

# Immediate or delayed loading in the completely edentulous mandible

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**Rehabilitation of complete mandibular edentulism** is considered a clinical challenge in dentistry. Conventional removable complete dentures have limitations that compromise the patient's quality of life. The McGill consensus recommended the mandibular two-implant overdenture as the standard of care, and it helps improve retention and masticatory efficiency.

To achieve osseointegration, Brånemark et al. suggested that implant loading should be done after at least three months for the mandible and six months for the maxilla. With scientific research, the healing time has been reduced. In 2008, the International Team for Implantology consensus meeting set out the following definitions of the loading protocols (Fig. 1):

- immediate loading: during the first week after implant placement.
- early loading: between one week and two months after implant placement.
- conventional or delayed loading: more than two months after implant placement.

Studies have shown that immediate loading is comparable to delayed loading for fixed prostheses. However, no consensus exists on the timing of implant loading for mandibular implant-supported overdentures. Our study sought to answer the question of whether immediate loading provides better clinical results compared with delayed loading for mandibular implant-supported overdentures.

## Implant survival

One year of observation is necessary to evaluate the effect of immediate loading on osseointegration. From analysis of recent scientific literature, it appears that implants loaded immediately have a higher failure rate than those with delayed loading. However, the difference is not statistically significant. Nonetheless, the authors recommend delayed loading rather than immediate loading.

Implant placement can follow the one- or two-stage surgical protocol (Fig. 2). However, there is no significant difference in terms of early implant loss between the different surgical stages. The placement of implants according

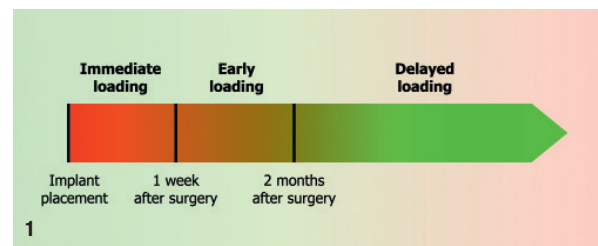


Fig. 1: Implant loading timeline.

to the one-stage protocol therefore does not seem to affect either implant or crestal bone loss.

A relevant parameter during immediate loading is the measurement of insertion torque or implant stability quotient (ISQ). Generally, during multiple restorations, a minimum torque of 20 Ncm is required, but this is not a guarantee of implant survival. Studies that measured ISQ have reported a significantly greater difference for delayed loading at three months; however, beyond three months, no difference was found between immediate and delayed loading.

## Peri-implant soft and hard tissue

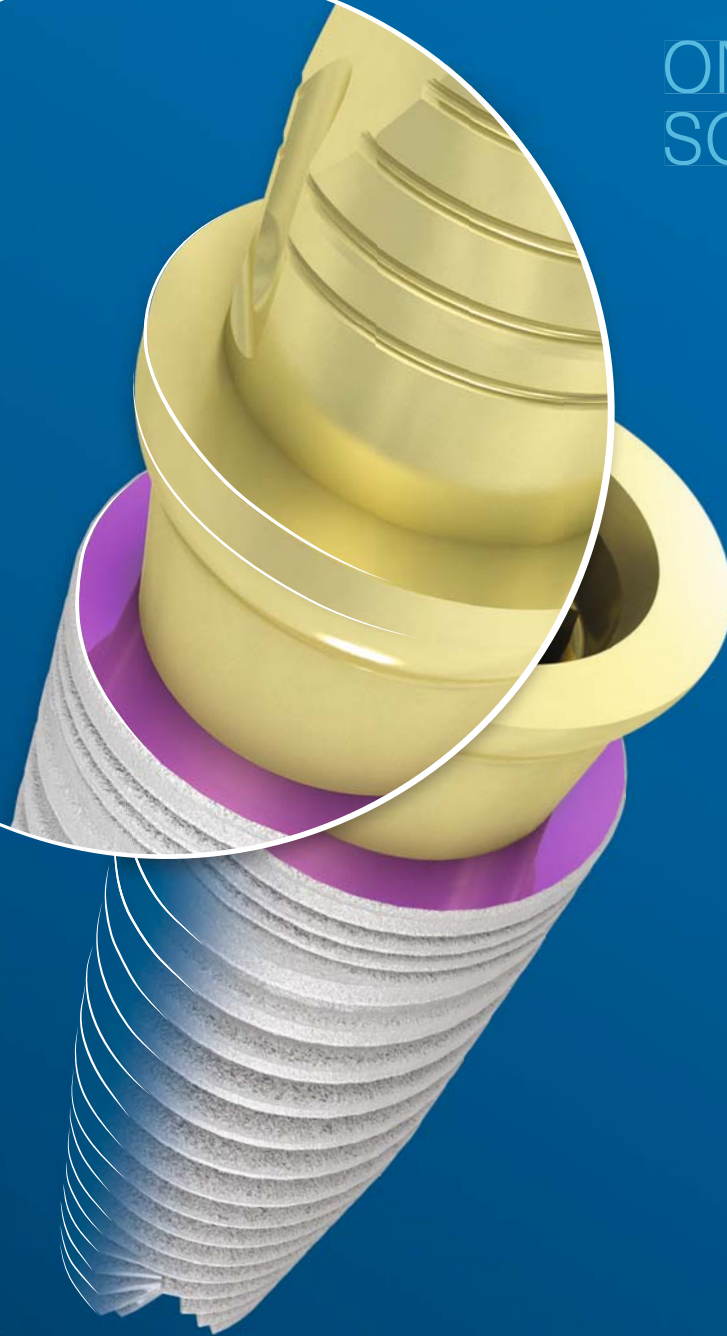
The evaluation of soft-tissue indices (plaque index, probing depth, bleeding on probing, etc.; Fig. 3) indicates similar values between immediate and delayed loading at one year. Crestal bone loss of less than 1.5 mm has been cited as a criterion for implant survival. It should be noted that an average of 1 mm of marginal bone loss normally occurs during the first year and is followed by a loss of 0.2 mm each year. The meta-analyses included did not find any statistical difference between the two loading protocols.

## Type of attachment

Analysis showed that different types of attachments did not result in a statistically significant difference between immediate loading and delayed loading. Furthermore, no difference was found between splinted and non-splinted implants (Fig. 4). However, probing depth appeared to be lower with a ball attachment and delayed loading rather



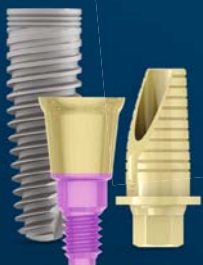
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than with a bar and immediate loading. This can be explained by the easier cleaning of the ball, whereas the bar, being less easily cleaned, can lead to gingival hyperplasia. A single meta-analysis has shown that delayed loading is preferable with ball or LOCATOR attachments (Zest).

### Number of implants

Most of the studies we included compared two implants versus four and found no significant differences. During the initial years of mandibular implant overdenture treatment, four interforaminal implants were used with a secured bar. Over the years, the use of two implants with axial or bar-connected attachments has proved to be as effective as the four-implant bar option. The results of the meta-analyses included indicate that there is no difference in implant failure or marginal bone loss with immediate or delayed loading when two unsplinted or four splinted implants are used (Fig. 5). Concerning overdentures supported by one or three implants, the research is insufficient in quantity and quality to determine statistically significant differences.

### Patient's oral health-related quality of life

Patient satisfaction may be associated with the stability obtained once the patient's removable prosthesis has been converted to a fixed implant-supported prosthesis. Dissatisfaction with delayed loading may be related to

discomfort or pain caused by the interference of healing screws with the existing prosthesis.

From our literature review, no significant difference between immediate and delayed loading with regard to patient discomfort, pain or oedema has been reported. One explanation could be that the procedures were rarely uncomfortable, the number of patients included was too small and the questionnaires were not sensitive enough to detect differences.

The same arguments could be made for patient satisfaction, as most patients were very satisfied with the treatment. The lowest satisfaction score was found for satisfaction with the temporary prosthesis. At one year, studies have found no difference in patient satisfaction between immediate and delayed loading protocols (Fig. 6). This may indicate that patients may have forgotten the procedure over time. Thus, the claimed greater patient satisfaction with immediate loading is not supported by solid evidence. The patient's perception of the implant treatment is more dependent on other factors than the loading protocol. Patients can accept temporary discomfort if they are convinced that it is essential to obtaining a stable long-term result.

### Prosthetic complications and maintenance

Studies have compared immediate and delayed loading regarding prosthetic complications and maintenance.

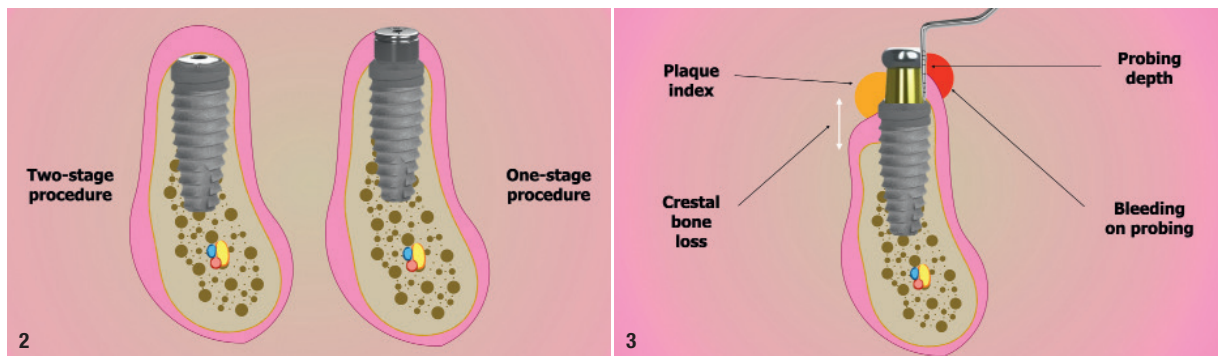


Fig. 2: Comparison of the surgical protocols. Fig. 3: Peri-implant tissue measurement indices.

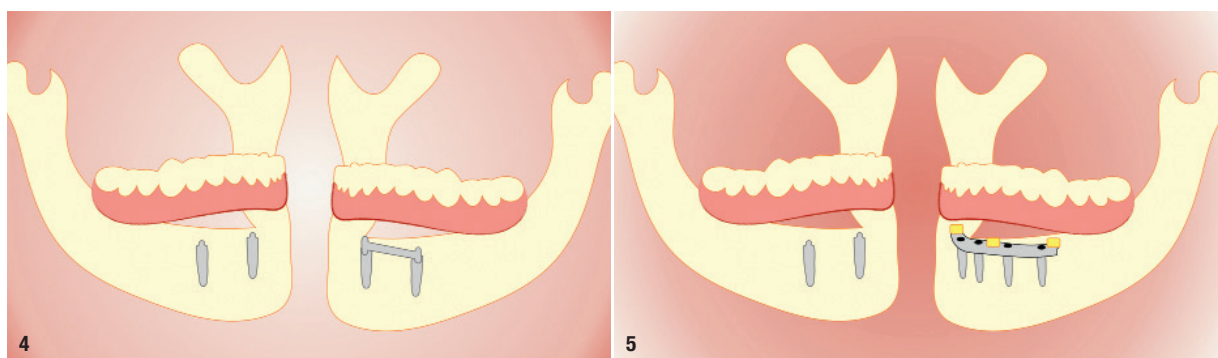


Fig. 4: Comparison of attachment types. Fig. 5: Comparison of number of implants.

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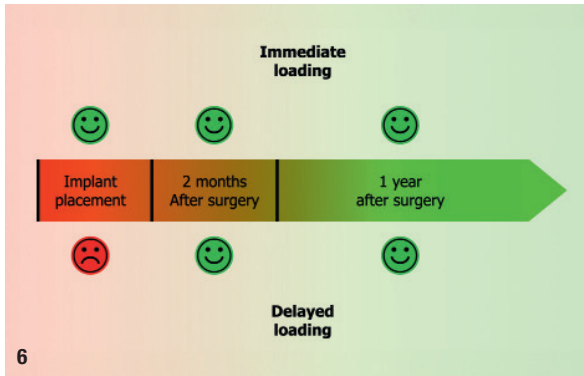


Fig. 6: Patient satisfaction timeline.

The main complications reported for immediate loading included prosthetic fracture and relining. For delayed loading, attachment displacement, screw fracture and denture fracture were more common. No differences were found between the two loading protocols.

## Conclusion

Based on our reading of recent scientific literature, the following conclusions can be drawn:

- There is no statistically significant difference in implant failure rate and marginal bone loss between immediate and delayed loading for mandibular implant-supported overdentures.
- The risk of early implant loss (before one year) is higher with immediate loading compared with early loading.
- The available evidence shows no differences in the health of peri-implant tissue regardless of the type of attachment, the number of implants or the loading protocol.
- An overall analysis of all the studies included revealed that no specific attachment type, number of implants or loading protocol had a significant advantage over the other.
- Patient satisfaction and oral health-related quality of life are similar for immediate and delayed loading protocols. However, with immediate loading, patients restored with fixed prostheses are more satisfied than those treated with removable prostheses. However, this difference does not persist after one year.
- Prosthetic complications and maintenance of mandibular implant-supported overdentures were similar between delayed loading and immediate loading.
- Further studies are needed to strengthen the evidence and make firm recommendations on loading protocols. The available evidence recommends early rather than immediate loading and delayed rather than early loading.

In summary, immediate loading in the completely edentulous mandible is a scientifically validated protocol. However, many factors must be taken into account to obtain

a clinically satisfactory result. The role of the practitioner is to evaluate the risk–benefit ratio in carrying out such a procedure. The immediate loading protocol has advantages for mandibular implant-supported overdentures; nevertheless, the potentially higher risk of implant failure cannot be ignored. Therefore, the patient should be informed of the risks and benefits beforehand. Arguments such as patient satisfaction and reduction in the number of treatment sessions with immediate loading are not sufficiently relevant given the risk of therapeutic failure.

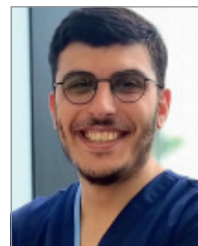
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<sup>1</sup> Norton MR, Astrom M. The influence of implant surface on maintenance of marginal bone levels for three premium implant brands: A systematic review and meta-analysis. Int J Oral Maxillofac Implants 2020;35(6):1099-111  
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