MINI IMPLANTS IN STABILIZING A LOOSE LOWER DENTURE

By Dr Jeffrey Kho

Many people in Australia are edentulous.¹ Those who have full dentures often complain of a loose lower denture. Despite our best efforts to fabricate a retentive prosthesis, an inadequate mandibular ridge results in a loose denture and an unhappy patient. Some of these patients are elderly and physically debilitated. Often, due to their health issues, they cannot undergo the surgery associated with conventional implant placement. Many do not have adequate funds to pay for comprehensive, expensive treatment plans. When an inadequate bone width is present for conventional implants, most practitioners think of bone grafting.² However, few patients desire, or can afford, bone grafting and the extra surgical procedures.

Mini dental implants were first used successfully as interim implants to support provisional prostheses, while conventional diameter implants were integrating.²-³ When attempting to remove these interim mini-implants, dentists found that they could not easily be removed, because they had already integrated with bone.³

Mini dental implants (MDIs) are root-form implants ranging from 1.8-2.4mm in diameter. Lengths range from 10mm – 18mm. They first received approval for long-term use in 2003.²

The main advantage of MDIs is the minimally invasive, single stage placement procedure. The insertion of the implants does not require the raising of a flap and full-depth osteotomy. This technique requires turning of the MDI into bone through a pilot hole, but not a prepared bone site. Bleeding and post operative discomfort are usually reduced and healing time is shortened. Generally, MDIs are loaded immediately as long as primary stability is achieved.²-⁸

CASE REPORT

A 61 year old patient presented to the clinic dissatisfied with his current dentures, particularly the loose lower prosthesis. He had been edentulous for over 20 years and had worn full dentures since. (Figure 1) The patient was presented with several options including a fixed prostheses, which he could not afford. A replica of his current lower denture was made using lab putty (Coltene Altstätten Switzerland) placed inside a denture container. The denture container was half-filled with lab putty and the lower denture seated firmly into it. Vaseline was applied liberally to both the putty and denture. The remainder of the container was filled with putty and the lid closed until set. Once set, the two halves of the putty were separated using a spatula and the
denture cleaned and returned to the patient. This putty was then sent to the lab technician to construct the replica denture in a clear acrylic. Upon return, four holes were drilled into the clear implant stent in the anticipated implant positions. These holes were then plugged with GP points and seared with a heated instrument. This completed the fabrication of the implant stent. (Figure 2) This was given to the patient to wear during the cone beam scan of the anterior mandible.

The cone beam was taken in order to evaluate the suitability of mini implant insertion, to determine number of implants, the optimal implant lengths, insertion angle, ridge shape and avoidance of vital structures eg. Mental foramina, lingual artery. (Figure 3). After radiographic assessment, it was deemed appropriate to proceed with the procedure.

A bilateral mental nerve block was performed with 2% lignospan (Septodont Cedex, France). The exact positions of the mental foramina were located by pulling the lip downwards and running a ball burnisher along the buccal area until it sank into an obvious depression. An appropriate mark was made on the crest of the ridge to mark this spot on both sides using a color transfer applicator.(Great Plains Dental, Kingman, Kansas, US). The GP in the implant stent was removed from the four sites using a straight probe. The stent was placed in the mouth and seated. A straight probe was inserted in the holes through to the gingival tissue and firmly pressed to make bleeding points on the gum. With reference to the cone beam scan, the ideal entry points for the implants were marked with the color applicator. (Figure 4)

The gingiva was punctured on the marked spots with a high speed round bur. The bone was initially drilled with a surgical drill (3M ESPE, St Paul Minnesota, USA) of 1.1mm diameter just past the cortical bone. This was then repeated in the other three implant sites. After drilling, the MDI Classic Standard 1.8mmx13mm was screwed into the bone site using the manual screw driver (3M ESPE). (Figure 5 and 6) This was repeated in the other three implant sites. Quarter turns (each taking five seconds) of the implant were slowly carried out on each implant in turn. (Figure 7) Once further progress became difficult, the winged thumb driver (3M ESPE) was used to turn the implant down to length. Again, this was performed in turn, one at a time. Adequate amounts of irrigation using cold saline were delivered to the implants during each turn to prevent excessive heat formation. The final thread was turned using the ratchet torque wrench (3M ESPE) to 35N/cm². (Figure 8)

Rubber block out shims (3M ESPE) were cut and placed over each implant and metal housings attached. (Figure 9) SS White paste (SS white Gloucester England) was smeared on the heads of each metal housing. The denture was returned to the mouth to transfer the paste. An acrylic bur was then used to drill out the intaglio of the denture to ensure proper seating of the denture in the mouth. The bite was checked with occlusal paper before proceeding.

Vaseline was applied to the periphery of the denture and adhesive applied to the troughed out areas. Secure hard reline (3M ESPE) was expressed onto the metal housings and also in the denture. This was then placed in the mouth.
Mini implants are not a fix for poorly made dentures. In fact, a well-made denture is essential for long term success of the implants.

DISCUSSION
MDIs are a relatively new option and as such do not have the long-term studies associated with conventional implants. The longest study was conducted by Shatkin et al., was a retrospective analysis of 2514 MDIs placed over five years on both prostheses. The survival rate was 94.2%.

With MDIs the most important factor for osseointegration is good primary stability. It is recommended to drill the pilot hole only 1/3rd the length of the implant. However, in extremely dense bone it can be impossible to hand screw the implant down to length. In these cases, re-entry of the site and further drilling to 2/3rds the implant length may be necessary. A good initial stability will definitely be achieved in these situations.

MDIs are not a substitute for conventional implants. They can be used as an alternative when there is a lack of buccal-lingual bone width, patients are unable to undergo more extensive grafting or surgical procedures, treatment duration is an issue, or when financial reasons preclude standard-sized implant placement.

Many practitioners see the use of MDIs as “easier” and “simpler” than conventional implants. In many ways, this may be the case: it is a flapless surgery, does not attract the high start up fees associated with conventional implants, and can be loaded immediately. However, placement of the implant, in many ways can be more difficult than standard implants. Due to its flapless nature, visualising the correct angulation of the implant can be challenging for the inexperienced practitioner. Furthermore, as the patient is usually edentulous, there are no surrounding teeth which can be utilised as reference points. This can lead to implants that are not in ideal positions and can result in a faster wear rate of the silicon o-rings in the metal housings.

It is important for the practitioner to remember that with mini implants, the prosthesis is implant retained, but still tissue supported. Thus it is essential for the long term success of the implants that the denture is made as well fitting as possible. Tired, worn out dentures are unsuitable and require a new prosthesis to be made prior to implant placement.
CONCLUSION

There are many advantages of the use of mini dental implants from both a practitioner and patient perspective. For the general dentist starting out in implant dentistry, their placement can be more challenging than conventional implants. It requires a different skill set, but one which can be learned with proper guidance and practice.

Overall, MDIs are a highly successful implant option and should be given consideration during prosthetic treatment planning for the edentulous mandible.

Figure 1: Presenting lower ridge condition of patient

Figure 2: Replica of patients existing denture with holes drilled and then filled with gutta percha.
Figure 3: Pre operative cone beam assessment. Note the gutta percha point showing estimated future implant site.

Figure 4: Four implant sites and the mental foramina sites marked with color applicator.

Figure 5: Finger driver (left) and Winged Thumb Wrench (right).
Figure 6: Mini implant straight after removal from sterile packaging. Note rubber handle still attached.

Figure 7: Insertion of implants.

Figure 8: Final positions of implants.

Figure 9: Placement of metal housings on top of the implants.
Figure 10: Application of vaseline to the periphery of denture

Figure 11: Application of adhesive to the troughed out area of the denture.

Figure 12: Extrusion of SECURE Hard Reline material into the denture.

Figure 13: Lower denture with metal housings, after final trimming and polishing
Dr Jeffrey Kho graduated from the University of Queensland in 2005 and has placed mini implants since 2007. He holds a mentorship role with 3M ESPE mini implants and maintains a private practice in Brisbane.

REFERENCES