

Quality Resource Guide

Immediate Dental Implants

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Educational Objectives

Following this unit of instruction, the learner should be able to:

1. Describe the different timings of implant placement
2. Describe the outcomes of immediate implant placement
3. Recognize the prevalence of mid-facial mucosal recession around immediate implants
4. Identify the risk factors for mid-facial mucosal recession
5. List clinical guidelines to decrease the risk for mid-facial mucosal recession
6. Identify treatment alternatives to immediate implant placement
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Timing of Implant Placement

The use of dental implants to replace missing teeth has been widely accepted since the early 1970s, supported by a substantial body of scientific evidence. Initially, the guidelines established by Brånemark and colleagues required implants to be placed in healed alveolar ridges.¹ However, advancements in implant surface technology and a deeper understanding of wound healing around dental implants have enabled the development of more efficient treatment protocols. These protocols aim to reduce treatment times while maintaining successful clinical outcomes. One significant milestone was the introduction of immediate implant placement, allowing for the surgical placement of implants immediately following tooth extraction within the same appointment.

Different classifications of the timing of implant placement have been described.^{2,3} The terminology used in the present article uses the definitions established by the International Team for Implantology (ITI).³ This classification is based on the desired clinical outcome during the healing period of the extraction socket following tooth extraction.

Type 1 (Immediate implant placement): Tooth extraction and implant placement occur at the same dental appointment. This treatment option is performed without raising a flap whenever possible.

Type 2 (Early implant placement with soft tissue healing): The extraction site is left to heal for 4 to 8 weeks, allowing soft tissue healing over the extraction site with a damaged facial bony wall. At the end of 8 weeks post-extraction, there is enough apical bone to stabilize an implant in the desired prosthetic position and enough soft tissue to allow flap elevation and advancement for contour bone augmentation buccal to the implant.

Type 3 (Early implant placement with partial bone healing): The site is allowed to heal for 12 weeks, allowing for complete soft tissue healing and partial bony healing of the extraction socket. This option is chosen when a large periapical lesion does not allow type 1 or 2 implant

placement. Contour augmentation with guided bone regeneration is done at the time of implant placement (as in Type 2).

Type 4 (Late implant placement): Represents the implant placement in fully healed sites, similar to the Brånemark protocol. The delay in implant placement could be due to patient (adolescent patients) or site-related reasons (extensive bony lesions or ankylosed roots). Implant placement in a healed ridge represents the most conservative approach and is widely adopted among clinicians, especially in conjunction with ridge preservation procedures (See *QRG Alveolar Ridge Preservation Following Tooth Extraction – Fourth Edition*).

Outcomes Assessment of Type 1 Implant Placement

Immediate implant placement (Type 1) has been documented as a predictable, safe, and effective approach to replace extracted teeth. Longitudinal studies with up to 10 years of follow-up have shown that immediately placed implants have a survival rate that exceeds 95%. In comparative studies, immediate implant placement (Type 1) and implant placement in healed ridges (Type 4) yielded similar survival rates without any statistically significant difference.¹³⁻¹⁶

While the reported high survival rates of immediately placed implants are encouraging, those results do not necessarily reflect a successful outcome in terms of patient satisfaction. Indeed, patients often prioritize their subjective aesthetic perception of an implant-supported restoration when determining the success of implant therapy. For example, the case illustrated in **Figure 1** demonstrates an implant that, when judged by survival alone, would be deemed a successful outcome. However, from the patient's perspective, the clinical result constitutes an esthetic failure. To address this limitation, recent studies have evaluated the aesthetic outcomes of immediately placed dental implants, focusing on factors such as the mid-facial mucosal margin alongside other measures, including implant survival and patient-reported outcomes.¹⁷⁻¹⁹

Soft Tissue Management

Immediate dental implants are often placed in the esthetic zone to preserve the natural appearance of a patient's dentition. Careful consideration of various factors during the planning and surgical phases is essential to minimize tissue recession and achieve optimal esthetic outcomes.

Immediate Implants and Recessions

One of the major esthetic concerns associated with immediate implant placement is recession of the facial peri-implant mucosa. The incidence of peri-implant mucosal recession of up to 1mm is reported to be between 8% and 40%.^{10,20-26} Some studies have reported peri-implant mucosal recession of up to 2mm following immediate implant placement, resulting in a discrepancy in the position of the soft tissue margins around the implant supported restoration and the contralateral natural tooth. In the esthetic zone, loss of symmetry leads to unsatisfactory esthetic outcomes.²⁶

Risk Indicators of Recessions

Several risk factors have been associated with the development of soft tissue recession around immediate implants. These include a non-intact facial plate following extraction, a thin buccal plate, facial positioning of the implant, and a thin periodontal phenotype. The sections below present some relevant literature for each of these risk factors and suggest clinical strategies to address them.

Figure 1



Clinical picture illustrating an esthetic failure following immediate implant placement at site #10
(Courtesy of Dr. Brian Mealey, DDS, MS)

Loss of buccal plate integrity - Prior to implant placement, a minimally traumatic extraction should be accomplished to maintain the integrity of the socket walls. It has been shown that the presence of a dehiscence defect of the buccal plate at the time of extraction and immediate implant placement led to a significant amount of buccal plate resorption and mucosal recession, even when guided bone regeneration was done at the time of implant placement.^{20,23,24} Therefore, if the integrity of the socket bone wall was not maintained after tooth extraction, it is recommended to reconstruct the alveolar ridge and place the implant in a staged approach.²⁷ More recent long-term randomized clinical trials showed that there was no statistically significant difference in radiographic and clinical outcomes, including facial mucosal recession, between delayed (preceded by ridge preservation) and immediate (with simultaneous guided bone regeneration) implant placement in esthetic sites with buccal bony defects.^{28,29}

Thin buccal plate - Pre-clinical and clinical studies have consistently demonstrated that the pattern of alveolar ridge resorption and remodeling following tooth extraction was influenced by the width of the buccal plate. Due to the thin nature of the buccal plate, especially in maxillary anterior sites,³⁰⁻³³ ridge resorption will decrease the width of the alveolar ridge, and a loss of the vertical height of the buccal plate is expected following tooth extraction.³⁴⁻³⁷ It is essential to mention that the placement of a dental implant in the extraction socket cannot prevent these physiological changes from occurring.³⁸⁻⁴¹ This is because bundle bone (the internal bony socket walls where periodontal ligament Sharpey fibers are inserted) forms a significant proportion of the buccal plate and resorbs quickly after tooth extraction due to the absence of periodontal ligament fibers on its internal aspect, resulting in a reduction in overall ridge height and width.⁴² Moreover, emerging evidence infers that these dimensional changes are not affected by the implant surface characteristics.⁴³

Grafting the residual horizontal defect (jumping gap) between the implant and the internal wall

of the buccal plate of the extraction socket to compensate for future resorption has been proven effective and has become common clinical practice.^{20,44,45} Other studies have suggested that bone grafting on the external aspect of the buccal plate, also known as contour augmentation, will increase the thickness of the buccal bone wall and possibly maintain soft tissue stability over time.^{46,47}

Buccal positioning - Chen and colleagues demonstrated that the main factor related to buccal mucosal recession following immediate implant placement was the placement of the implant shoulder too far facially in relation to the emergence profile of the adjacent teeth.²⁰ This finding has been confirmed by other clinical studies.^{21,48-50} In a healed ridge, the guidelines for the bucco-lingual positioning of a dental implant recommend to have the implant bed prepared in such a way that the implant shoulder is positioned about 1 mm palatal to the point of emergence of the adjacent teeth.^{51,52} Given the previously mentioned dimensional changes following tooth extraction, the positioning of an immediate implant in a correct oro-facial position has to account for these specific healing patterns. It has been suggested that the implant shoulder should be placed approximately 2mm palatal to the point of emergence of the adjacent teeth.^{20,27}

Periodontal phenotype - Traditionally, the gingival phenotype refers to the quality of the soft tissue around teeth considering four parameters, the width of keratinized gingiva, the gingival thickness, the shape and size of the interdental papillae, and the crown width/height ratio. Based on the 2017 World Workshop on periodontal classification, the term “periodontal phenotype” is recommended for classifying the gingival phenotype and the bone morphotype.⁵³ “Thin-scalloped,” “thick-scalloped,” and “thick-flat” periodontal biotypes can be evaluated through specific methods for gingival thickness, keratinized tissue width, and buccal bone plate thickness evaluation.⁵⁴ Typically, a thin gingival phenotype is associated with a limited amount of keratinized tissue, a thin gingiva with long interdental papillae creating a markedly scalloped gingival

architecture and reduced crown width/height ratio (*i.e.*, triangular shaped teeth). Conversely, a thick gingival phenotype is associated with a wide zone of keratinized tissue, a thick gingiva, short interdental papillae with a flat gingival architecture, and an increased crown width/height ratio (*i.e.*, squared shaped teeth).⁵⁵⁻⁵⁷ Teeth with a thin gingival phenotype have been shown to respond less favorably to periodontal procedures such as regenerative periodontal surgery and gingival recession coverage.^{56,58} Similarly, individuals with a thin gingival phenotype had less favorable soft tissue esthetic outcomes following implant therapy.^{12,16,59,60}

The explanation as to why a patient with a thin periodontal tissue phenotype may be at greater risk for mucosal recession following immediate dental implants may be the fact that a thin gingival phenotype is associated with a thinner underlying buccal plate thickness as compared to a thick phenotype.^{61,62} This, in turn, reinforces the importance of the buccal plate thickness and its potential role in the development of mucosal recession following immediate implant placement.

Recession Coverage

Since mucosal recession around immediate implants are fairly prevalent, can mid-facial soft tissue recession coverage on implants be attempted using traditional periodontal plastic surgery strategies?

While increasing the width of keratinized tissue thickness seems achievable, the coverage of soft tissue recessions around implants remains a challenge.⁶² While improvements of gingival recession around dental implants have been achieved, complete recession coverage remains unpredictable.⁶³ Zucchelli and colleagues proposed a classification system for peri-implant soft tissue dehiscence/deficiencies (PSTD) based on the positions of the mucosal margin, the implant crown, the implant platform, and the tip of interdental papillae.⁶⁴ This classification system also provided tailored treatment recommendations for each PSTD type, which could involve either a coronally advanced flap, a combined surgical-prosthetic approach, or, in severe cases, complete implant removal.

It can be concluded that preventive strategies should be implemented to avoid mucosal recession around immediately placed implants since current treatment protocols for peri-implant soft tissue deficiencies remain unpredictable and require complicated surgical interventions, increasing the financial burden and morbidity to patients.

Clinical Considerations

a) Anatomy

One requirement for successful immediate implants is the ability to achieve primary stability upon implant placement. Usually, the implant diameter is smaller than the dimensions of the tooth root. As a general rule, the amount of native bone engaged during implant bed preparation beyond the confines of the socket will determine the likelihood of obtaining primary stability.

The available bone apical to the root should be examined to ascertain that at least two millimeters are present. Limitations to this assessment include the anatomy of surrounding vital structures, such as the maxillary sinus and floor of the nose in the maxilla, as well as the inferior alveolar nerve in the mandible.

In the anterior maxilla, it is not unusual to have the implant positioned slightly palatal to allow a screw-retained implant-supported restoration with an access channel going through the cingulum of the implant crown. Such placement also reduces the risk of facial recession because of a facially placed implant. For such a case, a cone beam computed tomography (CBCT) is recommended to determine the amount of bone available palatal to the root of the tooth to be extracted.

A study by Kan and colleagues showed that 81.1% of the roots of maxillary anterior teeth (*i.e.*, canine to canine) are positioned against the labial plate.⁶⁵ Thus, in most cases the placement of an immediate implant in the anterior maxilla in a palatal position is possible. However, the Kan study also showed that almost 12% of maxillary anterior teeth have a very limited amount of available bone palatal and buccal to the root because the root occupies most of the alveolar volume. The authors considered such a scenario as a contraindication for immediate implant placement.

b) Periapical infection

The presence of a hopeless tooth with a chronic periapical infection is not a contraindication to immediate implant placement. Several randomized controlled clinical trials have demonstrated that chronic periapical endodontic lesions do not impact the survival rate of immediate implant therapy.^{51,66,67}

The clinical recommendation is to ensure adequate removal of the granulation tissue around the lesion and thorough rinsing with saline solution to ensure proper lesion debridement. Moreover, the presence of a buccal fenestration at the site of the lesion should be treated, following implant placement, by guided bone regeneration (GBR) using a bone graft material covered by a resorbable membrane.⁶⁷

c) Patient related factors

Among the factors to be considered are the patient's expectations and smile line. High esthetic expectations and a high smile line would leave very little margin for error. Even a 0.5mm mid-facial recession may be deemed unsatisfying to a patient with high esthetic demands.

d) Soft tissue grafting at the time of implant placement

Different techniques have been advocated to increase the thickness and quality of the soft tissue around dental implants. However, the evidence to support an added benefit from these procedures is limited, and more studies are needed before it can be considered standard care.^{68,69} A recent systematic review concluded that a connective tissue graft should be considered with immediate implant placement in cases where there is an elevated risk of midfacial recession (thin gingival phenotype and buccal bone thickness of < 0.5 mm).⁷⁰

Alternative to (Type 1) Immediate Implant Placement

The type 2 implant placement protocol as described by Buser and others represents a valid alternative to Type 1 implant placement.⁷¹

In brief, following tooth extraction a collagen plug is placed into the extraction socket and the site is left to heal to allow the soft tissue closure over the extraction socket. Four to eight weeks later, implant placement is performed using a full-thickness muco-periosteal flap elevation. In conjunction with implant placement, a GBR procedure using autogenous bone (harvested locally) and bovine bone mineral, is performed to over contour the ridge at the implant site before the flap is coronally advanced and tension-free primary closure is achieved.

Studies have shown a lower risk of mucosal recession with type 2 implant placement compared to the aforementioned studies in which a Type 1 implant placement protocol was used.^{44,72} Moreover, radiographic evidence derived from CBCTs show that the outcome of the GBR procedure was maintained and stable over time.⁷³

Finally, a conservative approach of extracting the tooth, performing ridge preservation (See *QRG Alveolar Ridge Preservation Following Tooth Extraction - Fourth Edition*), and returning for implant placement after a healing period of 3 to 4 months represents a valid alternative. Although this approach entails a longer overall treatment time, it provides the clinician a reliable fallback option.⁷⁴

Conclusions on Immediate Implant Placement

Immediate implants represent a viable treatment modality. However, they are technique-sensitive and require careful case selection and risk factor analysis to avoid suboptimal treatment outcomes.

The following conditions should be met for immediate implant placement:

- 1) An intact socket is present following extraction
- 2) A thick periodontal phenotype is present
- 3) Bone is available on the palatal and apical aspects of the extracted tooth to ensure primary stability of the implant.

Technique for Immediate Implant Placement

Prior to the surgery, CBCT imaging is helpful in evaluating the amount of bone available outside of the confines of the socket to predetermine the feasibility of engaging native bone and obtaining implant primary stability (**Figure 2**).

Figure 2



The sagittal cross section of the CBCT demonstrates that the root of tooth #9 is against the labial plate. Native bone is available beyond the apex of the tooth and on the palatal aspect of the root, which will allow implant primary stability. The presence of an intact buccal plate is also observed with no signs of dehiscence.

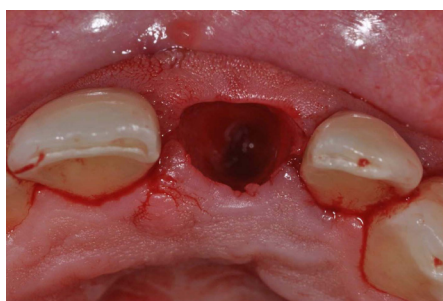
Following the administration of local anesthesia, the tooth should be carefully extracted using a minimally traumatic technique to preserve the integrity of the extraction socket walls, particularly the buccal wall. Periostomes are preferred over conventional elevators to minimize the risk of trauma to the surrounding bone. Once the tooth has been successfully extracted (**Figure 3**), a thorough clinical inspection of the socket should be performed to confirm the integrity of its walls. If dehiscence or a fracture of the buccal plate is detected, implant placement should be deferred, and ridge preservation or augmentation should be undertaken instead.

If all the socket walls are intact, the implant bed preparation should start with the first drill (sometimes also called precision drill), which should be a fine, sharp, and pointy drill (**Figure 4**). This first drill allows for repositioning the implant bed irrespective of the walls of the socket in the sagittal (labio-palatal angulation, **Figure 5**) and frontal (mesio-distal angulation, **Figure 6**) planes.

The technical difficulty of preparing an implant bed in a freshly extracted site is the natural tendency of any implant drill to follow the path of the socket. To adequately place the implant in the correct restoratively driven position, the implant bed must be displaced in relation to the socket. For example, in the anterior maxilla, the implant must be placed palatally in relation to the socket, not only to fulfill the requirement from a restorative point of view but also to be able to follow the guidelines proposed by Chen and colleagues mentioned previously, which require the implant shoulder to be placed approximately 2mm palatal to the point of emergence at the adjacent teeth (**Figure 7**).

While correcting the implant bed preparation is possible with subsequent drills of increasing diameter, the initial drilling with the precision drill should be carefully executed to set the position, axis, and angulation of the implant bed optimally. This, in turn, allows for much easier implant bed preparation with subsequent drills.

Figure 3



Intact extraction socket at site #9 following debridement.

Figure 4



Different precision drills commercially available.

Once the precision drill has enabled the ideal positioning of the implant bed, the use of drills of increasing diameter allows the completion of the osteotomy before implant placement in the correct restorative position (**Figure 8**).

The horizontal defect between the implant's shoulder and the internal wall of the socket (the jumping gap) is grafted using a freeze-dried mineralized bone allograft (FDBA), as in the illustrated case (**Figure 9**). A resorbable collagen membrane is then placed over the grafted site and the implant. A periosteal releasing incision may be necessary to advance the flap coronally and allow passive approximation of the flap margins before securing it with sutures and taking a baseline postoperative radiograph (**Figure 10**).

Post-operative care typically includes prescribing systemic antibiotics for 7 to 10 days, administering analgesics, and rinsing with a 0.12% Chlorhexidine solution twice a day for 7 to 14 days.

Figure 5



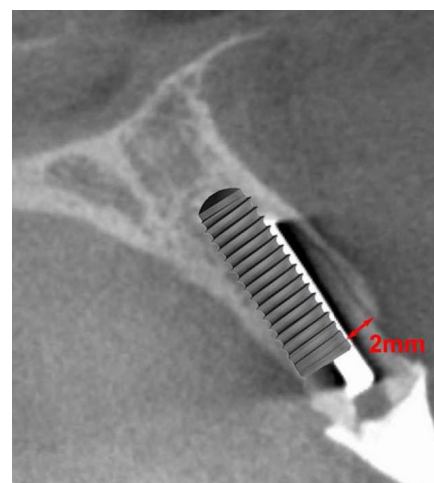
Planning of the implant placement based on the sagittal cross section of the CBCT. Notice the palatal position of the implant.

Figure 6



Precision drilled in the frontal view. Notice that not only does the precision drill reposition the implant bed towards the palate (as illustrated on the previous figure) but also in the frontal plane, the mesio-distal angulation is corrected.

Figure 7



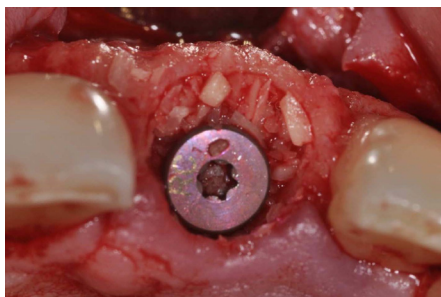
Desired implant position on the sagittal cross section of the CBCT, leaving 2 mm between the shoulder of the implant and the internal wall of the socket.

Figure 8



Clinical view of the immediate implant #9 placed in the correct oro-labial and mesio-distal position.

Figure 9



The horizontal gap between the implant and the socket is grafted with FDBA.

Figure 10



Post-operative radiographic control.

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POST-TEST

Internet Users: This page is intended to assist you in fast and accurate testing when completing the “Online Exam.” We suggest reviewing the questions and then circling your answers on this page prior to completing the online exam.

(1.0 CE Credit Contact Hour) Please circle the correct answer. 70% equals passing grade.

1. Which of the following timing of implant placement, as defined by the ITI (International Team for Implantology), represents the most conservative approach, in which the dental implant is placed after complete healing of the extraction site (with ridge preservation)?
 - a. Type 1 implant placement
 - b. Type 2 implant placement
 - c. Type 3 implant placement
 - d. Type 4 implant placement
2. Which of the following statements about immediate implants is **NOT** correct:
 - a. Immediate implants are technique sensitive.
 - b. Immediate implants have a similar success rate as implants placed in healed site.
 - c. Immediate implants require a careful case selection.
 - d. Immediate implants have a similar survival rate as implants placed in healed site.
3. According to the literature, what is the prevalence of mucosal facial recession following immediate implant placement?
 - a. Less than 1% of the cases
 - b. Less than 5% of the cases
 - c. Between 8% and 40% of the cases
 - d. More than 50% of the cases
4. The utmost important risk factor related to peri-implant mid-facial soft tissue recession is:
 - a. The presence of a thick phenotype
 - b. Implant placed too far facially
 - c. A thin (<1mm) bony palatal wall
 - d. The inability to achieve primary stability
5. Which of the following preclude(s) the placement of an immediate implant?
 - a. Presence of a chronic peri-apical infection
 - b. Loss of buccal plate integrity
 - c. Presence of bony exostosis
 - d. a and b
6. When placing an immediate implant in an extraction socket at what distance should the shoulder of the implant be in relation to the internal border of the buccal bone wall?
 - a. 0.5 mm
 - b. 1 mm
 - c. 1.5 mm
 - d. 2 mm
7. Recession coverage of an implant can be attempted by means of a connective tissue graft. Concerning this technique, which of the following statement is FALSE?
 - a. The patient needs to have a good plaque control.
 - b. The result of this procedure is more predictable around teeth (with Class 1 Miller recession).
 - c. You will get complete long-term recession coverage in a predictable way.
 - d. The site cannot present deep probing pocket depth.
8. Type 2 implant placement has been suggested as a treatment alternative to type 1. Following this protocol, how many weeks following extraction is the implant placed?
 - a. 1 to 2 weeks
 - b. 2 to 4 weeks
 - c. 4 to 8 weeks
 - d. 8 to 12 weeks
9. All the followings apply to a precision drill EXCEPT:
 - a. It pinpoints the entrance of the osteotomy site.
 - b. It widens the implant bed preparation right before implant insertion.
 - c. It is thin and pointy.
 - d. It defines the osteotomy pathway irrespective of the extraction socket walls.
10. Which of the following statements about the buccal plate, in relation to immediate implant placement, is FALSE:
 - a. Tooth extraction and disappearance of bundle bone are major causes of the rapid resorption of the thin buccal plate.
 - b. Immediate implant placement can help prevent the resorption of the thin buccal plate.
 - c. A thin buccal plate is a risk factor for mucosal recession following immediate implant placement.
 - d. Contour bone augmentation can compensate for future resorption of the thin buccal plate.

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