abutment, which act as a female component.

Fig-14: Ball abutment in position [male component]

Fig-15: O ring attached to the ball abutments in maxilla and mandible

Space created for o rings in the tissue surface of the both maxillary and mandibular denture in relation to the implants.

Fig-16: Space created for o ring placement

The space was filled with auto polymerizing resin, and placed over the O rings in the patient's mouth at occlusion for the transfer of O ring to the final prosthesis.

Fig-17: O ring attached to the fabricated denture (fig 19 &20)

DENTURE INSERTION

Fig-18: Denture insertion

DISCUSSION

Edentulism is characterized by atrophy of the jaw bone. Studies have shown an average of 4mm bone resorption occurring during the first year of tooth loss and thereby decreasing to 0.5mm per year. Vertical bone height of about 5.2mm is lost under complete dentures over a period of five year. Bone loss under complete dentures continues with the mandible experiencing a four times greater vertical bone loss than the maxilla. Schwartz-Arad et al found that 70 percent of their patients with implant-supported overdentures lost less than .2mm bone in the first year. Misch found that over a five- year period only .6mm of bone will be lost and long term resorption may remain as low as .1mm per year in patients with overdentures supported by implants. Dental implants integrate with the jawbone and dramatically reduce the rate of bone loss attributed to conventional dentures. Implant-supported full bridges and dentures function like tooth roots, which preserves jaw bone. A study was conducted which showed that the patients had better denture function after implant supported overdenture (ISO) treatment. The chewing performance and maximum jaw closing force increased significantly after implant attachment. The ISO treatment increased bite force, increased chewing activity and reduced chewing cycle [7]. With conventional complete dentures, instability and pain during chewing and biting may act as limiting factors for the muscle action [8, 9]. But the implant attachment stabilizes the denture and thereby permits patients to exert higher bite forces and also reduce the pain otherwise felt in the mandible during function. Ball attachment is considered the simplest of attachment for clinical application with tooth or implant supported overdenture. In a comparative study with different attachment systems, the authors reported that the marginal bone stress was less in ball attachments [10]. For new denture wearers or those who have low gagging thresholds, the implant-supported overdenture may reduce the amount of soft tissue coverage and Extension of the prosthesis which is of added advantage.

CONCLUSION

As the upcoming era are determined by branemark introduction of “Third dentition of titanium roots”(i.e.) implants. The implant supported overdenture remains superb, which is less expensive, more stable, more retention and also increase chewing efficiency compare to conventional complete denture. Hence, implant supported overdenture prosthesis, with combining 3D planning and occlusal concepts helps to easily, accurately and predictably rehabilitate edentulous patients.

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