

# Immediate implants in the esthetic area: Our perspective and clinical guidelines

## Abstract

The placement of implants immediately after tooth extraction has proven to be a predictable treatment strategy with a very high success rate. Nevertheless, the success of this surgery involves strict clinical criteria. A description is provided of a clinical orientation and scientific point of view based on our experience and available evidence of when and how to perform this procedure in the esthetic area.

We consider the  
clinical criteria in relation to

1. indications;
2. tooth extraction;
3. soft-tissue management;
4. implant placement technique;
5. the critical distance and gap filling; and
6. immediate versus delayed restoration.

These key factors, including a flapless procedure, presence of an intact buccal bone wall, absence of soft-tissue defects, gap filling to counteract the tissue changes after tooth extraction and immediate restoration when possible, should be considered to achieve good esthetic results.

## Keywords

Dental implants, immediate dental implant loading, tooth extraction, alveolar process, bone remodeling.

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## How to cite this article:

Perez A, Valente NA, Trottet L, Chatelain S, Alfonsi F, Barone A. Immediate implants in the esthetic area: Our perspective and clinical guidelines. J Oral Science Rehabilitation. 2018 Mar;4(1):16–23.

## Immediate placement of dental implants in the esthetic zone

Tooth extraction normally causes a remodeling process of the alveolar ridge, which normally follows a healing pattern with a dimensional shrinkage of the ridge in both shape and volume.<sup>1-3</sup> Thus, as a consequence of the natural healing events, implant placement to restore the missing tooth might be limited because of loss of the adequate amount of bone and because of the absence of the ideal volume of the residual ridge.<sup>1-3</sup> Several surgical procedures have been proposed to preserve or improve the volume of the alveolar ridge after a tooth extraction. Among the several available treatment options to manage a fresh extraction socket, immediate implant placement has been a debated issue in the last 25 years. During a consensus conference in 2003, Chen et al. established that immediate implants showed predictable outcomes in terms of survival rates that were similar to those of implants placed in healed ridges.<sup>4</sup> These authors pointed out the need to better clarify the long-term esthetic outcomes for immediate implants.<sup>4</sup> Moreover, the same authors observed that there was an absence of a clear classification, according to the timing of implant placement in extraction sockets.<sup>4</sup> Thus, different authors<sup>5,6</sup> have well clarified how to classify the timing for implant placement, in an extraction socket; nowadays, the terms "immediate," "early" and "delayed" in relation to implant placement are universally accepted and recognized. Several publications have reported negative esthetic outcomes associated with immediate implant placement, such as gingival recession, higher marginal bone loss and interdental papillae loss.<sup>5,7,8</sup> According to Buser et al., immediate implant placement in the esthetic area accounts for only 5–10% of cases, and for the rest, a different approach should be chosen, mostly early placement with hard-tissue healing (12–16 weeks), so for this reason, the clinician should develop the ability to both identify and successfully treat these few cases.<sup>9</sup> The aim of this review paper is to report the most debated points in the literature and the clinical approach that could be considered predictable in terms of implant functional and esthetic implant success.

## Clinical criteria

### 1. Indications

Immediate implant placement is certainly a delicate technique that requires experience and accurate case selection, based on certain indications, in order to achieve optimal results.

The 3-D positioning of an immediate implant, which will be discussed later in this article, requires that the bone housing should allow for a palatal/lingual placement and a sufficient buccal bone thickness that guarantees support for the facial soft tissue, thus decreasing the risk of facial mucosal recession. When a buccal alveolar bone thickness amounts to less than 2 mm, its integrity is at risk of fenestration, dehiscence and soft-tissue recession.<sup>10,11</sup>

Also, a possible immediate restoration of the immediate implant should be based on the measurement of ISQ (Implant Stability Quotient), the value of which has to be more than 62.<sup>12</sup>

In order to summarize the indications for immediate implant placement in a short checklist that is easy for the clinician to follow, it can be suggested that the decision in favor of this technique should be made when the operator is facing these local clinical scenarios: integrity of buccal bone wall and absence of soft-tissue recession immediately after tooth extraction, presence of adequate interdental bone around adjacent teeth and presence of bone beyond the tooth apex to allow good implant stability. Moreover, the reasons for tooth extraction should be carefully evaluated when considering immediate implant placement, with the aim of identifying clinical conditions that could relatively contraindicate immediate implant placement. For example, tooth trauma, which is commonly associated with a fracture of the buccal bone plate; and periodontal disease, which is commonly associated with interdental bone loss, could represent relative contraindications to immediate implant placement (**Figs. 1 & 2**).

The presence of an acute infection, lack of bone beyond the tooth apex, proximity to anatomical vital structures and absence of local ideal clinical conditions should be considered as full contraindications to immediate implant placement.

Finally, it should be underlined that the experience of the clinician is a fundamental factor in the execution of this delicate technique. The esthetic outcomes can be compromised by the inexperience of surgeons, especially when the implants are placed in esthetic areas.<sup>13</sup>

**Fig. 1**  
Root remnant of first maxillary left premolar, occlusal view.

**Fig. 2**  
Root remnant of first maxillary left premolar, lateral view.



Fig. 1



Fig. 2

## 2. Tooth extraction

The atraumatic extraction of the tooth to be replaced with an immediate implant is essential to prevent damage to the buccal bone plate and to preserve the interproximal papillae and labial soft tissue. Flapless extraction should be preferred or only a minimal mucoperiosteal flap elevation<sup>14</sup> to preserve the integrity of the vascular supply from the periosteum and avoid alveolar bone resorption in the exposed area (**Fig. 3**).<sup>15,16</sup>

Several measures or instruments can be adopted to aid in an extraction that is the least traumatic as possible, including sectioning the tooth to carefully remove the fragments and the use of a piezoelectric device or microsurgical instrumentation, such as periostomes.

After the extraction, the socket should be thoroughly degranulated by careful curettage. Then, the integrity of the buccal bone and soft tissue should be checked to determine whether it is favorable for immediate implant placement.

## 3. Soft-tissue management

The maintenance of soft-tissue contour and dimension is one of the most challenging aspects of immediate implant placement. Indeed, mid-facial mucosa recession around immediate implants has been reported to occur in a high percentage of cases (40%),<sup>8,17,18</sup> and almost one-third of unsatisfactory esthetic outcomes have

been associated with several factors, such as tissue biotype, thickness of facial bone wall and implant positioning.<sup>14,19</sup> It should also be taken into consideration that most of the soft-tissue changes can continue after implant surgery, even on a long-term basis.<sup>15</sup> Today, it is well known that the surgical technique influences the soft tissue around immediate implants.<sup>16,20</sup> The surgical procedure is usually performed flapless,<sup>21</sup> and it has been shown that it enhances esthetics and decreases gingival recession,<sup>22</sup> as previously discussed. The soft tissue at the facial level needs to be supported by a buccal bone wall of sufficient height and thickness. Therefore, a volume augmentation through grafting at the time of implant surgery seems to be strongly recommended<sup>7,23,24</sup> to maintain the bone volume at the facial level on a long-term basis<sup>25,26</sup> and thus to avoid a soft-tissue collapse, which can be responsible for some negative esthetic effects.<sup>27,28</sup> Otherwise, the soft tissue can be managed by a provisional crown, and there is evidence to support that immediate implant placement with temporary restorations can provide stable esthetic results and limited recession.<sup>29</sup> In fact, it has been shown that it is advantageous to avoid manipulation of soft tissue during and after initial healing because such an intervention may disrupt the soft-tissue seal.<sup>30</sup> This manipulation is unavoidable when implants are placed according to the traditional two-stage protocol. Thus, the idea is that

Fig. 3



**Fig. 3**

Tooth socket after careful atraumatic extraction of the root remnant.

immediate provisional restoration allows for minimal disturbance of the soft tissue during healing, and as a consequence, it could be expected that the undisturbed soft tissue will result in better maintenance of the bone level position.<sup>31</sup>

#### 4. Implant placement technique

Several factors are involved in the esthetic success of an immediate implant, among which the most important is certainly an appropriate implant positioning. A useful tool in the decision process during the evaluation of the extraction socket hard tissue for possible implant placement is the classification of Juodzbalys et al.<sup>32</sup> Once the alveolus is deemed adequate for the purpose, the implant placement should be performed as carefully as the already discussed atraumatic tooth extraction. A strict and standardized protocol should be followed that considers the peculiar anatomical features of a post-extraction socket, especially in the esthetic areas.

The implant site has to be prepared positioning the drills so that they follow the palatal bony wall as a guide and using the apical bone as much as the residual bone height allows. The residual apical bone will provide most of the necessary anchorage and stability for the implant. For this reason, the length of the implant should be accurately chosen accordingly during the planning. Once the implant site has been prepared, a periodontal probe should be used to verify the integrity of the walls. Finally, the implant must be placed with the platform at the marginal level of the buccal bone wall.

The palatally oriented preparation of the osteotomy is dictated by the anatomy of the post-extraction socket. The buccal wall of the socket is generally very thin and in the esthetic areas is generally less than 1 mm.<sup>33</sup> According to Huynh-Ba et al., in the upper anterior area, this bone is equal to or less than 0.5 mm thick in 64.1% of cases.<sup>34</sup> Although early studies supported the hypothesis that immediate implant placement could preserve the initial alveolar crest dimension,<sup>35–37</sup> later human and animal model studies showed that the ridge will not maintain its original shape for longer than 3–4 months after immediate implant placement.<sup>17,28</sup> For these reasons, it is important to keep a palatally oriented positioning, because the unavoidable resorption of the very thin buccal wall might compromise the success and the long-term survival of the implant if placed in close proximity to the buccal aspect (**Figs. 4 & 5**).

#### 5. The critical distance and gap filling

According to many authors, the need to graft the gap between the implant and the buccal socket wall is guided by the length of this space.<sup>38,39</sup> The critical distance, beyond which a graft is strongly suggested, is considered to be 1.5 mm.<sup>38, 39</sup> Several approaches have been proposed to fill the gap around implants, aimed at preserving or improving the dimension and contour of the ridge after tooth extraction and immediate implant placement.<sup>39, 40</sup> Different studies have shown that the use of bone substitutes might also modify the pattern of bone remodeling.<sup>41, 42</sup>

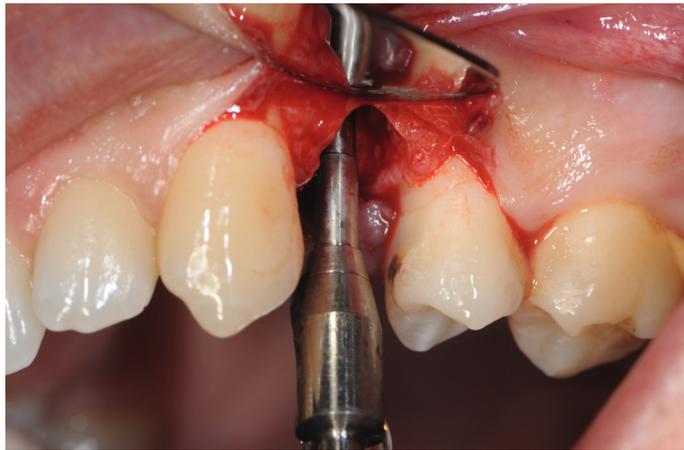


Fig. 4

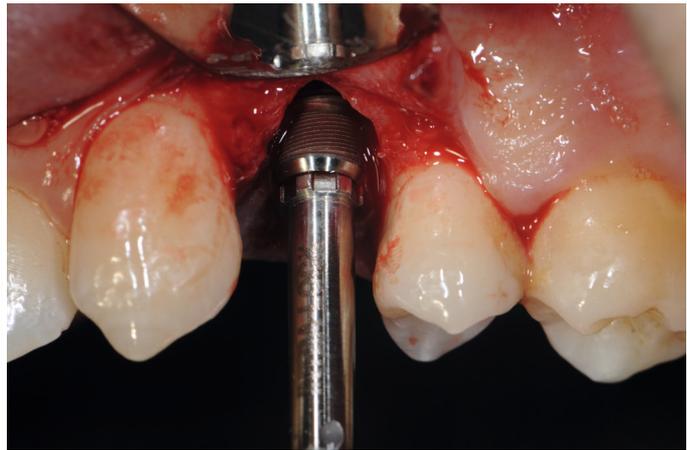


Fig. 5

**Fig. 4**  
Implant site preparation following the palatal wall of the socket.

**Fig. 5**  
Implant placement. The post-extraction socket presented a buccal V-shaped fenestration.

**Fig. 6**  
The gap, coronal area and fenestration were grafted with xenograft particles.

**Fig. 7**  
A resorbable collagen membrane was placed to cover the graft underneath the gingival margin.

**Fig. 8**  
Suture of the socket to stabilize the membrane.



Fig. 6

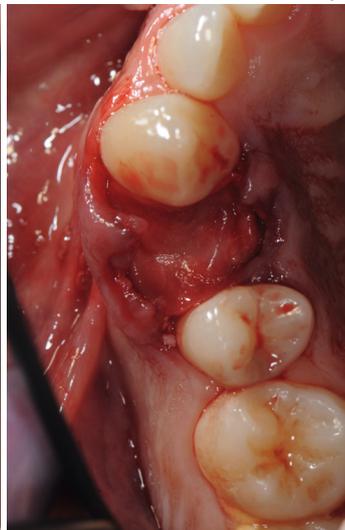


Fig. 7

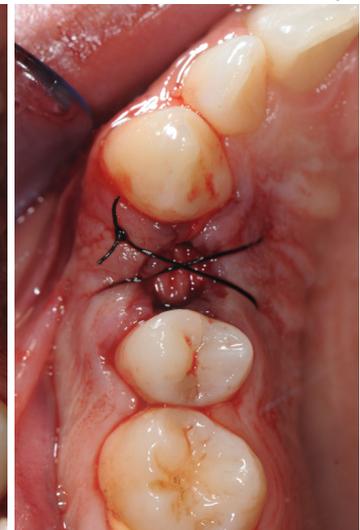


Fig. 8

In general, marginal bone changes around implants, when placed in fresh extraction sockets, may result in unfavorable bone thickness in the long term. For this reason, the use of guided bone regeneration techniques in this situation can be suggested. It is advisable to use cortico-cancellous porcine bone, which has a slow resorption rate, mixed or not with autogenous bone, and a resorbable membrane to stabilize the graft. The membrane can be left exposed, provided that antibiotic therapy is prescribed to the patient (amoxicillin and clavulanic acid, 1 g twice a day for 5 days, starting the day before surgery). With this technique, it was demonstrated in a previous study that implants have a cumulative survival rate of 94.6% at 7 years (**Figs. 6–8**).<sup>12</sup> All of the guided bone regeneration techniques applied in the implant–socket gap are useful to limit buccal wall resorption; however, a complete preservation of the initial contour is never possible and a remodeling will always take place to some extent, although with a slower rate.<sup>41</sup>

#### 6. Immediate versus delayed restoration

Several studies have shown that there is no difference in the long-term survival of implants restored with immediate or delayed provisional crowns and that, concerning the success rate, the two restorative procedures seem to be very similar in terms of soft-tissue behavior at the buccal aspect.<sup>43–45</sup> However, various studies regarding immediate implants placed in fresh extraction sockets suggested that wider papillary shrinkage was seen in delayed restorations than in immediate restorations.<sup>46</sup> From our point of view, the prosthetic treatment, namely immediate or delayed restoration, has to be based on strict clinical criteria, for example, the insertion torque value that should not be higher than 45 Ncm. Nevertheless, immediate prosthetic restoration may guarantee more predictable results in terms of an excellent hard- and soft-tissue prognosis for

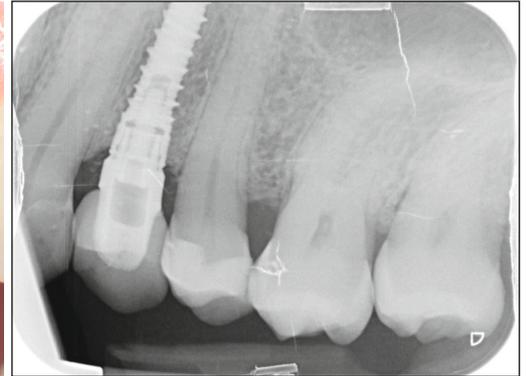
Fig. 9



Fig. 10



Fig. 11



all aspects.<sup>47</sup> In their study, Barone et al. showed that, with delayed restorations, loss of papillary soft tissue and bone resorption were faster and localized, whereas with immediate restorations, tissue modifications appeared slow and gradual, allowing more predictable results with an excellent soft-tissue prognosis regarding, above all, the mesial and distal aspects.<sup>47</sup> Moreover, treatment time until the final restoration is longer with delayed restoration than with immediate restoration.<sup>44</sup> Finally, delayed restoration had higher costs than immediate restoration did, 26% more, owing to both the adjunctive second-stage surgery and the higher number of visits required (Figs. 9–11).<sup>48</sup>

### Conclusion

Nowadays, the improvement in implant technology and knowledge of healing patterns after tooth extraction has made it possible to achieve adequate success rates and favorable esthetic outcomes with immediate implants. It should be pointed out that immediate implant placement can be considered as a possible treatment option only when strict clinical criteria are met, such as integrity of the buccal bone plate, integrity of bone peaks of the adjacent teeth, integrity of soft tissue (adequate amount of keratinized gingiva, adequate gingival scallop and adequate interdental papillae) and a thick gingival biotype. Under these clinical conditions, immediate implant placement could be considered as a viable treatment option that shows predictable outcomes. For these reasons, the following points, as discussed in this review, should be considered and reviewed before implant placement in fresh extraction sockets:

- Case selection should be made according to inclusion and exclusion criteria.
- The extraction of the tooth or root remnant should be done as atraumatically as possible in order to avoid any damage to the hard and soft tissue.
- Soft-tissue integrity should be preserved by avoiding flap elevation or, if necessary, only performing a minimal flap elevation. This will also decrease buccal bone resorption.
- The implant placement should follow the palatal wall and a vestibular orientation should be avoided as far as possible to avoid possible fenestration of the implant after unavoidable bone remodeling.
- The gap between the implant and the buccal bone wall should be grafted to avoid resorption and exposure of the buccal aspect of the implant and to provide support to the soft tissue.
- Immediate restoration, when possible, should be preferred because it can guarantee better support to the interdental soft tissue and is less expensive for the patient.

In addition, it should be taken into consideration that, when all of the clinical conditions for immediate placement are present, this procedure is still considered as a complex procedure that requires high surgical skills. When the clinician is not sufficiently experienced or when all of the requirements are not satisfied, other techniques should be considered, such as early implant placement with soft- or hard-tissue healing and late implant placement with or without socket grafting.<sup>9</sup>

### Competing interests

The authors declare that they have no competing interests and have not received any support from any companies.

**Fig. 9**

Placement of the final crown 5 months after implant placement.

**Fig. 10**

Follow-up at 6 years: The papillae had completely filled the interdental spaces.

**Fig. 11**

Periapical radiograph at 6 years, showing optimal maintenance of the marginal bone level.

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