Rehabilitation of the Edentulous Mandible with Implant-supported Overdentures Using Prefabricated Telescopic Copings

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The rehabilitation of edentulous mandibles by means of implant-retained overdentures is well established and documented. The majority of systems that adopt this approach, however, require a high level of laboratory support. Two cases are presented describing the use of prefabricated copings to significantly reduce the dependence on complex laboratory procedures. One case features immediate loading while the other describes delayed loading after second-stage surgery, further illustrating the versatility of the system. [*Singapore Dent J* 2005;27(1):30–5]

Key Words: edentulous mandible, implant overdenture, telescopic copings

The use of implants to retain and support mandibular full overdentures has helped to fulfill the functional requirements of patients with this challenging treatment indication.[1–3] In its most dramatic form, this can be provided by the immediate loading of four interforaminal implants as was first documented by Ledermann in 1979.[4,5] To date, other authors using a range of implant systems have described variations of this treatment modality with predictable results.[6–8]

A common feature of the materials and methods documented is the dependence on extensive and costly laboratory support to fabricate, within a short time frame, the fixed bar (meso-structure) that provides primary splinting of the implants. Such treatment indications are, thus, less accessible to the majority of private practitioners and their patients.

Recently, a technique has been introduced using prefabricated telescopic copings (Ankylos® SynCone®, DENTSPLY Friadent GmbH, Mannheim, Germany) that may be incorporated in the overdenture at chair side.[9] This simplified procedure that provides secondary splinting of the implants is especially useful with immediate loading, but can also be applied in other implant prosthetic indications. Two cases are presented in this article detailing the use of this system: Case 1 with immediate loading and Case 2 with two-stage surgical protocol and delayed loading.

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Case Reports

Case 1

A 62-year-old Chinese housewife sought treatment to improve the retention and chewing efficiency of her full lower denture. Only #15 and #17 remained of her natural dentition (Figures 1A and B). She was a nonsmoker and in good health.

Her existing partial upper and full lower acrylic dentures were assessed to be satisfactory in terms of extension, occlusion, and aesthetics. Further investigations by way of orthopantograph and ridge mapping confirmed that sufficient bone was present for implant therapy. The patient opted to use her existing dentures owing to her limited budget, and the following treatment plan was formulated:

1. Placement of four interforaminal Ankylos A11 implants (3.5 mm in diameter, 11 mm in length)
2. Immediate abutment connection with Ankylos SynCone abutments
3. Immediate loading with the existing denture incorporating prefabricated telescopic copings
4. Maintenance phase

Under local anaesthesia, a crestal incision was made leaving the median tissue bridge intact (Figures 1C and D). This served to reduce the risk of dehiscence and provided a reference point of the patient's midline. With the aid of a surgical stent, four interforaminal sites were prepared using a 2-mm diameter pilot drill. Direction and depth were checked with parallel gauges (Figure 1E). Following the sequence of instrumentation prescribed by the implant system, four Ankylos A11 implants were placed slightly sub-crestal (Figure 1F).

The relatively parallel placement of the implants allowed the use of four straight SynCone abutments (3-mm sulcus height). In situations where this is not the case, angled abutments can be selected. Nevertheless, paralleling pins splinted with Duralay™ (Reliance Dental Manufacturing, Worth, IL, USA) were used to confirm the line of draw (Figure 1G). The abutments were then torqued to 15 Ncm and the flap carefully adapted and sutured (Figure 1H).

Vent holes were created in the denture to accommodate the Degunorm/SynCone copings (Figures 1I and J). With these copings seated on the abutments and the denture in place, self-curing acrylic resin was introduced into the denture vents and allowed to cure with the patient biting in centric relation. Finishing and polishing were then performed to the modified surfaces.

The patient was prescribed antibiotics, analgesics, and a chlorhexidine mouth rinse. She was instructed to wear the denture continuously for a week and to maintain a soft diet. Review a week later for suture removal showed uneventful healing. The denture was worn continuously for a second week, after which diet restrictions were lifted and detailed hygiene instructions were given.

To date, the patient has attended recall visits beyond a year and reported good function with her prostheses. Radiographic and clinical assessments have also been favorable (Figures 1K–N).

Case 2

An 81-year-old Chinese man attended treatment complaining of difficulty in chewing his food because of loose dentures. The patient was in good general health, exercising regularly and a nonsmoker. Maxillary teeth present were #17, #12, #26 and #27; his mandible was edentulous. The existing prostheses did not induce pain but were severely worn (Figures 2A and B). Presurgical evaluation was done and a surgical stent fabricated (Figure 2C). As we felt that, in view of the patient's age, he would find a single-visit procedure with immediate loading too taxing, we opted for a treatment plan that would provide new chromium-cobalt dentures and which would involve two-stage implant surgery with delayed loading of an implant-supported lower overdenture.

Under local anaesthetic, a crestal incision similar to that described in Case 1 was made. Conforming with the prescribed technique, four interforaminal Ankylos A11 implants were placed (Figure 2D). We encountered 2 mm of buccal bone dehiscence at position #32, and this was managed by placing bone chips collected from the surgical drills and reamers over the site (Figure 2E). The flap was sutured and primary closure obtained. The patient's existing lower denture was relieved and relined with a tissue conditioner. Postoperative medication and instructions were given and healing was uneventful.

New upper partial and lower full chromium-cobalt dentures were fabricated with particular attention paid to the space necessary to accommodate the copings. Figure 2F shows the framework design adopted.

Five weeks after the initial surgery, second-stage surgery was carried out to uncover the implants. As shown in Figure 2G, the slit incisions to uncover the implants were conservative with no suturing required upon connection of the sulcus formers.

Ten days later, the patient returned for abutment connection. Soft-tissue healing was good (Figure 2H). There was some divergence in the angulation of implant placement and an angled abutment was selected for position #44. Paralleling pins were splinted with Duralay to allow confirmation of the line of draw (Figure 2I). The abutments were torqued to 15 Ncm and the telescopic copings fixed in the new denture as described in Case 1 (Figures 2J and K).

Recall visits were made at 1 week, 1 month, 6 months, and 1 year. The clinical and radiographic assessments have been favorable and patient feedback positive (Figures 2L and M).

Discussion

It is pertinent at this point to discuss specific features of the Ankylos implant system. The implants themselves are screw-like and have a rough surface and progressive thread design.[10] Unlike the external or internal hex platform found in most systems, the abutment to implant assembly is made by means of a conical connector (Figure 3). This permits total flexibility in the position that the abutment is seated within the axis of the implant as opposed to the limits imposed by a hex configuration. The 4° abutment taper and the availability of angled abutments mean that the technique can be applied even in situations with significant divergence in implant angulation.

Integral to the treatment modality advocated by Ledermann and others is the cross-arch splinting of the interforaminal implants by means of a fixed bar (meso-structure) shortly after implant placement.[6,7]

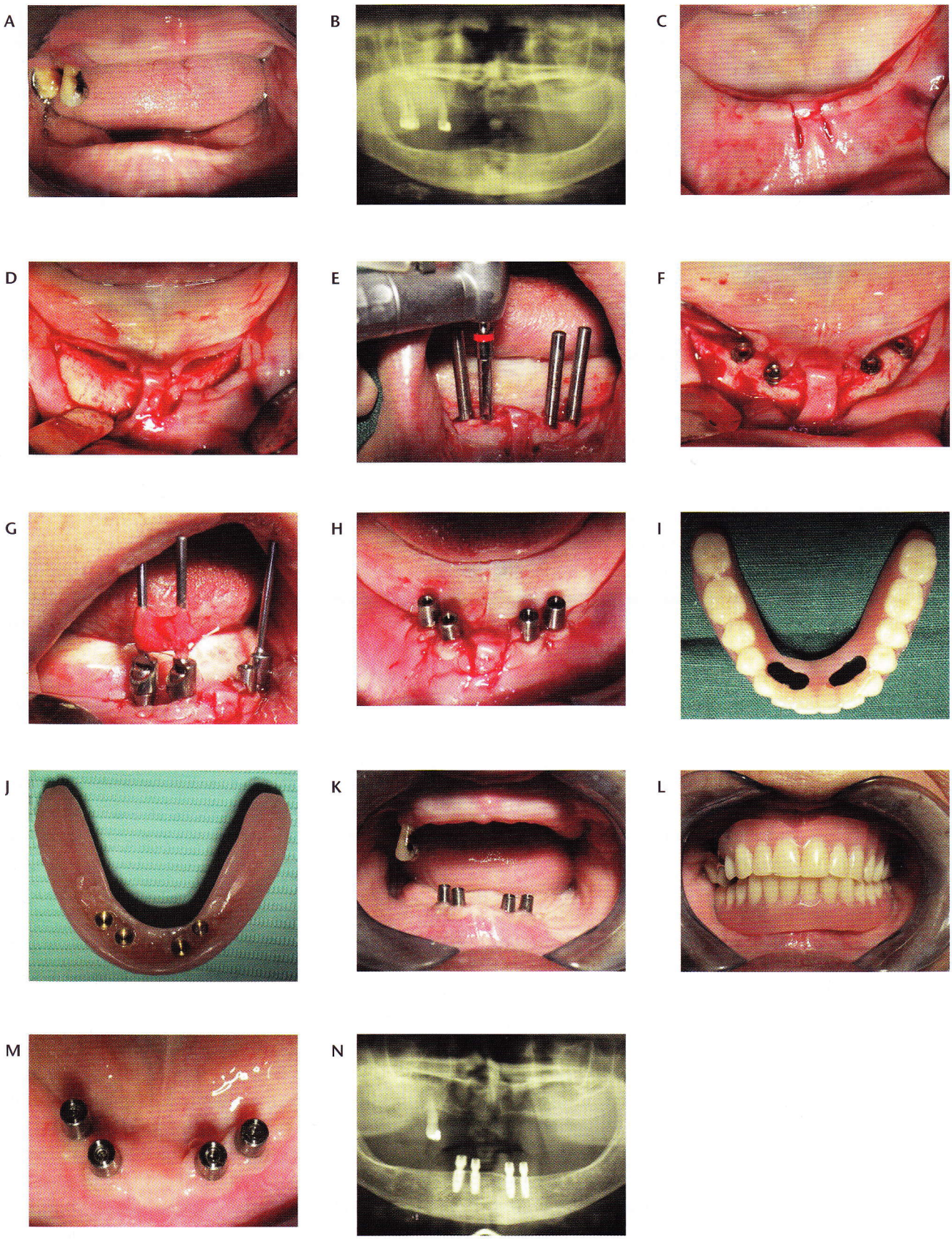

Figure 1. *(A) Pretreatment intraoral view. (B) Pretreatment orthopantograph. (C, D) Crestal incision leaving the median tissue bridge intact. (E) Direction of implant placement checked with parallel gauges. (F) Implant placement. (G) Paralleling pins splinted with Duralay were used to confirm the line of draw. (H) Abutments were torqued to 15 Ncm and the flap adapted and sutured. (I, J) Vent holes were created in the denture to accommodate the Degunorm/SynCone copings. (K, L) Intraoral views at 1 month. (M) Intraoral view at 1 year. (N) Radiographic view at 1 year.*

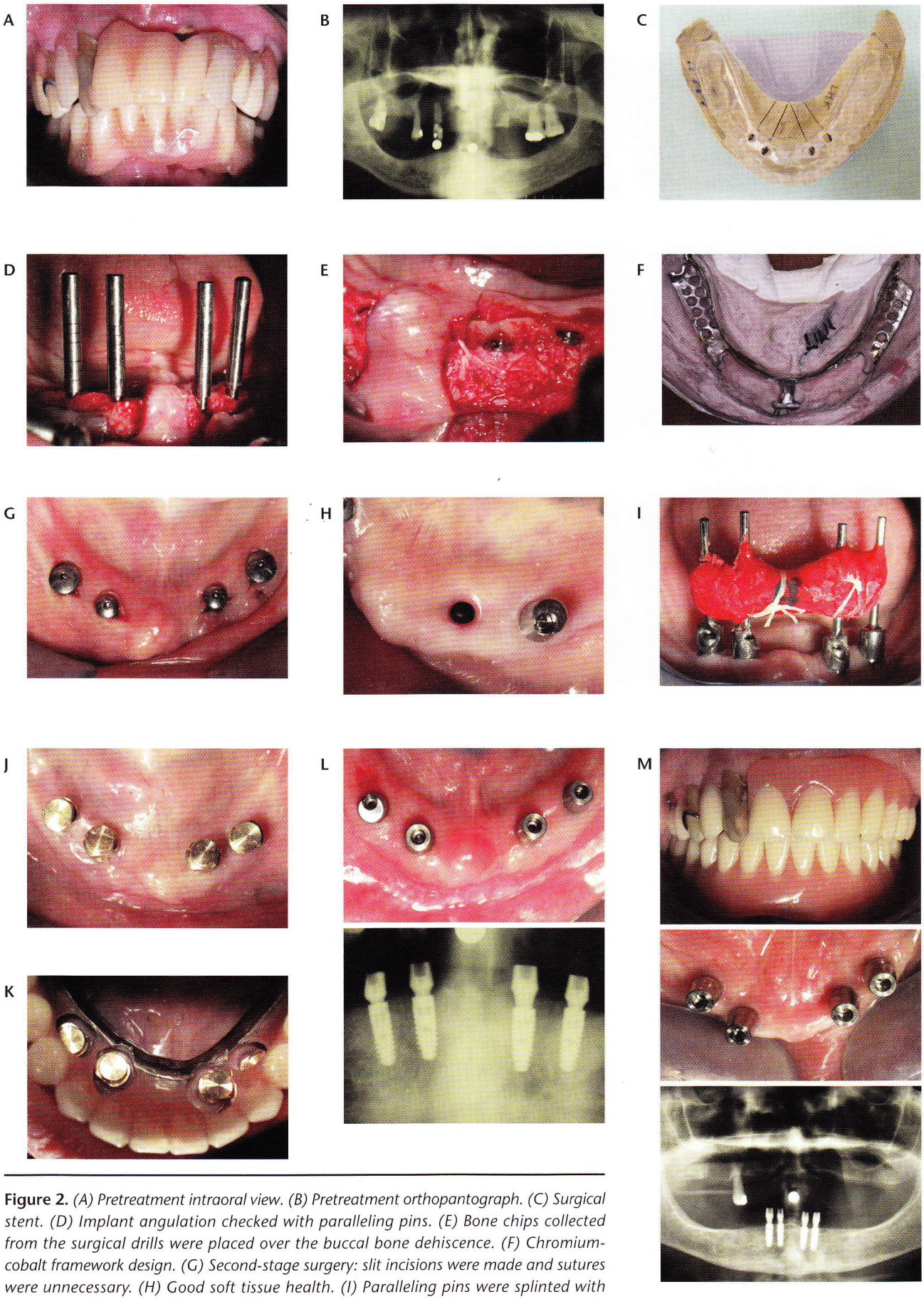

Figure 2. *(A) Pretreatment intraoral view. (B) Pretreatment orthopantograph. (C) Surgical stent. (D) Implant angulation checked with paralleling pins. (E) Bone chips collected from the surgical drills were placed over the buccal bone dehiscence. (F) Chromium-cobalt framework design. (G) Second-stage surgery: slit incisions were made and sutures were unnecessary. (H) Good soft tissue health. (I) Paralleling pins were splinted with Duralay to allow confirmation of the line of draw. (J, K) Abutments were torqued to 15 Ncm and the telescopic copings fixed in the new denture. (L) Clinical and radiographic outcome at the 1-month recall. (M) Clinical and radiographic outcome at the 1-year recall.*

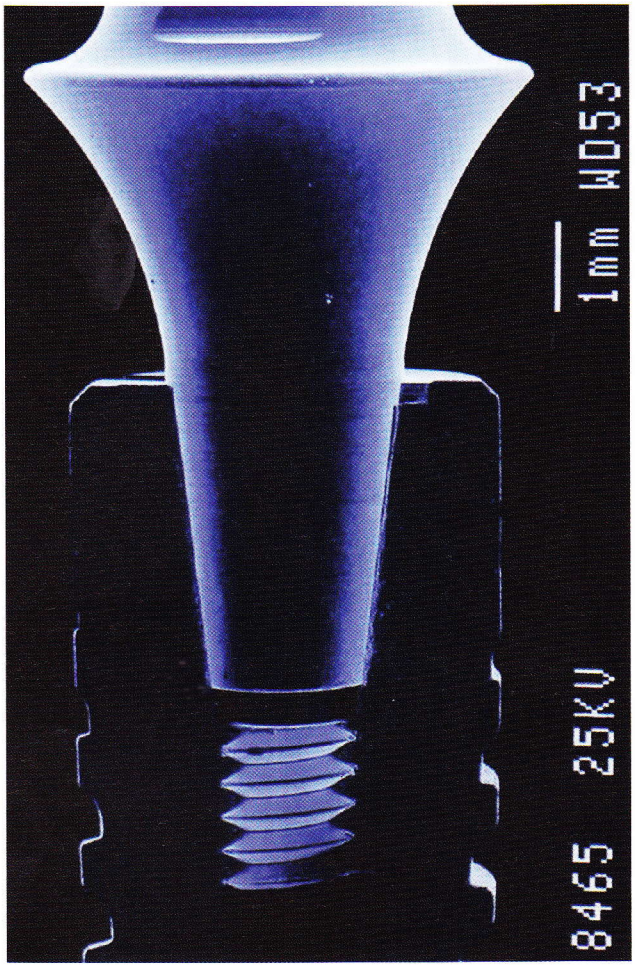

Figure 3. *Ankylos implant conical connector (picture courtesy of DENTSPLY Friadent GmbH).*

This serves to limit micromotion of the implants that would be deleterious to successful osseointegration.[11,12] The overdenture houses clips that fasten onto this meso-structure. The challenge comes from fabricating a bar that fits passively so as to avoid undesirable stress on the implants and screws securing the bar. This requires laboratory support that has not only a high level of expertise, but also a rapid response time in the situation of immediate loading.

The method we have adopted does away with the meso-structure and relies instead on the secondary splinting effect provided by the copings embedded within the overdenture.[9] A consequence of this is the absence of splinting when the denture is removed. In the situation of immediate loading (Case 1), the patient was instructed to wear the denture continuously and be restricted to a soft diet for 2 weeks postoperatively. Thereafter, the absence of a fixed bar greatly simplifies hygiene procedures.

In Case 2 where delayed loading was prescribed, the interval between implant placement and loading was approximately 6 weeks. This is significantly shorter than the conventional recommendation of 3 months for mandibular implants,[13] as the rationale for the delay was not to allow osseointegration to precede loading but rather for patient and prosthetic convenience. In similar cases of delayed loading, an alternative to selecting and aligning the abutments directly at chair side is to take an impression at the implant level and delegate this exercise to the laboratory. This also reduces the inventory of abutment designs the clinician would otherwise have to carry.

Conclusion

The management of two cases involving the provision of implant-supported overdentures for the edentulous mandible has been presented in this article. With a comprehensive range of abutments and prefabricated telescopic copings at our disposal, we are able to provide such treatment in an efficient and cost-effective manner, making such procedures more accessible to our patients.

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