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Localized Ridge Augmentation with Allogenic Block Grafts Prior to Implant Placement: Case Reports and Histologic Evaluations

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The placement of dental implants is based on the amount of alveolar bone present in the edentulous site to be reconstructed. Insufficient alveolar contours may require bone grafting procedures to restore an adequate bone volume before implant placement. Larger osseous defects often require block grafts harvested from the symphysis or the ramus buccal shelf region. These provide adequate donor sites to harvest a graft sufficient to restore a significant defect in the osseous structures planned for implant placements. Autogenous block grafts have been well established to reconstruct these types of defects prior to implant placement procedures. However, surgical complications associated with the unfavorable anatomical structures and the necessity of large donor sites (e.g., *symphysis and ramus buccal shelf) have led to the use of allogenic grafting materials. Recent developments in allogenic grafting materials have lead to the development of a corticocancellous block graft harvested from the iliac crest region. This study evaluates the clinical indications of these allogenic graft materials to replace compromised alveolar bone defects both horizontal and vertical in nature. The analysis is supported by re-entry procedures and histologic evaluations to substantiate predictability. (Implant Dent 2005;14:139–148)*

Key Words: allogenic block, site preparation, healing enhancement.

The presence of adequate bone contours for the placement of dental implants can be affected adversely by advanced periodontal disease, failed root canal procedures, tooth loss, and trauma.[1,2] The dilemma that this type of bone loss presents to the dental implant team is dealing with inappropriate bone height and width to support implant placements properly[3] to allow for long-term maintenance, support of the dental implant complex, and to provide adequate soft tissue support for the aesthetic result of the final implant-supported restoration.[4,5]

Bone replacement procedures to correct large osseous defects and restore adequate support for dental implants have been documented in the dental literature.[3,6] Harvested bone from the symphysis,[3,7-12] ramus buccal shelf,[3,13-20] tibia,[21,22] fibula,[23] iliac crest,[24-27] scapula,[24] and calvarium[28,29] has served as donor sites for the collection of autogenous bone to provide an adequate amount of grafted bone volume to correct osseous defects properly. However, there is some variability of the type of bone quality and quantity available for collection in these donor sites (Table 1).[30] In current implant surgical practice, alveolar bone harvested from the symphysis or ramus buccal shelf is the primary donor site for reconstructing localized osseous defects prior to implant placement.[7,12,16-20]

Provided that proper surgical techniques are followed, a 4- to 7-mm gain in ridge width[31] and a 2- to 3-mm gain in vertical ridge height[32] can be expected with intraoral harvested block grafts. The types of defects that can be corrected from these types of grafting procedures can be seen in Table 2.

Intraoral block grafts harvested from the symphysis or ramus buccal shelf have been shown to be well suited for not only reconstructing the horizontal and vertical osseous defects but also to veneer ridge deficiencies prior to implant placement, especially in the esthetic zone.[3,16,20] This staged technique using autogenous blocks harvested from donor sites remains the grafting procedure used most frequently for large defects because of its clinical success and predictability to regenerate bone contours prior to implant placement.[33-38] However, harvesting these block grafts from the donor sites of the symphyseal or ramus regions carries the risk of complications associated with the advanced surgical procedures involved with collection of these grafts (Table 3).

Another complicating factor is the additional surgical time necessary to harvest the autogenous bone block. Because of the limitations of surgical anatomy, insufficient block size may be harvested to correct the defect. This

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Table 1. Extraoral and Intraoral Sites for Harvesting Autogenous Bone and the Maximum Volume That Can Be Obtained from Each Site

Donor Site	Form available	Maximum Volume (ml)
Extraoral		
Posterior iliac crest	Block and/or particulate	40
Anterior iliac crest	Block and/or particulate	70
Tibia	Particulate	20–40
Cranium	Dense cortical block	40
Intraoral		
Ascending ramus	Block	5–10
Anterior mandible	Block and particulate	5
Tuberosity	Particulate	2
Miscellaneous (*e.g.*, bone scrapers, suction traps)	Particulate	Varies

Table 2. Classification of Recipient Sites for Intraoral Harvested Block Grafts

Insufficient Buccal-Palatal (Lingual) Ridge Width	Insufficient Vertical Ridge Height
Anterior maxilla	Anterior maxillae
Posterior maxilla, anterior to the maxillary sinus	Posterior maxillae, anterior to the maxillary sinus
Posterior maxillae with sinus involvement	Posterior maxillae with sinus involvement
Anterior mandible	Anterior mandible
Posterior mandible	Posterior mandible

Table 3. Potential Complications of Harvesting Autogenous Blocks from the Symphysis or Ramus Region

Site	Complication
Ramus buccal shelf	Paresthesia
	Obtaining a thin cortical bone graft insufficient to correct a large defect (horizontal)
Symphysis	V-3 paresthesia
	Disfiguration of the chin
	Loss of mandibular keratinized gingival tissue
	Infection
	Affecting tooth vitality

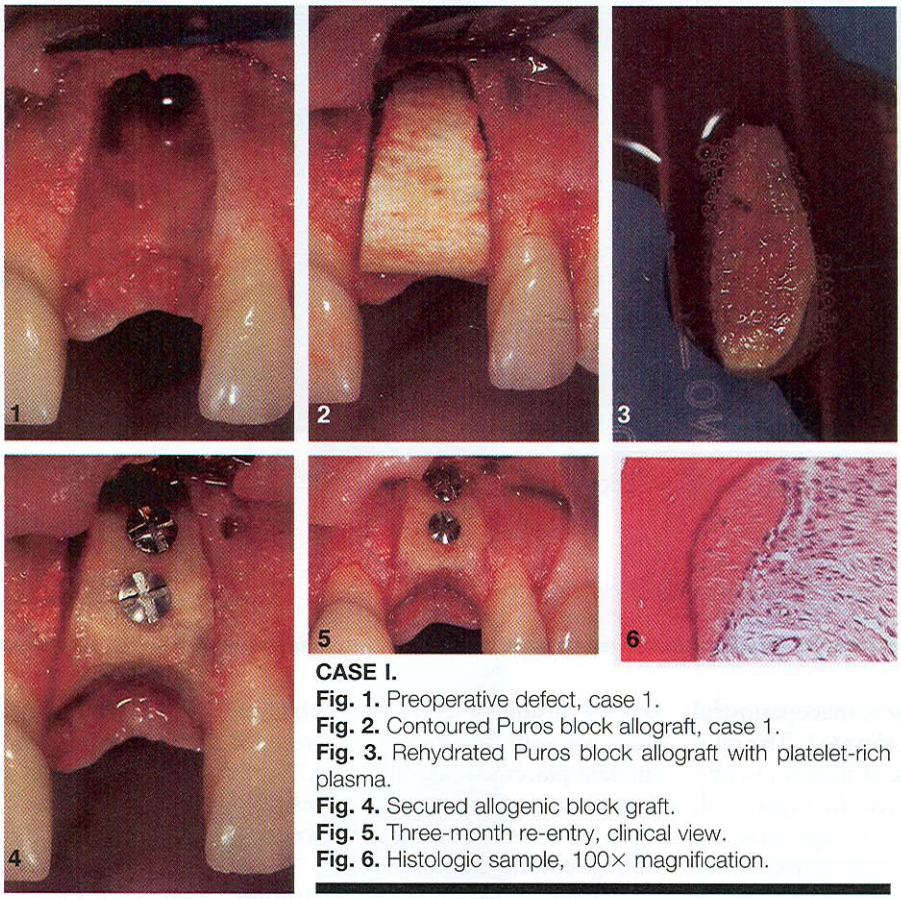
may require additional regenerative surgical procedures. Finally, the acceptability of a patient can remain a deciding factor. All of these potential issues preclude a widespread indication for the use of these grafts.[8,11,39-43]

As an alternative to this type of grafting, research and development of bone substitute materials provided the clinician with allogenic,[44] xenographic,[45,46] and alloplastic[47,48] products to use as substitutes for autogenous bone. However, in block form, none have recaptured the healing and bone replacement that autogenous block grafts can provide. Recent advances in the procurement of allogenic bone, which preserves a large portion of the mineral component of the graft, has led to clinical indications of an allogenic block harvested from the iliac crest region.[49-51] This article will present three case reports of the use of this allogenic material to reconstruct both horizontal and vertical defects being strongly supported by histologic evidence of active bone regeneration replacing the original defects.

Case 1

A 41-year-old nonsmoking male presented for removal of a failing implant in the left central incisor region. The day before surgery, the patient started an antibiotic regime of Augmentin 875 mg (Glaxo SmithKline, Philadelphia, PA) b.i.d. After administration of an appropriate local anesthetic, a full-thickness mucoperiosteal flap was elevated in the maxillary anterior from the right central incisor to the left canine region. The implant was removed, and a deep, wide defect was present (Figure 1). After careful site preparation, which included decortication of the maxilla in the defect site to enhance marrow space bleeding, an allogenic corticocancellous block (Puros block allograft; Zimmer Dental, Carlsbad, CA) measuring 18 × 20 × 8 mm was trimmed with chisels and high-speed rotary instruments to adequately fit the prepared osseous defect (Figure 2). Before being secured, the block was rehydrated with nonactivated platelet-rich plasma (Figure 3).[52,53] The platelet-rich plasma, obtained from the blood of the patient that was drawn prior to surgery, allows for the localized delivery of platelets that contain growth factors directly into the cancellous part of the allogenic block. Rehydration took place approximately 5 minutes before block placement and securing. Fixation miniscrews (Salvin Dental, Charlotte, NC) were used for stabilization of the prepared block to the recipient site. The screws were placed through the block and rested in the palatal portion of the defect for stability and to prevent micromovement of the graft. After graft placement, carving of the appropriate crestal anatomy was performed (Figure 4). Before closure, additional platelet-rich plasma was applied before the insertion of a resorbable collagen barrier (Biomend; Zimmer Dental) to exclude any soft tissue migration into the small space that existed between the graft and recipient site. Vicryl Rapide sutures (4.0; Ethicon, Inc., Somerville, NJ) in a continuous sling and horizontal mattress suturing technique were used for closure. Starting the day before surgery, the patient was to continue taking Augmentin for 9 days in addition to chlorhexidine rinses twice daily starting the day after surgery.

Convalescence was uneventful. In the healing phase, the patient decided to forego additional implant placement and proceed with a fixed prosthesis. At the 3-month postoperative period, the patient was again prepared

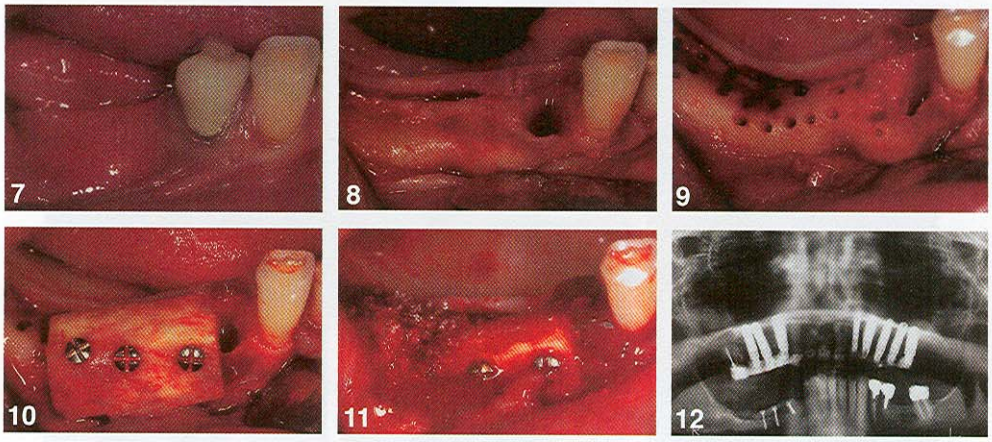


CASE I.
Fig. 1. Preoperative defect, case 1.
Fig. 2. Contoured Puros block allograft, case 1.
Fig. 3. Rehydrated Puros block allograft with platelet-rich plasma.
Fig. 4. Secured allogenic block graft.
Fig. 5. Three-month re-entry, clinical view.
Fig. 6. Histologic sample, 100× magnification.

for surgery to remove the fixation screws and evaluate the allogenic block graft. After administration of an appropriate local anesthetic, a full-thickness mucoperiosteal flap was elevated once again. Upon flap elevation, the regenerated osseous defect that had been reconstructed was observed (Figure 5). [Compare the preoperative defect (Figure 1) with the regenerated osseous structures in Figure 5]. A histologic sample was obtained from the crest of the ridge and processed for analysis. As shown in Figure 6, new bone formation apposed to the original bone can be observed. This new bone shows evidence of ongoing bone deposition with the presence of a surrounding osteoblast layer. The patient was referred to the prosthodontist after adequate healing was achieved subsequent to the fixation screw removal and histologic analysis.

Case 2

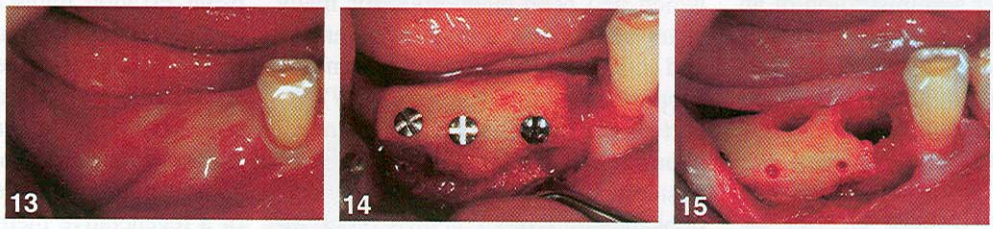
A 55-year-old nonsmoking female presented for implant reconstruction of her failing natural dentition. Part of her treatment plan consisted of regeneration of the severely resorbed atrophic mandibular right posterior region, which had been edentulous for many years and lacked appropriate vertical and horizontal bone dimensions to support dental implants (Figure 7). As part of her overall treatment plan, regeneration of the mandibular right posterior region with an allogenic corticocancellous block (Puros block allograft) was planned. Administration of preoperative antibiotics (Augmentin 875 mg b.i.d.) was started the day before the procedure. Preceding surgery, withdrawal of 50 cc of whole blood of the patient from the antecubital fossa allowed for preparation of approximately 10 cc of platelet-rich plasma to enhance the healing phase of the allogenic block. After administration of an appropriate local anesthetic, a full-thickness mucoperiosteal flap was elevated (Figure 8). Tooth 28, which exhibited a failing endodontic lesion, was removed, followed by site preparation to receive the allogenic block (Figure 9). After sculpting of the block with chisels and rotary instruments, the block was adequately rehydrated with platelet-rich plasma. Tricortical stabilization was performed using Fixation miniscrews (Figure 10) and preceded additional grafting at the mesial and distal aspects of the block with a platelet-rich plasma mineralized bone graft complex (Puros) (Figure 11). Before closure, additional application of platelet-rich plasma preceded placement of a regenerative membrane to exclude any soft tissue ingrowth at the level of the block from the tension-free reapproximated soft tissues. Closure was accomplished with 4.0 Vicryl Rapide sutures in a horizontal mattress suturing technique. An immediate postoperative panoramic view can be seen in Figure 12. The patient underwent an uneventful healing period of 4 months, and the clinical appearance during this period can be seen in Figure 13. After adequate pretreatment planning, implant placement in the mandibular right posterior region was scheduled. Following antibiotic administration as mentioned previously, blood was drawn from the antecubital fossa for preparation of platelet-rich plasma. After administration of an appropriate local an-

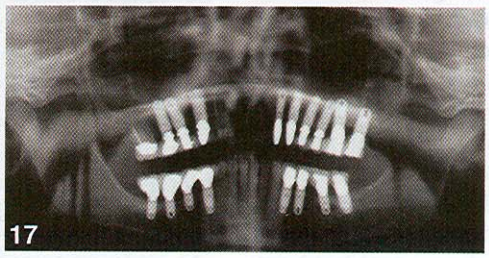


CASE II.
Fig. 7. Case 2: preoperative view, mandibular right posterior.
Fig. 8. Clinical view, pregrafted ridge defect.
Fig. 9. Decortication of the recipient site.
Fig. 10. Allogenic corticocancellous block secured.
Fig. 11. Additional grafting at the margins of the block graft and host bone.
Fig. 12. Case 2, immediate postoperative panoramic view.

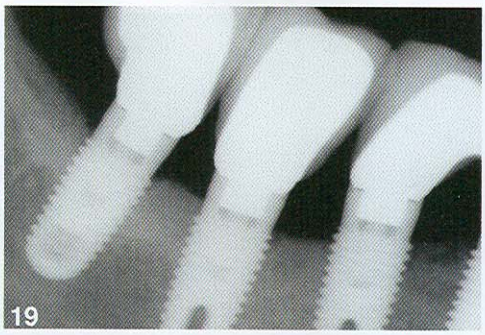
esthetic, a full-thickness mucoperiosteal flap was once again elevated. The clinical appearance of the 4 month re-entry procedure can be seen in Figure 14; compare this with the preoperative defect in Figure 8. Reconstruction of the insufficient vertical and horizontal dimensions is evident from this view. After removal of the supporting fixation screws, histologic cores were obtained from the graft (Figure 15) and preceded implant placement. As shown in Figure 16, substantial bone formation resulting from the allogenic bone can be observed throughout the tissue sample.

After gathering the histologic samples, implant placement was performed. Four tapered Screw-Vent implants (Zimmer Dental) were placed that were 4.7 mm in diameter and 13 mm in length at tooth 28 and 10 mm in length at sites 29, 30, and 31. After placement of the healing screws, closure was once again accomplished with 4.0 Vicryl Rapide sutures. Four additional months of healing were allowed, followed by the stage 2 proce-





CASE II.
Fig. 13. Case 2, 4-month postoperative clinical view.
Fig. 14. Case 2: 4-month re-entry, clinical view.
Fig. 15. Osteotomy site preparation for histologic samples, preceding implant placement.
Fig. 16. Histologic sample, 10× magnification.
Fig. 17. Case 2, case complete panoramic radiograph.

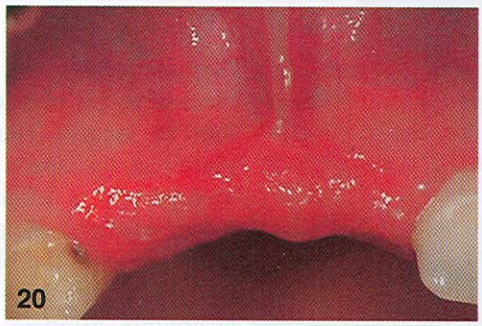


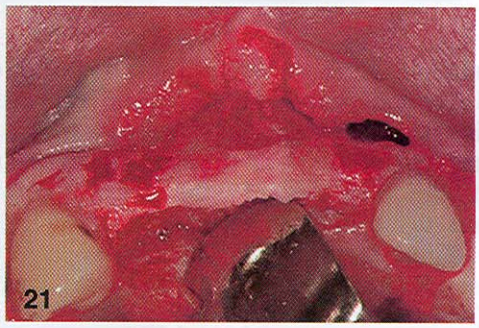
CASE II.
Fig. 18. One-and-a-half year postcementation clinical view.
Fig. 19. One-and-a-half year postloading periapical radiograph view.

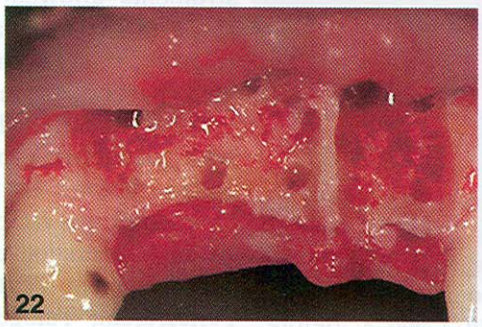
dure and the placement of healing abutments. The patient was then referred back to the reconstructive doctor for the construction of the final implant-supported restorations. Figure 17 shows the case complete panorex of the lower right posterior sextant. Figure 18 shows the 1.5-year postcementation view of the implant-supported restorations, with Figure 19 exhibiting the 1.5-year postloading periapical radiograph view. Notice that the osseous crest that was reconstructed has been maintained through this time frame.

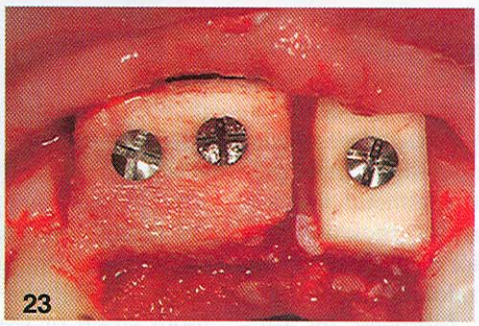
Case 3

A 26-year-old nonsmoking female presented for localized ridge augmentation of the maxillary anterior region prior to implant placement (Figure 20). The patient had lost teeth 7, 8, and 9 in a motor vehicle accident several years before. Advanced bone loss in the buccal palatal dimension necessitated bone replacement procedures with block grafting before implant placement. After a complete diagnostic workup, which included radiographs and a diagnostic waxing of both the hard and soft tissues to be replaced, the decision was made to reconstruct the deficient anterior maxillary region first with the allogenic block graft material followed by implant placement at the sites of teeth 7, 8, and 9 after completion of the bone regeneration procedure. The day before surgery, the patient began a prophylactic antibiotic regimen of Augmentin 875 mg. The day of

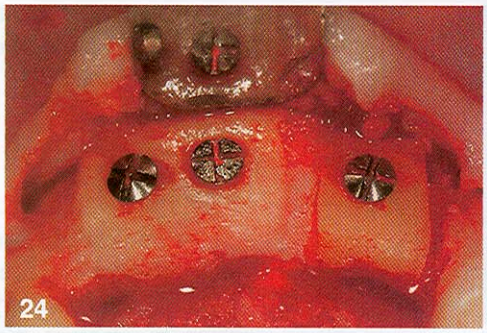


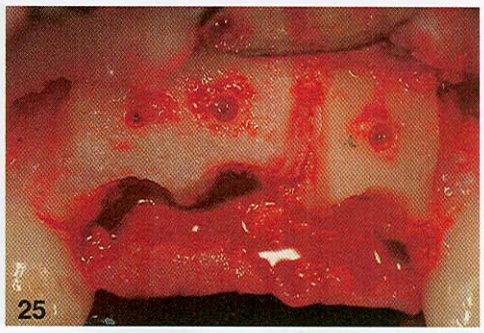


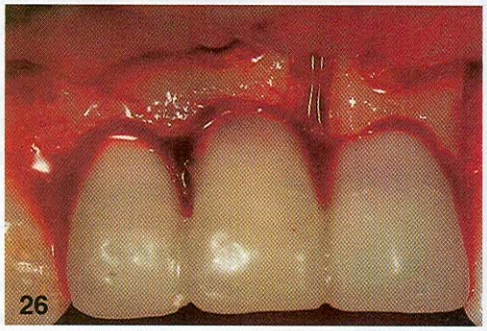




CASE III.
Fig. 20. Case 3, preoperative view.
Fig. 21. Pretreatment ridge defect, clinical view.
Fig. 22. Recipient site preparation.
Fig. 23. Allogenic block secured at the recipient site.







CASE III.

Fig. 24. Three-and-a-half month re-entry, clinical view.

Fig. 25. Implant site preparation.

Fig. 26. Immediate nonfunctional provisional restoration.

Fig. 27. Six-month post-loading digital periapical radiograph.

surgery, before administration of an intramuscular sedative and local anesthetic, the collection of 25 cc of whole blood from the antecubital fossa allowed for the fabrication of 6 cc of platelet-rich plasma to be used as a healing enhancer during the surgical procedure. After sedation with 3 cc of 5 mg/ml Versed (Abbott Laboratories, North Chicago, IL) administered intramuscularly, 5.5 cc of Septocaine HCl 4%, 1:100,000 epinephrine (Septodont, Ontario, Canada) was administered in the anterior buccal vestibular region in addition to the anterior palatal region. After anesthetic was administered, a crestal incision was made in the anterior edentulous region with two vertical releasing incisions at teeth 5 and 12, followed by full-thickness mucoperiosteal flap elevation. The significant ridge defect present precluded the correct placement of dental implants for an esthetic result and supported the rationale for the block graft procedure (Figure 21). Adequate site preparation was then performed, which consisted of the creation of a recipient site bed to house the allogenic block graft and decortication of the alveolar bone to allow for marrow space bleeding to aid in the revascularization of the graft (Figure 22). An 18 × 20 × 8-mm Puros block allograft was selected to reconstruct the defect. The allogenic, corticocancellous block was then trimmed to fit securely within the housing, which was prepared using chisels and high-speed rotary instruments. The block was split into two parts; the smaller of the two was to reconstruct the site of tooth 9 and the larger portion of the allogenic block to reconstruct the tooth space of teeth 7 and 8. Before securing the block grafts, the blocks were rehydrated with platelet-rich plasma. After the rehydration procedure, the larger portion of the allogenic block was secured with two Fixation miniscrews (Salvin Dental) measuring 1.8 mm in diameter by 10 mm in length. The smaller block, placed at the space of tooth 9, was secured with a 1.8-mm (diameter) by 8-mm (length) Fixation miniscrew. After securing the blocks, shaping of the grafts with high-speed rotary instruments allowed for the correct shape of the maxilla to be obtained (Figure 23). Additional bone grafting with particulate mineralized bone grafting material (Puros) enhanced with platelet-rich plasma was performed around the margins of the block graft and recipient site. Guided tissue regeneration using a regenerative membrane (Tutoplast Processed Pericardium; Tutogen Medical, Alachua, FL) enhanced with platelet-rich plasma was placed over the block grafts and inferior to the buccal and palatal tissue surfaces. Closure was accomplished using horizontal and

vertical mattress suturing techniques with 4.0 Vicryl Rapide sutures. The provisional removable partial denture was secured with no pressure being placed over the newly grafted region. Postoperative instructions included completion of the preoperative antibiotherapy along with chlorhexidine rinses twice a day. The patient was allowed to heal, and the graft was allowed to mature for 3.5 months at which time implant placement was planned. Following construction of a TempStent (Contemporary Periodontics & Implantology, Lake Elmo, MN), the surgical guide/provisional system to be used at implant placement, the patient was prepped for surgical implant placement procedures. Preoperative instructions were similar to initial surgical procedures, which included preoperative administration of antibiotics and chlorhexidine rinses. After intramuscular sedation with Versed and local anesthetic administration with 5.5 cc of Septocaine 4%, 1:100,000 epinephrine, a full-thickness mucoperiosteal flap was elevated. Examination of the regenerated buccal plate can be seen in Figure 24. Compare Figure 24, the 3.5-month postgrafting procedure with the allogenic corticocancellous block, with Figure 22, the pregrafted defect present and Figure 23, the clinical appearance after the blocks had been secured. It is important to note how little resorption, based on appearance, the allogenic blocks had undergone in the 3.5-months postoperative. After removal of the fixation screws and site preparation of the planned implant receptacle sites (Figure 25), three implants were placed. A 3.7-mm by 13-mm in length tapered Screw-Vent implant was placed at the site of tooth 7 followed by two 4.7-mm (diameter) by 13-mm (length) tapered Screw-Vent implants at sites 8 and 9. After implant placement, provisional abutments were prepared extraorally, placed over the implants, and the TempStent was retrofitted to provide the patient with an immediate nonfunctional provisional restoration (Figure 26). Closure was obtained with 4.0 Vicryl Rapide sutures in a continuous sling-suturing method. The 6-month post-loading digital radiograph can be seen in Figure 27.

Conclusion

These case reports demonstrate the safety and effectiveness of the allogenic bone grafting material demonstrated. This novel approach opens new avenues in oral and maxillofacial bone grafting procedures while circumventing important limitations (size and location) inherent with autogenous grafts. In addition, complications that can exist with the harvesting of autogenous bone from the symphyseal or ramus buccal shelf region can be avoided altogether. Furthermore, implant placement in grafted areas demonstrates the functionality of the regenerated bone. Finally, bone biopsies at re-entry areas disclosed evidence of new bone deposition. The authors recommend continued research and clinical studies of this product to supplement the present initial clinical and histologic reports.

Disclosure

Dr. Paul Petrungaro is a consultant to Zimmer Dental and a stock shareholder in Harvest Technologies.

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Lokale Anreicherung des Zahnkamms mit allogenen Blockknochentransplantatstoffen zur Vorbereitung der Implantatsetzung: Fallstudien und histologische Bewertungen

ZUSAMMENFASSUNG: Die erfolgreiche Setzung eines Implantats hängt maβgeblich von der Menge an Alveolarknochen ab, der im wiederherzustellenden zahnlosen Bereich zu finden ist. Unzureichende Alveolarstrukturen können es erforderlich machen, vor Implantierung Knochengewebstransplantierungen durchzuführen, um hierüber ein entsprechendes Knochenvolumen herzustellen. Bestehen schwerwiegendere Knochendefekte, kann eine Blocktransplantierung erforderlich werden, bei der das zu transplantierende Knochengewebe aus der Symphyse bzw. dem Rand des Wangenastes entnommen wird. Diese Bereiche eignen sich hervorragend zur Entnahme eines Transplantats, das alle Anforderungen zur Wiederherstellung maβgeblicher Defekte in den knöchernen Strukturen erfüllt und somit die Grundlage für eine bevorstehende Implantierung schafft. Autogene Blocktransplantate werden heutzutage vielfach zur Beseitigung derartiger Defekte vor Implantierungsbehandlung eingesetzt. Allerdings führten vielfache Komplikationen beim chirurgischen Eingriff aufgrund der ungünstigen anatomischen Strukturen sowie die Notwendigkeit, umfangreiche Spenderbereiche (Symphyse und Rand des Wangenastes) zu nutzen, zu einer vermehrten Verwendung allogener Transplantierungsmaterialien. Neueste Entwicklungen im Bereich der allogenen Transplantierungstechnologie brachten die Entwicklung eines Kortikospongiosa-Blocktransplantats mit sich, das aus dem Beckenkamm entnommen wird. Die vorliegende Studie bewertet die klinischen Indikationen dieser allogenen Transplantationsmaterialien in Bezug auf die Wiederherstellung beeinträchtigter Defekte des Alveolarknochens in sowohl horizontaler wie auch vertikaler Richtung. Die Analyse wird durch Reflexionsabläufe sowie histologische Beurteilungen gestützt, um eine Vorhersagbarkeit nachzuweisen.

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Aumento localizado de la cresta con injertos de bloques alogénicos antes de la colocación del implante: Informes de casos y evaluaciones histológicas

ABSTRACTO: La colocación de implantes dentales se basa en la cantidad de hueso alveolar presente en el sitio edentuloso a reconstruir. Contornos alveolares insuficientes podrían requerir procedimientos de injerto de hueso para restaurar un volumen adecuado de hueso antes de la colocación del implante. Los defectos óseos más grandes a menudo requieren injertos de bloques sacados de la región de la plataforma bucal de la rama o la sínfisis. Estos proporcionan sitios adecuados de donación para lograr un injerto suficiente para restaurar un defecto significativo en las estructuras óseas planificadas para la colocación de implantes. Los injertos autógenos del bloque han sido ampliamente usados para reconstruir estos tipos de defectos antes de los procedimientos de colocación de implantes. Sin embargo, las complicaciones quirúrgicas asociadas con las estructuras anatómicas desfavorables y la necesidad de sitios grandes de donación (sínfisis y plataforma bucal de la rama) han llegado al uso de materiales de injerto alogénicos. Descubrimientos recientes en los materiales de injerto alogénicos han permitido el desarrollo de injertos de bloques cortico-canceloso sacados de la región de la cresta ilíaca. Este estudio evalúa las indicaciones clínicas de estos materiales de injerto alogénicos para reemplazar los defectos de hueso alveolar problemáticos, de naturaleza horizontal y vertical. El análisis ha sido aprobado por los procedimientos de reingreso y evaluaciones histológicas para justificar la pronosticabilidad.

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Aumento Localizado do Rebordo com Enxertos Alogênicos em Bloco Antes da Colocação do Implante: Relatos de Caso e Avaliações Histológicas

RESUMO: A colocação de implantes dentários é baseada na quantidade de osso alveolar presente no local desdentado a ser reconstruído. Contornos alveolares insuficientes podem exigir procedimentos de enxerto para restaurar um volume ósseo adequado antes da colocação do implante. Defeitos ósseos maiores freqüentemente exigem enxertos em bloco colhidos da sínfise ou da região de projeção lateral do ramo. Estas proporcionam áreas doadoras adequadas para colher um enxerto suficiente para restaurar um defeito significativo nas estruturas ósseas planejadas para colocações de implantes. Enxertos autógenos em bloco foram bem estabelecidos para reconstruir estes tipos de defeitos antes dos procedimentos de colocação de implantes. Contudo, complicações cirúrgicas associadas a estruturas anatômicas desfavoráveis e a necessidade de áreas doadoras grandes (sínfise e projeção lateral do ramo) levaram ao uso de materiais de enxerto alogênico. Desenvolvimentos recentes nos materiais de enxerto alogênicos levaram ao desenvolvimento de um enxerto cortiço-esponjoso em bloco, colhido de uma região de crista ilíaca. Este estudo avalia as indicações clínicas destes materiais de enxerto alogênico para substituir defeitos do osso alveolar comprometido, tanto horizontal quanto vertical por natureza. A análise é apoiada por procedimentos de reabertura e avaliações histológicas para consubstanciar a previsibilidade.

インプラント設置前のAllogenic Block GraftsによるLocalized Ridge Augmentation：症例報告と組織学的評価

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要約：デンタルインプラントの設置については、修復を必要とする無歯歯槽堤の骨量が重要な意味を持つ。歯槽堤contourが十分でない場合には、インプラント設置前に骨体積の十分な修復のための骨移植が必要である。骨欠陥が大きい場合には、symphysisかramus buccal shelf regionから採収されたblock graftがしばしば要請される。これらの部位は、インプラント設置が望まれる部分の骨構造の大きな欠陥を修復するために必要となる移植片を十分に提供することができるdonor siteである。インプラント設置前にこの種の欠陥を修復する方法として、autogenous bone graftがすでに定着している。しかし良好でない解剖学的構造と大型のdonor site（symphysisかramus buccal shelf region）の必要性に起因する外科的合併症の問題があり、そのためallogenic grafting materialの使用に関心が持たれるようになった。Allogenic grafting materialについての最近の研究の結果、iliac crest regionから採収されたcortico-cancellous block graftが開発された。本研究はこのようなallogenic grafting materialの、本来垂直・水平の両方向に起こりうる歯槽骨欠陥を修復するための臨床適用について評価する。分析については、re-entry処置と組織学的評価によって予後予測性の確認が行われた。

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