

ENGLISH SUMMARY

It is of fundamental importance to realize that loss of the remaining teeth and provision of artificial dentures is an irreversible procedure that can be a cause of concern to the patient. The most common problem associated with complete dentures is probably the instability and the looseness of the mandibular ones. An implant-retained overdenture can be beneficial for edentulous patients who complain about the reduced retention of their conventional mandibular denture and the consequent impaired mastication function. The level of success of implant treatment has led to its implementation as a standard choice of treatment in the edentulous mandible. The original protocol involved a healing period of several months after implant placement. More recently, the concept of immediate loading has been accepted as a predictable treatment modality to rehabilitate the edentulous mandible. Several clinical investigations reported high survival rates for endosseous implants, placed in the interforaminal region and loaded immediately after implant placement. Although initially four interconnected implants were considered mandatory to reduce the risk of implant overloading, our review of the literature (**chapter 2**) has shown that two immediately loaded standard-sized implants (≥ 3.3 mm) can be successfully used to retain mandibular implant overdentures (IODs).

The absence, however, of sufficient width of the crestal ridge, as well as the immediate and long-term costs might preclude the generalized application of this treatment approach. A further development and a possible alternative treatment option might be the utilization of implants with a reduced diameter, the so-called Mini Dental Implants (MDIs). The advantages of MDIs include the potential selection of less invasive surgical techniques, a simplified restorative phase, and reduced costs. This treatment might be particularly suitable for patients with a compromised medical history. Although the MDIs were used initially to support provisional prostheses, they gained popularity due to their promising clinical performance. They have been designed in such a way to facilitate application of the immediate loading protocol. The gradually widespread application of MDIs to retain mandibular IODs deserves additional evaluation.

The long-term success of this treatment method is dependent, to a large extent, on the response of the peri-implant soft and hard tissue. The marginal bone level changes in particular, should be within the clinically acceptable range reported in the literature for standard-sized implants. Beyond clinical findings, patients' acceptability and perception of how implant treatment contributes to their Oral Health Related Quality of Life (OHRQoL) and overall satisfaction are also important factors that affect the overall success of IODs. These parameters were investigated in the pilot study as described in **chapter 3**. The study population consisted of patients who experienced problems with the retention of their existing mandibular prostheses. In some cases, the presence of narrow crestal ridges would either require the employment of augmentation procedures or extensive alveoloplasty, potentially compromising the available bone height. The purpose of the study was to gain a better insight in the short-term changes in marginal bone level that

occur after placement of the MDIs. The radiographic bone level changes in this pilot study were within the expected range reported in the literature. The patients reported also high levels of satisfaction and OHRQoL, as these were measured with the Visual Analogue Scales and the Oral Health Impact Profile (OHIP-20) questionnaire.

The positive outcomes resulted in further investigation by designing a randomized controlled clinical trial to compare the clinical performance of immediately loaded MDIs used to retain implant overdentures with another treatment approach that has already been adequately documented, namely the rehabilitation of the edentulous mandible with two immediately loaded interconnected standard-sized tissue level implants and an overdenture. The study was approved by the local ethical committee and involved a thorough clinical investigation of the patients to assess their eligibility. If the existing dentures were unsatisfactory with respect to border extension, occlusal vertical dimension and esthetics, new sets of dentures were fabricated. If the only shortcomings were a lack of retention and stability of the mandibular dentures and poor mastication function, the existing set of dentures were used. During the surgical procedures, the manufacturers' respective protocols were followed for both implants systems. The mandibular dentures were used as an impression tray and the dentures were modified in the laboratory to implant overdentures. The prostheses were fitted the same day for the MDIs and the following day for the standard-sized implants. The main outcome measure was the marginal bone loss (MBL) around the implants as it was measured by means of standardized intra-oral radiographs. The peri-implant soft tissue response was also evaluated. In addition, the prosthodontic maintenance required was documented (**chapter 4**). The results indicated that there were no statistically significant differences in MBL between the immediately loaded MDIs and standard-sized implants. For both types of implants the marginal bone level changes were well within the clinically acceptable range. Likewise, there were no signs of inflammation around both the MDIs and standard-sized implants, as was demonstrated by the absence of increased pocket depth measurements, the absence of excessive bleeding and the absence of high plaque scores. Furthermore, there was no manifestation of severe prosthodontic complications that would require extensive and costly repairs.

To have a thorough evaluation of the impact of implant therapy, however, it is important to use also patient-based outcomes such as patients' satisfaction and OHRQoL. For this purpose, structured instruments such as Visual Analogue Scales and the Oral Health Impact Profile (OHIP-20) are suitable for edentulous patients. Our findings (**chapter 5**) have indicated that patients' ratings of comfort, stability and ability to chew in particular were significantly higher after conversion of their conventional dentures to IODs, regardless of the implant system used. In addition, the patients reported significantly less oral health-related quality of life problems.

The likelihood that the patients will express an overall positive experience can be enhanced by formulating an accurate treatment plan prior to implant placement. This will help the

surgeon gather sufficient information, minimizing the risk of complications during surgery. Selection of the appropriate imaging techniques as part of the preoperative treatment planning, could prevent injuries of critical anatomical structures. Implant size selection and identifying critical anatomical structures prior to implant placement in the anterior mandible to retain overdentures might be influenced by the type of imaging technique used for preoperative planning (**chapter 6**). The results indicated that when data provided by the CBCT scans were added, narrower and shorter implants were often selected by clinicians involved in implant dentistry. The additional information provided by the CBCT scans seemed also to improve clinicians' ability to locate important anatomical landmarks in the anterior mandible.

The eventual goal of health care is to improve patients perspective with respect to function, pain and discomfort as well as patients perception of emotional and behavioural responses to health interventions. Although the scientific evidence for immediately loaded MDIs used to retain implant overdentures is growing, including studies of medium-term duration, it remains to be demonstrated whether this treatment modality will achieve high success over long periods of time. Therefore, further experimental validation is necessary before incorporating this therapeutic approach into practice as a true replacement of the existing treatment protocols.