

**Ridge Augmentation Along With Flapless Delayed Implant Placement – A Case Report**

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**Abstract**

Following the 1970s, modern implantology has been based on the notion of flap elevation surgery. Several clinical trials have steadily shown that a mid-crestal incision offers equivalent success rates relative to those achieved using the classical procedure. Over the past decade, however, the idea of minimally invasive surgery has been introduced in dentistry, consisting of taking advantage of developments in diagnostic methods and specific surgical instruments to conduct surgical procedures that cause as little damage as possible to the patient. After presenting the clinical cases and reviewing the literature, we can conclude that flapless surgery should

be confined to well-selected cases where adequate clinical and radiological preparation has been carried out.

**Keywords:** flapless, delayed implant placement, ridge preservation, socket shield

**Introduction**

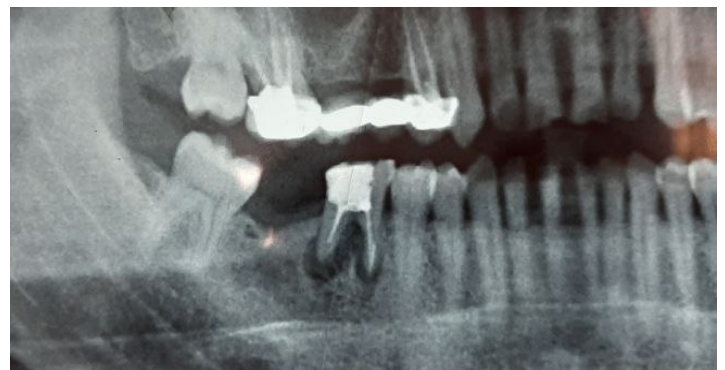
Socket healing after tooth loss results in altered dimensions of the alveolar ridge<sup>1,2</sup> due to remodeling<sup>3</sup> and tooth-dependent alveolar process.<sup>1</sup> The degree of alterations varies and it can result in the loss of ridge volume and changes in ridge shape, with up to 3.8 mm horizontal and 1.24 mm vertical reduction.<sup>4</sup> Moreover, the greatest losses occur on the buccal aspect, which is related to a thinner bone wall<sup>2</sup> composed of large amounts of bundle bone<sup>2</sup> primarily vascularized by the periodontal

tooth membrane<sup>3</sup> and particularly susceptible to surgical trauma and resorption.<sup>5-7</sup> Other important reasons to maintain the bone wall while teeth are present include maintenance of the periodontal ligament and the provision of nutritional and functional stimuli.<sup>8</sup> Most dimensional changes that compromise socket healing occur during the first to third months.<sup>8</sup> A reorganization of the alveolar ridge can be observed for up to 1 year, but with a less pronounced influence on the hard and soft tissues.<sup>9</sup> In most situations, these changes adversely affect with the aesthetic outcome, treatment planning, implant positioning, material selection, and osseointegration.<sup>1</sup> This is even more critical in the anterior regions<sup>10</sup> where these changes directly influence red and white esthetics.<sup>11,12</sup> Soft-tissue augmentations immediate or posterior to implant placement are successful to control the tissue alterations. However, it means more surgical interventions.<sup>13</sup> Several approaches have been described for contouring the socket alterations caused by tooth extraction<sup>10-12</sup>: implant placement directly after extraction<sup>4</sup>; positioning of the implant on the palatal/lingual wall, preserving the buccal wall contact<sup>1</sup>; performing the surgery using the flapless technique to maintain vascularization<sup>1</sup>; and using soft tissue or bone grafts to maintain the dimension of the ridge by socket augmentation.<sup>10</sup> Recent studies concentrated either on immediate implants or on the use of grafts, but they also stated that remodeling cannot be avoided with these techniques but can continue even after 3 to 6 months of healing.<sup>1,14</sup> Moreover, any surgical intervention can result in an anxiety response on the part of the patient.

### Case Report

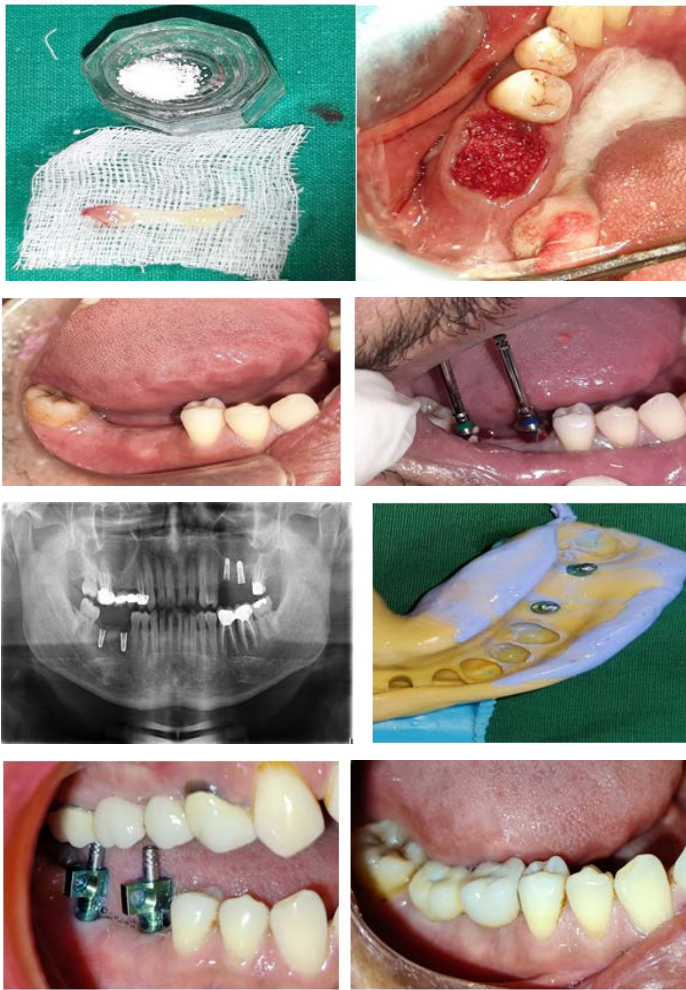
A 26-year-old male patient reported to the department of periodontology for a root stump with respect to 46. As the bone was healthy, a socket preservation was planned following an extraction with 46. The patient wanted to

replace the missing tooth at a later date so a delayed implant placement was decided. The medical history was non-contributory. Following administration of local anaesthesia, an atraumatic extraction was done with 46. A curettage was thoroughly performed with the 46 to remove any granulation tissue and debris. Socket preservation done with the help of PRF and xenograft (heliguide). A non-resorbable suture was placed. Patient was recalled after 15 days for reevaluation. Following 3-months of treatment, a flapless implant placement was planned in relation to 46 and 47. Implant size of 4.5 by 10 mm and 5 by 10 mm was selected for the procedure. (Osstem company) Following implant placement, a healing abutment was also placed. After 3-months, patient was called for follow up and an open tray impression was made using addition silicon. In 15 days, a screw retained PMF crown was placed with respect to 46 and 47.



Pre-operative OPG.





## Discussion

The first 6 months postextraction are critical because the highest rate of bone resorption occurs in either direction.<sup>15-18</sup> Therefore, the immediate or delayed insertion after extraction can be a realistic opportunity to reduce the postextraction bone loss. This method is an important modification of the traditional surgical protocol, recommending a 12-month healing period between tooth extraction and placement of implants,<sup>19</sup> and, in our opinion, finds special indication in the frontal esthetic regions of the upper jaw. The anatomic characteristics of the socket after tooth extraction is different from the socket environment after 1 year of healing. Implants placed immediately into fresh extraction sites engage precisely prepared bony walls only in their apex, whereas the coronal space is filled by the end of the healing phase.

The main difference occurs during the initial phase of osseointegration. That is why most of the studies focus on this interval to define survival rates.<sup>20</sup> Cumulative survival rates of 92.4% for the maxillae and 94.7% for the mandibles after 5 years of loading are similar to the survival rates described in other studies with delayed or immediate implantation methods.<sup>21</sup>

The socket-shield technique (SST) may reduce the extent of treatment and decrease patient stress and pain.<sup>10</sup> Additionally, the SST might reduce socket resorption and help avoid soft-tissue or hard-tissue grafting. The technique retains the buccal root after extraction, preserving periodontal vascularization, cementum bundle bone<sup>16</sup> and the buccal bone wall.<sup>22</sup> Furthermore, the technique has additional advantages: there is no added cost for materials, comorbidity is reduced, and it can be applied in the presence of endodontic apical pathology, and reduced surgical intervention.<sup>1</sup>

There are many advantages that make flapless surgery of dental implants an act increasingly demanded by clinicians and patients like firstly, there is faster healing of soft tissue. Flapless surgery prevents the reflection of soft tissues reducing the surgical trauma. As a result, the necessary process of healing of the wound is minimal, with an absence of scar and its typical complications of conventional surgery as the dehiscence of the flap. The absence of suture in the majority of cases contributes equally to the best postoperative appearance of the surgical area.<sup>23</sup> Secondly, there is minimal interference on the blood supply. As flapless technique implies only essential orifices on the mucosa in the flapless technique, blood supply is hardly affected compared to what takes place in surgeries with large flaps which are forced to be designed broad-based in order to avoid flap necrosis.<sup>23</sup> It should be recalled that the vascularization of the underlying bone is determined by three essential sources:

major supra-periosteum vessels, vascular plexus of the periodontal ligament, and the vessels of the alveolar bone. With the absence of a tooth, the plexus of the ligament disappears, remaining the vascularization guaranteed due to the two other sources. Under these conditions, the flap reflection entails a loss of the blood supply of the suprapariosteum vessels, so the bone vascularization depends upon its own vessels, which is a poor blood source in the case of cortical bone. This will imply a certain level of bone resorption during healing in cases that occur with a mucoperiosteum flap reflection.<sup>24</sup>

Several studies corroborate that bone resorption that follows flap surgery causes a decrease of the vascularization threatening the final aesthetic results. Thus, Kim in 2009<sup>25</sup> shows in one study in dogs, than in areas where it was placed a flapless implant presented a much richer vascularization than the area in which the surgery was conventional, thus making a better vascularization of the areas in which flap was not practiced. Jeong and cols in 2007<sup>26</sup> published a comparative study in dogs about socket healing after the insertion of an implant with or without flap, showing that sites with flapless technique showed a higher-osseointegration (greater contact bone implant-BIC) and less peri-implantary bone loss, which was measured by greater crestal bone height in these implants. Furthermore, You et al. 2009<sup>27</sup> repeated the previous model, finding three months after the implant surgery that the flapless technique could reduce gingival inflammation, reduce the height of the junctional epithelium and reduce the bone loss.

### Conclusion

The flapless technique allows to make intervention with a minimum aggression to both the bone and soft tissues, shortening the surgery time and achieving high levels of satisfaction by the patient. However, the technique is not

exempted from complications and limitations; the main obstacle of flapless surgery is the fact of limited visibility of the drilling and during implant placement, so the risk of causing wrong bone directions or damaging neighbouring structures is higher than the conventional technique. For all this, flapless surgeries should be restricted to well-selected cases in which a proper clinical and radiological planning has been made.

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