Bone Replacement Grafts

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Instructions for Use

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Related Dental Policies

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Coverage Rationale

Bone Replacement Grafts for Retained Natural Teeth

Bone replacement grafts for retained natural teeth are indicated for the following:

- Infrabony/intrabony vertical defects
- Class II furcation involvements

Bone replacement grafts for retained natural teeth are not indicated for the following:

- Non-vertical defects
- Individuals who have been non-compliant with previous periodontal therapies
- Individuals with poor oral hygiene
- Teeth with a hopeless prognosis
- In conjunction with periradicular surgery

Bone Replacement Graft for Ridge Preservation

Bone replacement grafting for ridge preservation following an extraction may be indicated for the following:

- A planned dental prosthesis in which loss of ridge volume would adversely affect fit and/or function
- To prepare a site for placement of an implant

Osseous, Osteoperiosteal or Cartilage Grafting

Osseous, osteoperiosteal, or cartilage grafting may be indicated to augment deficient alveolar bone needed to support a dental prosthesis or placement of implants.

These procedures may not be indicated for the following:

- Individuals with an unmanaged medical condition; these conditions include, but are not limited to, metabolic, cardiovascular, and autoimmune/inflammatory, as well as genetic conditions that affect collagen synthesis
- Individuals taking medications that negatively affects the healing response; these include, but are not limited to, immunosuppressive agents, corticosteroids, anticoagulants, NSAIDS, and nicotine

Applicable Codes

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by the member specific benefit plan document and

applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other Policies and Guidelines may apply.

CDT Code	Description
D3428	Bone graft in conjunction with periradicular surgery – per tooth, single site
D3429	Bone graft in conjunction with periradicular surgery – each additional contiguous tooth in the same surgical site
D4263	Bone replacement graft – retained natural tooth – first site in quadrant
D4264	Bone replacement graft – retained natural tooth – each additional site in quadrant
D7950	Osseous, osteoperiosteal, or cartilage graft of the mandible or maxilla - autogenous or nonautogenous, by report
D7953	Bone replacement graft for ridge preservation-per site

Description of Services

Bone grafting is a well-established procedure that uses autologous or donor bone, xenografts, and alloplastic materials to augment bony defects due to tooth extraction or disease. This augmentation may be needed to prepare an extraction site for an implant, or other fixed or removable prosthetics, as well as replace the bone lost to periodontal disease. Bone grafts are typically used in conjunction with the application of biological materials and guided tissue membranes. Many surgical endodontic procedures are being performed less frequently, as the high success rate of dental implants makes them an accepted alternative. As a result, new evidence for these procedures is lacking.

Clinical Evidence

Bone Replacement Grafts

In a 2015 systematic review from the American Academy of Periodontology (AAP) Regeneration Workshop, Kao et al., updated the consensus reports by reviewing periodontal regeneration approaches developed for the correction of intrabony defects. Fifty-eight studies provided data on patient, tooth, and surgical-site considerations in the treatment of intrabony defects and forty-five controlled studies provided outcome analysis on the use of biologics for the treatment of intrabony defects. It was concluded that biologics (enamel matrix derivative and recombinant human platelet-derived growth factor-BB plus β-tricalcium phosphate) are generally comparable with demineralized freeze-dried bone allograft and guided tissue regeneration (GTR), and superior to open flap debridement procedures in improving clinical parameters in the treatment of intrabony defects. It was also reported that clinical outcomes are appreciably influenced by patient behaviors and surgical approach rather than by tooth and defect characteristics. Long-term studies show that these improvements are maintainable up to 10 years, even in severely compromised teeth.

Jambhekar et.al (2015) conducted a systematic review was to analyze the outcomes of a socket grafting procedures performed with flapless extraction of teeth with the primary outcome being to determine which graft material results in the least loss of socket dimensions, the maximum amount of vital bone, the least remnant graft material, and the least amount of connective tissue after a minimum of 12 weeks of healing. Secondary outcomes included the predictability of regenerating deficient buccal bone, necessity of barrier membranes, and coverage with autogenous soft tissue graft. 32 RCTs studying 1354 sockets were included. The results showed the mean loss of buccolingual width at the ridge crest was lowest for xenografts, followed by allografts, alloplasts and sockets without any socket grafting. 3 studies reported on loss of width at 3 mm below the ridge crest. The mean loss of buccal wall height from the ridge crest was lowest for xenografts and allografts followed by alloplasts and sockets without any grafting. The mean histologic outcomes at or beyond the 12-week period revealed the highest vital bone content for sockets grafted with alloplasts (45.53%), followed by sockets with no graft material (41.07%), xenografts (35.72%), and allografts (29.93%). The amount of remnant graft material was highest for sockets grafted with allografts (21.75%), followed by xenografts (19.3%) and alloplasts (13.67%). The highest connective tissue content at the time of reentry was seen for sockets with no grafting (52.53%), followed by allografts (51.03%), xenografts (44.42%), and alloplast (38.39%). The authors concluded that after flapless extraction of teeth, and using a minimum healing period of 12 weeks, xenografts and allografts resulted in the least loss of socket dimensions compared to alloplasts or sockets with no grafting. Histologic outcomes showed that sockets grafted with alloplasts had the maximum amount of vital bone and the least amount of remnant graft material and remnant connective tissue.

Reynolds et al. (2003) conducted a systematic review of randomized controlled studies to further clarify the efficacy of bone replacement grafts for the treatment of periodontal osseous defects compared to open flap debridement (OFD) alone. Primary endpoints included changes in bone level, clinical attachment level, probing depth, gingival recession, and crestal resorption. For purposes of meta-analysis, change in bone level (bone fill) was used as the primary outcome measure, measured upon surgical re-entry or transgingival probing (sounding). The results showed that bone grafts increase bone level, reduce crestal bone loss, increase clinical attachment level, and reduce probing depth compared to OFD alone, and there were no differences in clinical outcome measures between particulate bone allograft and calcium phosphate (hydroxyapatite) ceramic grafts. Furthermore, bone grafts in combination with barrier membranes increase clinical attachment level and reduce probing depth compared to graft alone. For the treatment of furcation defects, there was positive clinical benefits with the use of grafts in the treatment of Class II furcations. Histologically, 2 randomized controlled studies showed that demineralized freeze-dried bone allograft (DFDBA) supports the formation of a new attachment apparatus in intrabony defects, whereas OFD results in periodontal repair characterized primarily by the formation of a long junctional epithelial attachment. Multiple observational studies provide consistent histological evidence that autogenous and demineralized allogeneic bone grafts support the formation of new attachment. Limited data also suggest that xenogenic bone grafts can support the formation of a new attachment apparatus. All data indicates that alloplastic grafts support periodontal repair rather than regeneration. The authors concluded that the results of this systematic review indicate that bone replacement grafts provide demonstrable clinical improvements in periodontal osseous defects compared to surgical debridement alone.

Bone Replacement Grafts for Ridge Preservation

Rignon-Bret et al. (2021) conducted a single-blinded, randomized controlled clinical trial with 2 balanced parallel arms, to evaluate the efficacy of socket grafting with a xenogenic bone substitute on the preservation of the height and width of the bone ridge in the maxillary anterior region of 36 participants receiving maxillary immediate removable complete dentures. Participants had been without posterior teeth for at least 3 months. The results showed that of 36 participants, (3 were lost to follow-up), there was a decreased loss of height of the buccal crest, horizontal ridge width after 3 months, and 1 year of follow-up. The authors concluded that grafting DBBM-C into the extraction socket after removing anterior teeth for immediate removable denture therapy resulted in significantly less vertical buccal crest and horizontal ridge resorption as compared with spontaneous socket healing after 1 year of follow-up.

Avila-Ortiz et al. (2020) conducted a randomized controlled trial aimed at testing the efficacy of alveolar ridge preservation (ARP) compared with unassisted socket healing. A secondary objective was to evaluate the effect that local phenotypic factors play in the volumetric reduction of the alveolar bone. A total of 53 participants were randomized into either the control group, which involved only tooth extraction, or the experimental group, which received ARP using a combination of socket grafting with a particulate bone allograft and socket sealing with a nonabsorbable membrane (dPTFE). (ARP n = 26). A set of clinical, linear, volumetric, implant-related, and patient-reported outcomes were assessed during a 14-wk healing period. The results showed that all linear and volumetric bone assessments showed that ARP is superior to EXT. There were no significant differences in terms of soft tissue contour changes were observed. Additional bone augmentation to facilitate implant placement in a prosthetically acceptable position was deemed necessary in 48.1% of the EXT sites and only 11.5% of the ARP sites. Although some extent of alveolar ridge remodeling occurred in both groups, ARP therapy was superior to EXT as it was more efficacious in the maintenance of alveolar bone and reduced the estimated need for additional bone augmentation at the time of implant placement.

In 2019, Canellas et al. conducted a systematic review and meta-analysis of immediate implant placement or delayed placement with alveolar ridge preservation following tooth extraction. The primary outcomes were implant survival and esthetic outcome. Secondary outcomes were peri-implant bone resorption and implant complications at least one year after treatment. 16 studies that included 580 implant surgeries in 444 patients met the review criteria. The results showed a 3% risk of implant failure in the immediate implant protocol group, with no statistically significant differences in esthetic outcomes. The anterior region presented better results with immediate implants, while the molar region presented better results with delayed implants. The quantitative analysis showed no statistical difference in peri-implant bone resorption between the immediate and delayed implant protocols. The authors concluded that due to due to the lack of studies with a low risk of bias, further randomized controlled trials are needed before definitive conclusions can be made.

Periradicular Surgery

In a 2019 randomized prospective comparative study, Nakkeeran et al. compared and evaluated bone regeneration with and without combining platelet rich plasma (PRP), calcium sulfate (CS) and autogenous bone graft in periapical defects of jaw. The study included 20 participants assigned equally to the study and control groups. In the study group, the defect was filled with PRP, calcium sulfate and autologous bone graft. In the control group, the defect was allowed to heal without PRP, calcium sulfate and autogenous bone graft. The results were analyzed via orthopanogram radiographs for bone density and regeneration using grey scale analysis, and residual bone defect calculation. The results showed the

mean bone density in the study group was significant at weeks 5, 13 and 20 week follow up when compared with the control, and the percentage bone formation analyzed using residual bone defect calculation revealed significantly higher size reduction in the study group than with the outcome obtained in the control group. The authors concluded that the combination of PRP, CS and autologous bone grafting is a novel osteoconductive treatment for periapical defects. This study is limited by a small number of participants, and larger studies are required to validate these findings.

Sreedevi et al. (2011) conducted a study to evaluate and compare the clinical and radiographic healing following periapical surgery with and without bone grafting. Twenty patients were selected and randomly divided into two groups: A and B. After periapical surgery, Group A patients had the bony defect filled with hydroxyapatite, while Group B did not. Radiographic angulations were standardized for subsequent follow-up during the period of the study, and only lesions with 0.5-2cm in dimension were selected. Following surgery all patients were assessed both clinically and radiographically for a period of nine months. Clinical parameters assessed included pain on percussion and palpation, mobility, swelling and vitality of adjacent teeth. Radiographically the graft was assessed by comparing it to surrounding bone (the margin between the bone and the graft, radiopacity of the graft in comparison with the surrounding bone, the presence of trabecular bone formation), and size of the lesion. On clinical evaluation the test group (Group A) did not show any significant immediate or delayed clinical symptoms. Radiographically, in the follow up period of 6 - 9 months the bone graft became indistinguishable from the surrounding bone which indicates complete bone regeneration. Group B showed incomplete bone fill at the end of the nine-month evaluation period. The authors concluded that bone regeneration following periapical surgery is effective and can be facilitated using an alloplastic bone graft. Randomized controlled studies with larger patient populations are required to validate these findings.

U.S. Food and Drug Administration (FDA)

This section is to be used for informational purposes only. FDA approval alone is not a basis for coverage.

Tissue grafting products from donated human skin are regulated by the FDA as human tissue for transplantation, as are products used for bone grafts and they are processed and marketed in accordance with the FDA's requirements for banked human tissue (21 CFR, Part 1270, and Part 1271) and Standards for Tissue Banking of the American Association of Tissue Banks (AATB). Information is available at: http://www.fda.gov/BiologicsBloodVaccines/TissueTissueProducts/default.htm. (Accessed December 29, 2022)

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Policy History/Revision Information

Date	Summary of Changes

06/01/2024	**Coverage Rationale**
	• Added language stating the procedures addressed in this policy may not be indicated for:
	  ○ Individuals with an unmanaged medical condition; these conditions include, but are not limited to, metabolic, cardiovascular, and autoimmune/inflammatory, as well as genetic conditions that affect collagen synthesis
	  ○ Individuals taking medications that negatively affect the healing response; these [medications] include, but are not limited to, immunosuppressive agents, corticosteroids, anticoagulants, NSAIDS, and nicotine
	Bone Replacement Grafts for Retained Natural Teeth
	• Removed language stating bone replacement grafts for retained natural teeth are not indicated for individuals with an uncontrolled underlying medical condition
	Supporting Information
	• Updated *Description of Services* and *References* sections to reflect the most current information
	• Archived previous policy version DCP.048.02

Instructions for Use

This Dental Clinical Policy provides assistance in interpreting UnitedHealthcare standard and Medicare Advantage dental plans. When deciding coverage, the member specific benefit plan document must be referenced as the terms of the member specific benefit plan may differ from the standard dental plan. In the event of a conflict, the member specific benefit plan document governs. Before using this policy, please check the member specific benefit plan document and any applicable federal or state mandates. UnitedHealthcare reserves the right to modify its Policies and Guidelines as necessary. This Dental Clinical Policy is provided for informational purposes. It does not constitute medical advice.