Viability in simplicity

Mandibular two implant retained overdenture

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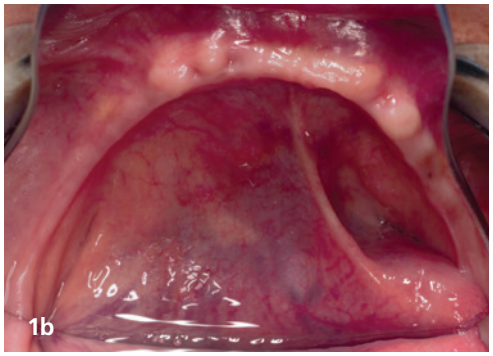
Removable Complete Dentures are commonly fabricated for edentulous jaws. The stability of removable complete denture depends on the height and width of the edentulous area.



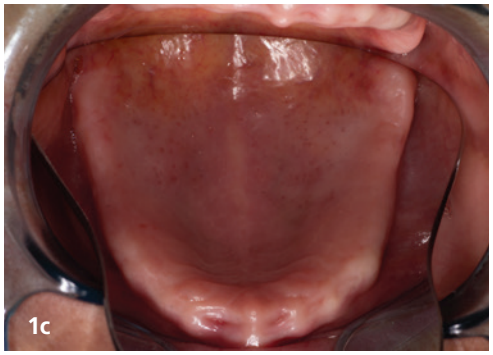


Fig. 1a: Completely edentulous patient. **Fig. 1b:** Mandibular arch with moderate bone loss. **Fig. 1c:** Well formed, broad and rounded maxillary ridge.

Considering the lower coverage area of the mandible, mandibular dentures are usually not as stable as their maxillary counterparts. Furthermore, the constant mobility of the floor of the mouth and movement of the mandible makes them less retentive as well. Faster resorptive changes in the mandible as compared to the maxilla, warrant constant relining or rebasing of the denture, causing decreased acceptability by the patient and the clinician. Hence implant retained mandibular overdentures retained by two implants have emerged as the minimum standard of treatment for rehabilitation of the edentulous mandible.[1]

The preferred choice of treatment between fixed and removable implant-supported overdentures varies across cultures and countries. A survey done across ten countries showed that, in all but two countries, most respondents thought that patients with implant overdentures were equally or more satisfied with overdentures as those with fixed implant-supported prostheses.[2]

Case report

A seventy-year-old woman reported with edentulous jaws (Fig. 1a) and desired replacement of missing teeth and ability to chew comfortably. She had moderate alveolar bone loss in the mandible (Fig. 1b). The maxilla revealed broad, well-formed ridge and sufficient vestibular depth for fabrication of a removable complete denture (Fig. 1c). Radiographic analysis was done with a CBCT (Figs. 2a & 2b). A two-implant retained and a soft-tissue and implant-supported mandibular overdenture was planned for the lower arch. This decision was also based on the fact that the patient had financial constraints.

Preoperative procedures

Stainless steel mesh reinforced removable maxillary and mandibular complete dentures were fabricated (Figs. 3a–3e). Bilateral balanced occlusion was established. Duplication of the lower denture was done, and a clear acrylic stent was made to serve as a surgical guide for implant positioning in the canine region as well as to maintain the crown height space (Fig. 4). The fit of the clear acrylic denture was checked intra-orally (Fig. 5). The Crown-Height Space (CHS) was 13 mm (Fig. 6), which was sufficient for planning the case with free standing stud abutments (retention.loc, bredent medical) for the prosthetic phase.

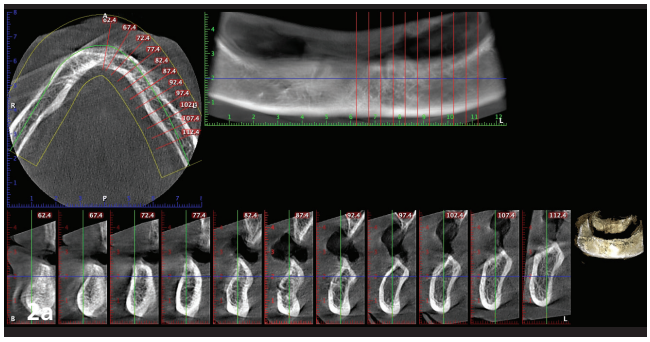
Surgical procedure

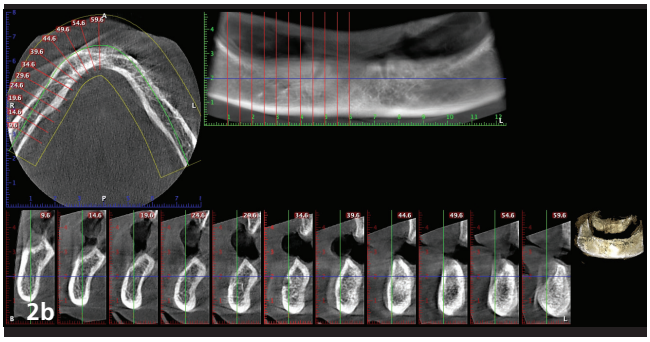
The procedure was done under local anaesthesia by administration of lignocaine 1:100,000 by local infiltration technique. The clear acrylic surgical guide was placed, and the osteotomy sites were marked as

bleeding points on the ridge as per plan (Fig. 7). Implant osteotomy was prepared completely flapless (Fig. 8). The bredent medical mini2SKY implants (3.2 x 12) were placed freehand as parallel to each other as possible. Torque greater than 35 Ncm was achieved on both the implants. The implants were loaded immediately. Retention.loc (bredent medical) abutments with height of 2 mm were placed on the external hex of the mini2SKY implants (Fig. 9). There was less than a ten-degree divergence in their parallelism, as indicated by the angle measuring post (Fig. 10). The abutments were tightened with the retention screws. Fixation with mini2SKY retention screw ensures optimal application of force via the precision torx in the implant. Antirotation design of the torx prevents screw loosening.

Prosthetic procedure

Blocking rings were placed on the abutments (Fig. 11) to prevent any acrylic from flowing underneath during the intra-oral pickup. This was followed by placement of the black processing inserts (Fig. 12), which serves the purpose of a spacer for retention inserts in the prosthesis and component on which the final steel housing (male component) is placed (Fig. 13). A through and through hole was made in the acrylic denture (Fig. 14) followed by placing self-cure acrylic resin in the holes and making an intra-oral pickup of the steel housing with the black processing inserts (Fig. 15). The black processing insert was removed using a special tool (SKY locator instrument, bredent medical; Fig. 16) and the silicone retention blue ring (minimum retention) was inserted (Figs. 17a & b). The choice of retention ring was based on the requirement of minimizing the transmission of masticatory forces to the implants during the osseointegration phase since immediate loading was done. There is approximately 0.4 mm of empty space between the male and female components. This procedure creates true vertical resiliency and allows a hinging func-





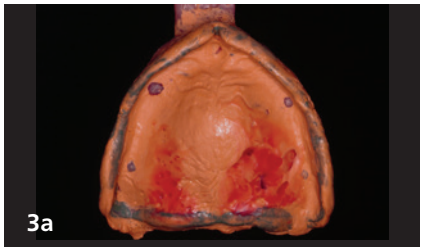


Fig. 2a: Sagittal plates left side. **Fig. 2b:** Sagittal plates right side. **Fig. 3a:** Upper final impression after border moulding. **Fig. 3b:** Lower final impression after border moulding. **Fig. 3c:** Maxillary plane verified intra-orally. **Fig. 3d:** Try-in done. **Fig. 3e:** Dentures fabricated with a balanced occlusion. **Fig. 4:** Clear acrylic stent made from duplicated lower denture. **Fig. 5:** Clear acrylic stent fit checked intra-orally. **Fig. 6:** Checking crown height space (CHS).

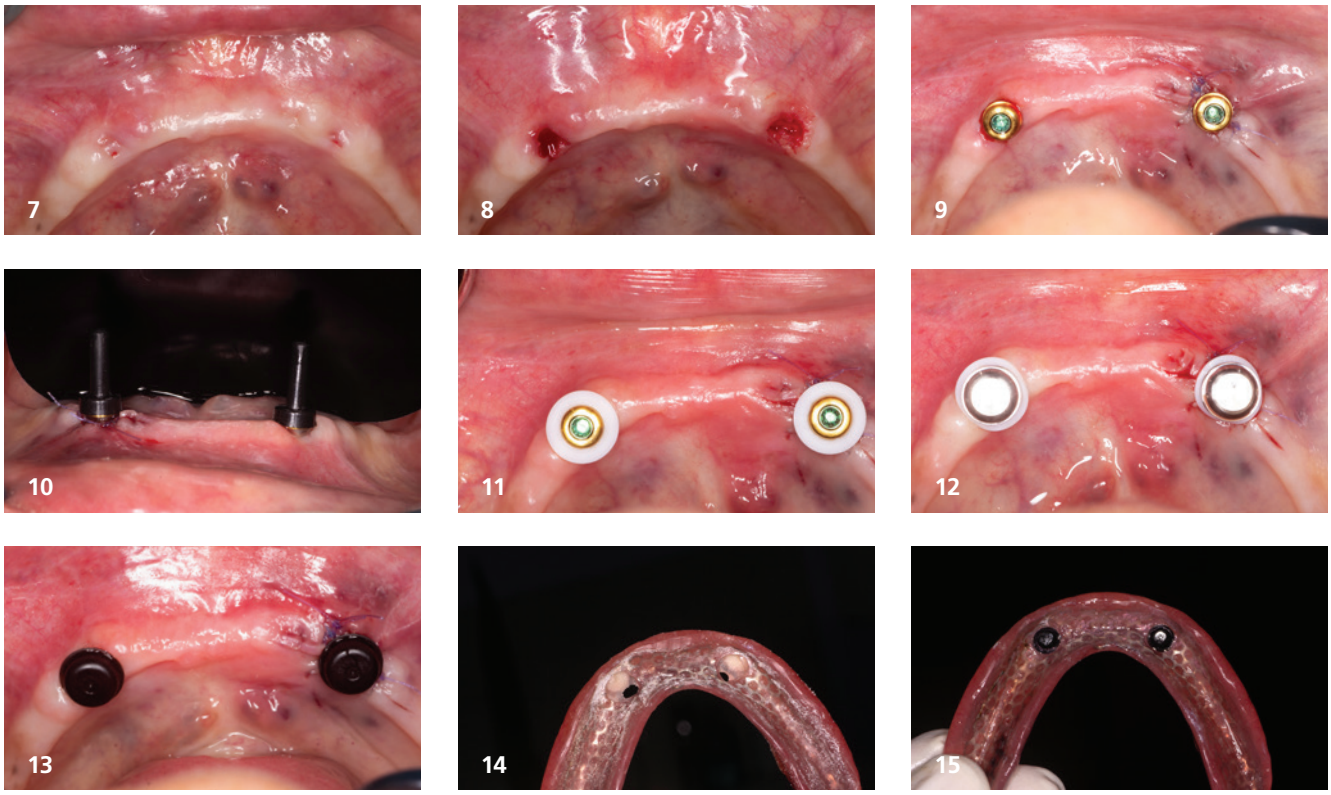


Fig. 7: Marking bleeding points for implant position. **Fig. 8:** Flapless osteotomy site preparation. **Fig. 9:** Retention.loc abutments placed on the external hex of the mini2SKY implants. **Fig. 10:** Angle measuring post showing less than ten degree divergence of the implants. **Fig. 11:** Blocking rings placed. **Fig. 12:** Placement of the final steel housing (male) component. **Fig. 13:** Black processing rings placed. **Fig. 14:** Space created in denture for intra-oral pickup. **Fig. 15:** Intra-oral pickup done.

tion. The retention ring can be changed to an increased retention ring, post osseointegration of implants, if increased denture retention is desired by the patient. Immediate postoperative OPG was taken (Fig. 18). The denture was polished and balanced occlusion was achieved (Fig. 19). The patient was extremely comfortable and satisfied with the comfort and aesthetics achieved (Fig. 20).

The patient reported for a follow-up after two years, the soft-tissue level was stable (Fig. 21). Follow-up X-ray showed stable crestal bone levels (Fig. 22) and the retention of denture was increased by changing the retention insert to pink (Fig. 23).

Discussion

In 2002, a symposium held at McGill University in Canada, focused on the efficacy of available treatments for edentulous patients. The mandibular two-implant overdenture was considered as first choice standard of care for edentulous patients. According to the consensus, a two-implant retained overdenture should be the minimum treatment offered to patients for treating an edentulous mandible. If the patient is willing to continue with the removable prosthesis, an implant-supported overdenture is advocated than the fixed prosthesis.[1]

The literature indicates that implant-supported overdentures in the mandible provide predictable results with improved stability, retention, function, and patient satisfaction compared with conventional dentures with the possibility of incorporation of the existing denture into the new prosthesis as well. Implants placed in the anterior mandible

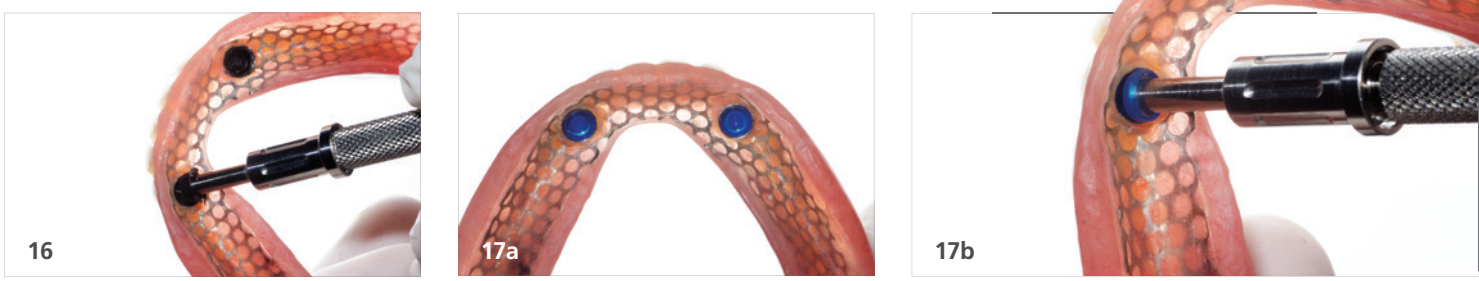


Fig. 16: Special tool used to remove the black processing. **Fig. 17a:** Placing the blue retention ring using the special tool. **Fig. 17b:** Blue retention rings placed.

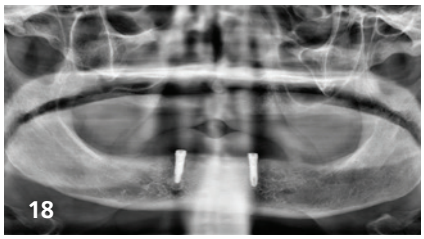
have a success rate equal to or greater than 95 per cent.[3]

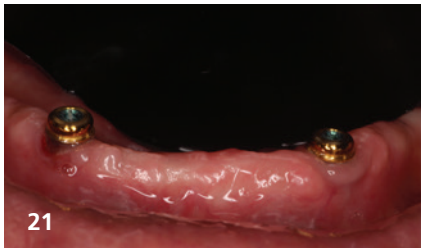
According to Misch et al., the Crown-Height Space (CHS) is an important factor for making a treatment choice in rehabilitation of edentulous jaws. The CHS in the current case was 13 mm and was the determinant factor in treatment planning. The CHS for implant dentistry is measured from the crest of the bone to the plane of occlusion in the posterior region and the incisal edge of the arch in question in the anterior region. A consensus conference on CHS in 2004 concluded that ideally, removable implant overdentures often require ≥ 12 mm CHS for denture teeth and acrylic resin base strength, attachments, bars, and oral hygiene considerations.[4]

The implants were placed as parallel to each other as possible. Parallelism of implants especially when solitary abutments are planned and used is very critical, as abutment non-parallelism leads to faster wear of the matrix.[5] Ideally, the freestanding stud-type attachments should be parallel to each other to provide ease of insertion and removal, and reduce wears potential.[6] Increased implant angulation has been reported to reduce the longevity of the attachment retention by causing premature wear of the components and required increased maintenance.[7]

The two-implant mandibular overdenture with non-splinted abutments was loaded immediately. The immediate loading concept using two non-splinted implants with mandibular overdenture not only achieves clinical and radiographic outcomes similar to those of conventional loading but also improves patient satisfaction. In the early loading protocol, the use of two implants to support a mandibular overdenture attains outcomes similar to that of conventional loading.[8]

The implant-retained overdenture for the mandible has been proven to be a highly successful prosthetic treatment similar to the fixed implant denture.[9] Implant-supported overdentures offer many practical advantages over conventional complete dentures and removable partial dentures. These include decreased bone resorption, reduced prosthesis movement, better aesthetics, improved tooth position, better occlusion, increased occlusal function and maintenance of the occlusal vertical dimension.[10]





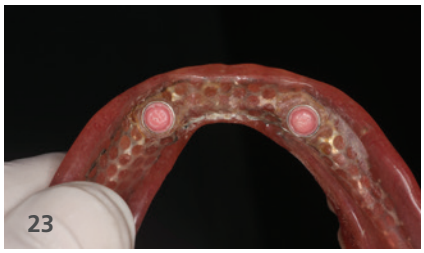


Fig. 18: Immediate postoperative OPG. **Fig. 19:** Balanced occlusion established. **Fig. 20:** Satisfied patient with appealing aesthetics. **Fig. 21:** Two-year follow-up showing stable soft tissue. **Fig. 22:** Two-year follow-up showing stable crestal bone levels. **Fig. 23:** Retention ring changed to the more retentive pink retention ring.

Conclusion

The rehabilitation of the edentulous jaw with implants can be carried out using an array of surgical and prosthetic treatment options. Treatment choice should be a combination of clinicians' expertise and comfort along with expectation and economic viability of the patient. Holistic treatment with pre-prosthetic planning and radiographs are crucial and aid decision making for long term success of the prosthesis irrespective of the number of implants or the type of prosthesis chosen.

References

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