

Socket Preservation For Implants- A New Scenario

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ABSTRACT

AIM: The aim of this article is to review socket preservation techniques and treatment outcomes in association with preservation techniques. There is a significant physiologic change after tooth extraction which implies the necessity of socket preservation for planning a delayed implant. Various clinical trials and studies have given different preservation techniques. Bone grafting and biological membrane are the most common methods done to preserve the socket.

METHOD: A PubMed database search was done with the Keywords – socket preservation, ridge preservation and bone grafting.

RESULT: The initial database searches returned 200 results. 15 articles were downloaded. 13 articles were found to meet inclusion and exclusion criteria.

CONCLUSION: Preservation of bone volume is of major importance to ensure proper implant and aesthetic rehabilitation. Socket preservation maintains the height and width of the socket/ridge which is essential for aesthetics and function of implant.

INTRODUCTION

MATERIALS AND METHODS: The materials and methods are from Systematic Reviews and Meta analyses from the electronic databases –PubMed searches with keywords such as **socket preservation, socket grafting and ridge preservation.**

The important goal of the treatment is to provide health, function and aesthetics to the patients.

When the tooth is to be extracted, it has several options to replace it from implant to fixed prosthesis according to the economical status of the patient.

The morphology of the alveolar bone is tooth dependent. It is determined by form of tooth & axis of tooth eruption. Following extraction, occurs a remodelling of alveolar bone (a physiologic process). There will be a horizontal and vertical reduction of the bone. The contour loss is more significant in first six months post-extraction [1].

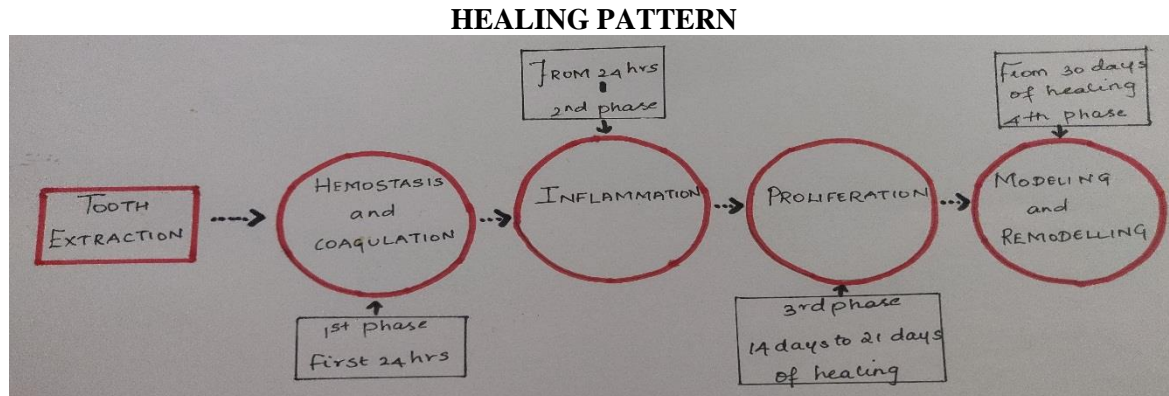
It affects the buccolingual and apicoronal process. The buccal plate shows more resorption than the palatal/lingual plate which leads to thin buccal plate, narrowing of ridge and palatal/lingual midline shift. Lekovic et al studies reported that the loss of width is three times more than that of loss of

height of the ridge. The average width loss is 3.87 mm and height loss is 1.67-2.02 mm in premolar sites [2].

The key goal of implant placement is preservation of socket. These ridge alteration affects optimal implant placement and compromise aesthetics.

For ideal implant, atraumatic extraction is also recommended [5].

Using socket preservation techniques, it is possible to prevent the height and width of the ridge.



WHEN TO DO RIDGE/SOCKET PRESERVATION?

AESTHETIC PRIORITY

THIN BUCCAL BONE PLATE

PATIENTS NEEDS DELAYED IMPLANT

TECHNIQUES

The socket preservation techniques are based on principle of guided bone regeneration. Many studies results that socket preservation can limit morphologic changes following extraction [4].

The various techniques are

BONE GRAFT

BONE GRAFT WITH MEMBRANE

BARRIER MEMBRANE[3].

MATERIALS USED

Bone Grafting:

The bone grafts are of different types,

AUTOGRAFT=> GOLD STANDARD METHOD

XENOGRAFT=> NANOCRYSTALLINE HYDROXYAPATITE

ALLOGRAFT => MINERALISED & DEMINERALISED FORMS(FREEZE DRIED DEMINERALISED BONE ALLOGRAFT)[9]

ALLOPLASTS=> BIOACTIVE GLASS

TRICALCIUM PHOSPHATE

CALCIUM SULFATE[10]



(FIGURE 2)

Bio-Membrane:

The membrane alone is not much used. The combination of graft & membrane is mostly recommended [11].

MEMBRANES ARE OF

RESORBABLE
BOVINE COLLAGEN
PORCINE COLLAGEN
NON-RESORBABLE

EXPANDED POLY TETRAFLUORO ETHYLENE

BONE GRAFT ACTS AS **SOCKET FILLER**

BARRIER MEMBRANE ACTS AS **SOCKET SEALER**[8]

Clinical Studies

Various clinical trials and studies were done.

Horvath *et al* had done 8 randomised controlled resorption of socket/ridge is limited after extraction but not eliminated through socket preservation.

Vignoletti *et al* included 14 studies and 9 in meta analysis. He concluded that ridge preservation have shown reduced loss of alveolar bone [12].

Morjaria *et al* included 42 papers and 9 randomised controlled trials in which ridge preservation due to unresorbed graft material

A Clinical Scenario

A case with internal and external resorption of 24. The tooth is hopeless and suggested for extraction. The patient age was 32 years and apparently healthy.

Under local anesthesia, the tooth was extracted with minimal trauma to the bone. Once the tooth was removed the socket is irrigated.

Preparation of PRF(Platelet Rich Fibrin) and it is used for preservation of socket/ridge as grafting material [7].

To obtain PRF, 10ml of venous blood was drawn and collected in test tube without anticoagulants. The tube was placed in centrifuge at 3000rpm for 13 minutes. The platelet poor plasma is formed the superficial layer and the middle layer with platelet rich buffy coat and RBC the bottom of the tube. The extraction socket is filled with PRF and suturing is done.

Post-surgical follow-up is done and after 6 months reviewed with minimised loss of ridge and optimal implant is placed.

DISCUSSION

Daniel Clark in 2017, studied RCT in 40 patients. He studied the extraction socket with PRF & FDBA. Studies with PRF alone shows more vital bone than in FDBA. Combination of PRF+FDBA also shows significant decrease in dimensional changes. The socket which left without preservation shows significant loss in height and width [13].

Avila Ortiz in 2014 –systematic reviews sub-meta analyses showed that ARP via socket filling with bone graft prevents bone loss after extraction of non-molar teeth in both horizontal & vertical dimension. He also reported ARP significantly prevents bone remodelling post extraction [14].

Buser et al reported ridge augmentation with GBR in humans using e-PTFE membrane & tenting pins in 12 patients. Following 6-12 months of healing an increase in bone volume to allow placement of implants is observed. The gain in bone formation is 1.5-5.5mm

Guo et al in 2018 reported that, Socket Shield Technique combined with PRF, it prevents tissue preservation at implant site. PRF helps in bone regeneration. SST at mesial & distal prevents retraction of interpapillae [15].

Jab Majzoub in 2019- meta analysis & review articles reports ARP with grafting materials proximal sites of the socket exhibited less vertical dimensional reduction, compared to mid buccal & mid-lingual sites, similarly horizontal resorption seems to be gradually minimized [16].

Dong Joo in 2018– RCT in 34 patients reports ARP with a d-PTFE membrane and freeze dried irradiated allogenic bone substitute materials on socket with bone deficiency results that

- 1) Decreased horizontal ridge resorption at the most coronal level.
- 2) Led to a tendency of less ridge resorption in both molar and non-molar sites.
- 3) Significantly decreased the need for bone augmentation at the time of implant placement [17].

Vail Natale in 2018-RCT in 40 patients reports Socket preservation with bovine bone graft limited but not impede the bone remodelling after 120 days of extraction [18].

Scheyer in 2016 reported – forty extraction sockets with buccal dehiscence treated with demineralized allograft and collagen membrane or deproteinized bovine bone mineral. Thirty seven out of forty had sufficient ridge dimension for implant placement after 6 months [19].

Christian studied many articles and reported that socket shield technique reducing the need for invasive bone grafts around implants in the aesthetic zone [20].

CONCLUSION

Preservation of bone volume is of major importance to ensure proper implant and aesthetic rehabilitation. Socket preservation maintains the height and width of the socket/ridge which is

essential for aesthetics and function of implant. Socket preservation limits the resorption rate hence it is used especially in aesthetic area.

The most commonly used technique is grafting. The post-extraction minimal resorption is achieved by adequate flap design, atraumatic extraction and adequate selection of grafting and barrier membrane [6].

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