Reconstruction of an Atrophic maxilla using six dental implants

Dr Avik Dandapat presents a case presentation

Presenting complaint: Mrs X attended our clinic in 2011. She was a lady in her 70’s whom had recently lost the upper retainer teeth on her partial chrome denture. She was extremely distressed with her new full upper denture and wanted a more long term solution.

History of complaint

Over the last five years she had worn a partial chrome denture retained by three teeth - these teeth had progressively deteriorated and were recently extracted by her GDP; they had added to the existing chrome denture making a very bulky and heavy upper full denture.

Medical history

Apart from suffering from Bell’s palsy and having a distinct lack of facial muscular function related to the left side, the medical history was unremarkable.

On examination

Extra Oral: TMJ appeared sound and no pathology detected on examination

Lymph nodes: Clear

Muscles of mastication: Appeared normal and with functional limits

Facial muscles: Exhibited atrophy on the left side and the reduced function of the following muscles

Depressor Anguli Oris
Mentalis:
Zygomaticus Major and Minor

The most distinct element we observed was when the patient smiled only the right side of the muscles used in smiling were functional. However the patient was aware of this and understood that we would work in harmony with the current Neuromuscular function.

There was also an obvious loss of maxillary bone and support to the soft tissues and an decreased OVD was also present. All of these issues were corrected by the use of a well-constructed full denture replacing these areas and supporting the soft tissue.

Intra-Oral examination

Soft tissues were clear and free from any pathological signs

Dental Examination: Lower dentition was stable, Oral hygiene was good and BPE no more than 1. Heavily restored molars and another eight remaining teeth present.

On discussion

After the examination we discussed with the patient the various forms of treatment available and also potential levels of investment required for these options listed below:

1. A Complete upper denture
2. A Upper denture retained by four implants and...
splayed with a bar

3. Photo graphs

4. Study models and new temporary denture made to correct OVD, bite and to evaluate tissue support required

5. CT Scans of upper jaw with correct prosthesis in position to study hard tissue relationship to correct tooth position. And to ascertain degree of bone volume/density present. (Fig 1)

Surgical considerations

In such cases my approach is firstly to ascertain the corridor of bone that lies between the medial wall of the maxillary sinus and its position. In order to gain this information one must be familiar with the manipulation of the CT scan image.

Often RAW data is needed to draw the correct cross sectional curve along the desired axis of implant placement. The spatial relationship of bone and exposed titanium may not allow the operator to manipulate this curve. The corridor of bone exists in most patients and can accommodate a longer implant fixture whereby the dental implant head can lie distal to the apex of the implant hence negating the need of a sinus graft hence the implant is placed more distal in the arch. For inexperienced implant dentists a surgical guide to triangulate this position exactly is an absolute requirement. In practice this area can be marked out as the zygoma has a distinct curvature on exposure of the maxillary jaw.

Where the curvature or bulbosity starts is usually the position of the medial wall of the maxillary sinus; by using osseotomes, drills and reconfirming this position can be achieved in two ways. Perforating into the sinus via the lateral wall and palpation of the medial wall and mark points at 5.6, 1.1mm - or by intra oral X-rays and check the ostotomy site for perforations during surgery. I recognise these are not ever as accurate as a CT guided stent and the author would always recommend a bone supported stent in these cases as opposed to a soft tissue supported guide.

The other consideration is the space along the horizontal plane to place four or up to six implants. Although there is a lot of literature relating to “all on four” technique the author prefers, where possible, to place six implants simply because if a failure occurs (current accepted two in every 100 or two per cent will fail) there is a backup of still making a final prosthesis on five or four implants if equally spread along the arch. One must also consider the A-P(Anterior - Posterior) spread of the implants.

In such cases there must be adequate AP spread to allow for favourable loading of the prosthesis as using this technique cantilevering will be required in most cases. The picture shows a favourable arch form (rounded) for a better AP spread when compared to a squared arch form.

Healing

After placement of the six dental implants a post-operative OPG was taken and the denture relined with soft reline material over the healing abutments placed. In this case I opted for transmucosal healing as we achieved high levels of primary stability on all the implants. In this case the distal implant on the right side entered the sinus space and we performed a summers lift. The patient was allowed to heal for a period of five months with the temporary reline denture.

Prosthetic protocol

After the healing period all implants were checked using a periostat to measure osseointegration. The readings were as follows:

- U3 Implant = -7.0
- U2 Implant = -6.9
- U1 Implant = -8.0
- U1 Implant = -5.0
- U1 Implant = -6.0

All implants had osseointegrated well and showed no pain, mobility, infection, loss of bone or exposed titanium intra orally.

We then carried out the following sequence for restoration:

1. Fixture head impressions linked in a special tray. Using

Fig 4 - Representation of A-P Spread concept needed for cantilevering forces

Post op OPG

Fig.1 Fixtures head impressions in situ

Metal Framework try-in

Peri-implanting jaw

Internal healing abutments

Screw holes

Fig.5 Views of final prosthesis showing measurable gaps and point contact to abutments

Fig.6 Post op - OPG Internal healing abutments Screw holes

UL3 Implant = -6.0
UL2 Implant = -5.0
UL1 Implant = -6.0
UL2 Implant = -5.0
UL1 Implant = -8.0

floss and GC pattern resin to
link impression screws

2. Try-In of the multi-angled
screw retained abutments
with lab made positional jig to
parallel the abutments

3. New impression of the mul-
ti-angled abutments and X-ray
verification of correct seating.
Again these are linked us-
ing GC pattern resin and also
a verification jig made by the
lab to verify accuracy of mod-
el prior to metal framework
construction

4. The denture was relined
again over the new abutments

5. Metal framework try-in -
screw retained and checked
for passive fit using the Shef-
field test. Re-verification of the
midline, re-bite registration, a
new face-bow record, intra-
oral and extra oral photogra-
phy to give the technician suf-
ficient data to make the teeth,
and an idea of degree of soft
tissue support was required

6. A Hybrid Acrylic-Compos-
itive prosthesis was then placed
and checked intra-orally for
aesthetics, lip support and bite.
I had decided to provide a
balanced articulation type of
the occlusal scheme

7. Final fixation of the pros-
thesis and detailed written
and oral instruction given to
the patient. One must consider
cleanable spaces and your lab
must understand this and al-
low for the patient to be able
to clean the spaces underneath
the area around the implant
heads. We provide a waterpik
and review the hygiene hab-
its at three, six and 12 months
post placement

8. The screw holes were then
filled with cotton wool fol-
lowed by flowable composite

9. Post-operative follow ups
at three, six and 12 months
with regular dental checks on
lower dentition and follow-
up x-rays yearly to determine
bone levels after baseline
OPG were taken:

Dr Avik Dandapat qualified from
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2006 in Cohort 3 of the course. Avik
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