Reconstruction of an **Atrophic maxilla** using six dental implants

**Author:** Dr Avik Dandapat

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**Case History:**

**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 and they had added to the existing chrome denture making a very bulky and heavy upper full denture.

**Medical history**
Apart from suffering from Bells pal-sy 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.

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**Fig. 1** Ct Scan showing pre operative situation.
**Fig. 2** Planned implant positions on scanning software.
**Fig. 3** Sectional view of sinus cavity showing complete lack of bone inferior to sinus.
**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 smiles 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 also was an obvious loss of maxillary bone and support to the soft tissues. And an decreased OVD was also present. All however 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 one. 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. An upper denture retained by four implants and splinted with a bar
3. A screw retained hybrid bridge on six dental implants replacing facial support and utilising prosthetic replacement of tissue support but with no grafting or sinus work
4. A full hard and soft tissue reconstruction with hip grafting and up to eight dental implants and a cement retained bridge

After discussion the patient opted for the screw-retained prosthesis based on six dental implants and de-
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decided against extensive and invasive reconstructive surgery. From this point the treatment plan now started.

Initial special tests carried out

1. Impressions

2. Face bow record

3. Photographs

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. Pre-formatted scans on some software platforms 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 cervical 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, then by use of osseotomes, drills and re confirming this position can be achieved in two ways. Perforation into the sinus via the lateral wall and palpation of the medial wall and mark points at 3,6,11mm - or by intra oral X-rays and check the osteotomy 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 as 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 5 or 4 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.

After placement of the six dental implants a post-operative OPG was taken and the denture relined with soft reline material over the healing abut-
ments 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 relined denture.

_Prosthetic protocol_

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

- UR3 Implant = -7.0
- UR2 Implant = -6.9
- UR1 Implant = -5.0
- UL1 Implant = -8.0
- UL2 Implant = -5.0
- UL3 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 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 multi-Angled abutments and X-ray verification of correct seating. Again these are linked using GC pattern resin and also a verification jig made by the lab to verify accuracy of model 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 Sheffield test. Re-verification of the midline, re-bite registration, a new face-bow record, intra-oral and extra oral photography to give the technician sufficient data to make the teeth and an idea of degree of soft tissue support required

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

7. Final fixation of the prosthesis and detailed written and oral instruction given to the patient. One must consider cleanable spaces and your lab must understand this and allow 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 habits at three, six and 12 months post placement

8. The screw holes then filled with cotton wool followed 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 taken.

**Author info**

Dr Avik Dandapat qualified from Birmingham University then went on to complete his MFDS(UK), the Diploma and Advanced certificate in dental Implantology from The Royal College of Surgeons of England in 2006 in Cohort three of the course. Avik has been an ADI mentor for the past eight years and a mentor for both Ankylos and DIO Implant systems. Avik actively lectures at the the FGDS(UK), ADI members forum, Ankylos Implant members forum and is active ADI study club lecturer in dental implantology. At present Avik runs two practices in Reading, Berkshire and 121 Harley Street, London and his focus is solely on implant and reconstructive dentistry. Currently Avik is studying toward his MSc in Implant dentistry from Manchester University. Thanks to my Lab - Medmatch UK - www.Medimag.co.uk and the Dental Implant Manufacturer: DIO Implants UK - www.Dental.co.uk