Implants for the narrow edentulous site: The use of the NobelDirect 3.0 implant

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Placement of dental implants is subject to certain spacial requirements to ensure successful osseointegration and for optimal aesthetics, phoentics and function. This space is necessary so that damage is not done to the adjacent teeth during the drilling process; and that there is adequate space for hygiene, aesthetics and development of emergence profiles. Encroachment of this space can lead to unacceptable aesthetics, poor hygiene, non-vitality of adjacent teeth, loss of bone and/or attachment with a multitude of other prosthetic complications.

The space requirements are:

- Between teeth and implant: 1.5mm (Esposito et al, 1993); and
- Between implants: 3mm (Tarnow et al, 2000).

The smallest implants in the past have been 3.3 to 3.5mm in diameter that, when the space requirements are extrapolated from the above, would lead to minimum space requirements of approximately 6.5mm. Anything less than this space would lead to possible risk of complications during the insertion process. In this situation, the only other situation has been orthodontic treatment to enlarge the space for Mesial-Distal deficiencies and bone grafting for bucco-lingual deficiencies before implant placement.

Nobel Biocare has released the NobelDirect 3.0 implant, which is a solid implant that is one of the smallest implants on the market (excluding mini-implants and provisional implants). Due to its solid one-piece design, there is minimal chance of fracture of the implant, which is a distinct possibility with previous narrow dimension implants. This solid design has an integrated abutment, which is prepared like conventional crown and bridgework. It is the first FDA cleared 3mm implant.

This implant allows placement into an edentulous site that measures only 6mm, which can be favourable for the mandibular incisor region and some maxillary lateral incisors or in other narrow edentulous sites.

Figure 1. NobelDirect 3.0 implant. Note integrated abutment.

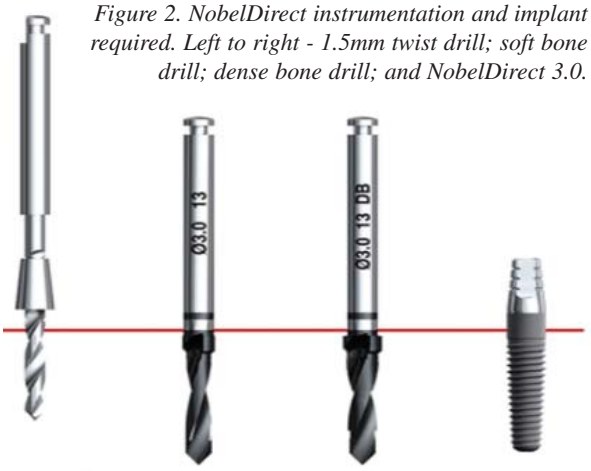

Figure 2. NobelDirect instrumentation and implant required. Left to right - 1.5mm twist drill; soft bone drill; dense bone drill; and NobelDirect 3.0.

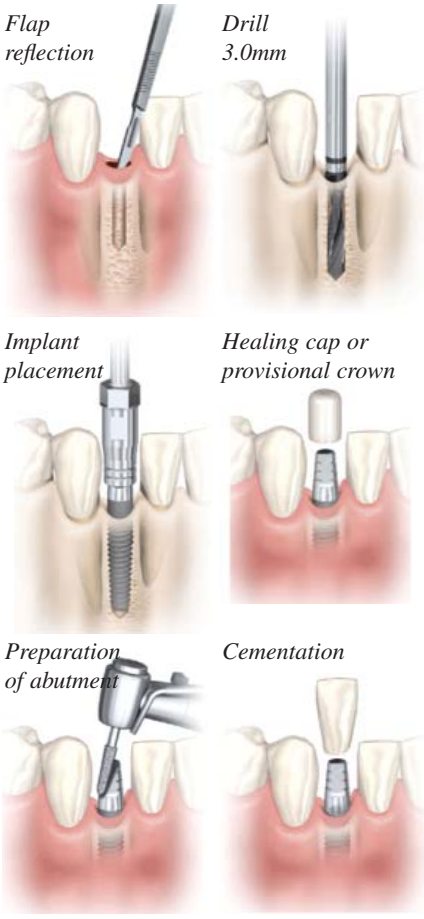

Figure 3. NobelDirect procedure.

The implant is available in two lengths - 10 and 13mm - and has the surface modification TiUnite along the fixture threads (Figure 1).

The procedure

Implant placement and restoration is a simple procedure that can be performed in 2-3 steps. Surgical access is attained through raising a mucoperiosteal flap or alternatively a flapless approach can be utilised.

The first drill required is the 1.5mm twist drill, which is prepared to a depth of 13 or 15mm. The soft bone 3.0 drill follows this and if required for denser bone, the dense bone 3.0 drill is used to widen the site slightly. The implant is then placed with the motor implant driver or a manual torque wrench. A healing cap or provisional crown may be utilised under immediate loading protocols.

After a suitable osseointegration period, the abutment is prepared as per a conventional crown, and impressions are taken in the conventional way. A crown can be made and cemented onto the prepared abutment.

Case report: NobelDirect 3.0

Figure 4. Smile shot.

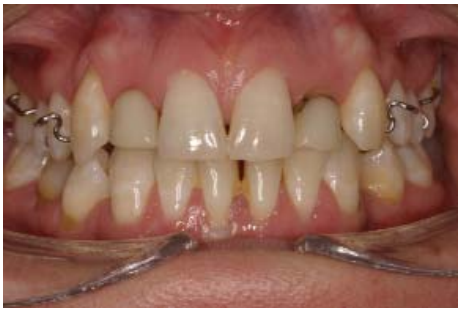

Figure 5. Retracted frontal shot (orthodontic retainer with prosthetic teeth 12 and 22).

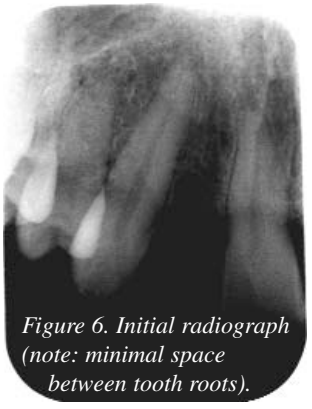

Figure 6. Initial radiograph (note: minimal space between tooth roots).

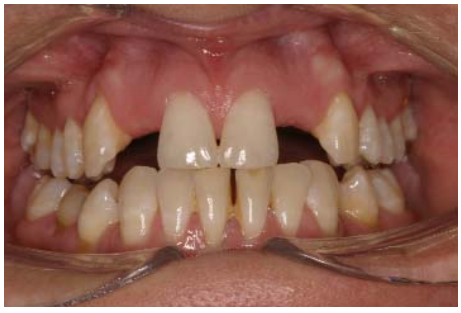

Figure 7. Retracted frontal photo without ortho retainer.

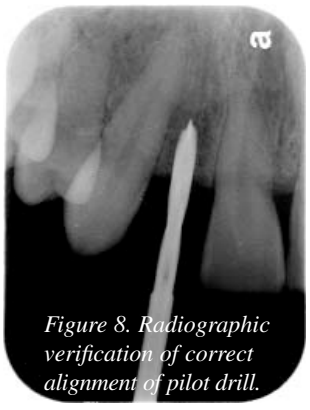

Figure 8. Radiographic verification of correct alignment of pilot drill.

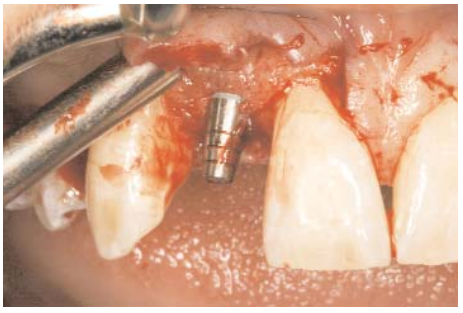

Figure 9. NobelDirect 3.0 inserted.

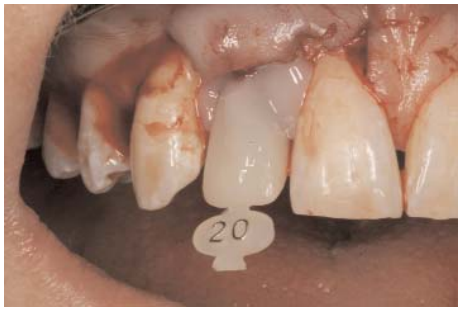

Figure 10. Polycarbonate provisional crown relined to fit implant.

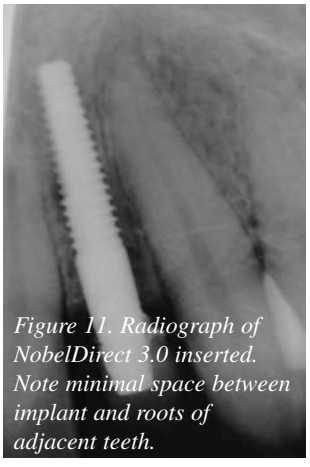

Figure 11. Radiograph of NobelDirect 3.0 inserted. Note minimal space between implant and roots of adjacent teeth.

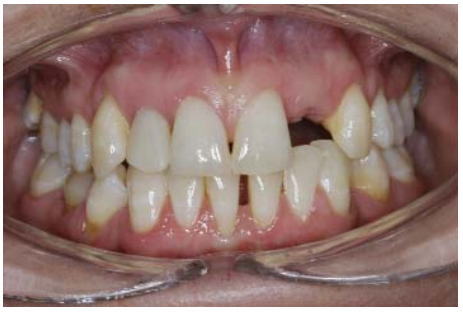

Figure 12. Provisional crown on 12 NobelDirect 3.0 implant.

A 32-year-old woman was referred for a fixed replacement of teeth 12 and 22 (Figures 4 and 7). These teeth were congenitally missing with orthodontic treatment being carried out 14 years previously. The patient had continued wearing her orthodontic retainer with denture teeth (Figure 5). She was medically fit and well with no contraindications to implant treatment and dentally her history was unremarkable. The options for replacement of these teeth were discussed, with this being a removable denture, full fixed bridgework, resin-bonded bridgework and implants. The patient wanted a conservative and fixed replacement of these congenitally missing teeth. Of the aforementioned options this came down to either a resin bonded bridge or implants. Informed consent was received for the implant option including a detailed discussion of risks of implant placement, in particular with the 12 site having minimal space (Figure 6) and difficulties that this may present.

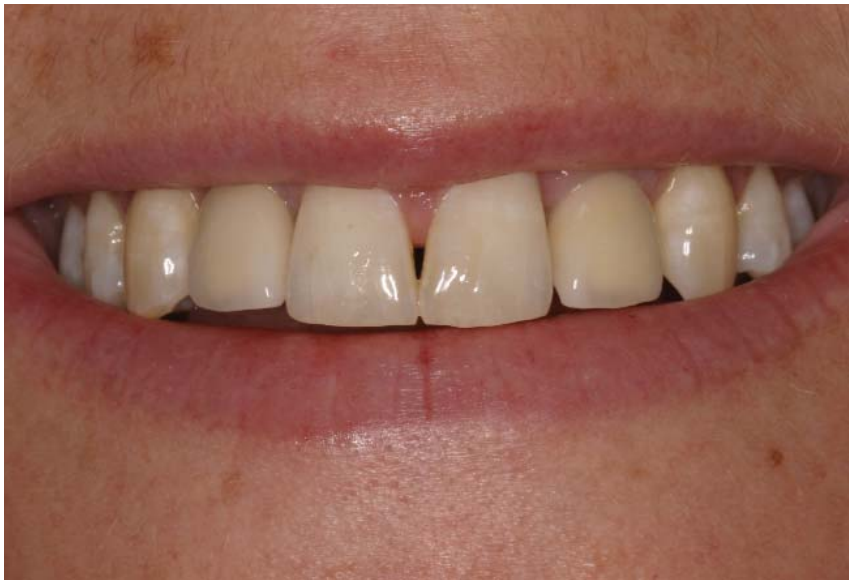

Figure 13. Completed smile photo.

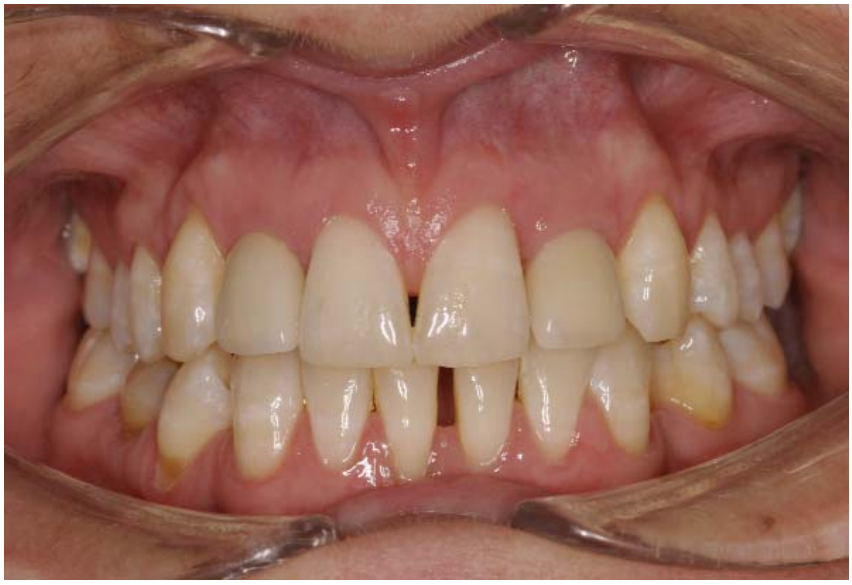

Figure 14. Completed retracted photo of implants in 12 and 22 position (12 - NobelDirect 3.0; 22 - NobelReplace 3.5mm).

As can be seen in Figure 7, there was sufficient space clinically for prosthetic restoration with crowns, but radiographically there was minimal space between the roots of the 11 and 13 of about 6mm (Figure 6). Earlier orthodontic treatment had created the space clinically but had not developed significant space within the apical bony area for implant placement. This minimal space is sufficient for placement of dental implants as discussed earlier with the NobelDirect 3.0 implant.

Surgery was performed for both 12 and 22 sites. A full thickness flap was raised for both sites and a Replace Select 3.5mm implant was placed for the 22 site. The 12 site received a NobelDirect 3.0 implant. This osteotomy site 12 with the minimal space apically was prepared with extreme care and was verified with radiographs to ensure correct alignment and direction while working (Figure 8). The implant was placed (Figure 9) with over 35Ncm insertion torque and it was decided that a provisional crown was to be placed on this implant following Immediate Function protocols.

A polycarbonate temporary crown was relined to fit the abutment (Figure 10). This integrated abutment did not need any preparation for the temporary crown. If any preparation is required then placement of rubber dam is required before any preparation of the titanium surface to exclude contamination with the site.

This provisional crown (Figures 11 and 12) was left for 4 months before final preparations and impressions were taken to construct the permanent porcelain fused to metal crown.

Both implants had the crowns cemented as per conventional crown and bridge with a resin-modifiied GIC - FujiCem (GC). The patient was extremely happy with the final result (Figure 13 and 14).

(Discussions were made with the patient in regards to soft tissue plastic surgery to reduce the discrepancy with the gingival tissues. The 12 and 22 implants had excess gingival tissue that could be removed but due to the patient's smile line and the minimal display of gingiva this was not performed.)

Conclusion

The Nobel Direct 3.0mm has been suggested as an implant for the narrow edentulous site. It can be used for a site measuring 6mm in mesial-distal width allowing for a space of 1.5mm between implant and tooth. The alternative to this solution for narrow sites would be orthodontic treatment to open this space, which would add significant cost and time inconvenience to the patient. It can be an immediately loaded implant, i.e. having a temporary crown inserted at the time of surgery which is placed into limited function, and restored with a permanent crown after a suitable osseointegration period.

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Dr Christopher Ho received his Bachelor in Dental Surgery with First Class Honours from the University of Sydney in 1994 and completed a Graduate Diploma in Clinical Dentistry in oral implants in 2001. He is a Clinical Associate with the Faculty of Dentistry at Sydney University. In addition to teaching at undergraduate level, he has lectured and given continuing education presentations in Australia and overseas on a wide range of topics related to cosmetic and implant dentistry. He maintains a successful private practice centered on comprehensive aesthetic and implant dentistry in Sydney, Australia.