Simultaneous Placement of Implant and Bone Graft in the Anterior Maxilla: A Case Report

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This article describes a method for harvesting intramembranous bone from the paranasal bone around the piriform aperture for lateral alveolar ridge augmentation and simultaneous implant placement in the anterior maxilla. In particular, the technique is recommended for situations where a maxillary incisal implant is being placed and ridge augmentation is needed to cover exposed threads. Surgical access is simple and can be accomplished by the same incision, and bone harvesting can be accomplished under local anesthesia. Postoperative morbidity is not yet known. INT J ORAL MAXILLOFAC IMPLANTS 2004;19:892–895

Key words: *alveolar ridge augmentation, autogenous bone grafts, dental implants, paranasal bone, piriform aperture*

Dental implants have been accepted internationally and have become a vital treatment modality for oral rehabilitation in completely or partially edentulous patients. In patients lacking adequate bone volume, bone grafting has been proposed. Bone grafts can be placed either before or simultaneously with the placement of dental implants.[1,2] Xenografts, alloplastic bone grafts, and allografts have been studied extensively for lateral and vertical alveolar ridge augmentation.[3–6] In maxillofacial reconstruction, the autogenous bone graft is still the "gold standard" for bone augmentation procedures.[7] Autogenous bone is advantageous because of its osteoinductive and osteoconductive properties and its freedom from transmissible diseases.

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Autogenous bone grafts can be used in block or particulate forms. Classical donor sites such as the calvarium, ilium, mandibular ramus, and chin have been reported in the literature.[7–10] The drawback of harvesting bone from these sites is the involvement of a second operation site. Extraoral harvesting of a bone graft unusually requires general anesthesia and hospitalization. In cases where the iliac crest has been used as a donor site, morbidity and gait disturbances have been reported.[11]

The advantage of intraoral bone harvesting is its simplicity. (It is not necessary to operate at a second site.) Intraoral bone harvesting can usually be accomplished under local analgesia. The convenience of surgical access and close proximity of the donor site reduce both operation time and patient anxiety. Morbidity of intraoral donor sites is usually minimal.

One disadvantage in using an intraoral donor site is that only a limited amount of bone can be harvested. Complications, including altered sensation in the teeth, neurosensory disturbances, wound dehiscence, and infection, have been reported for various intraoral donor sites.[12]

The most commonly used intraoral donor sites are the mandibular ramus and symphysis. Onlay

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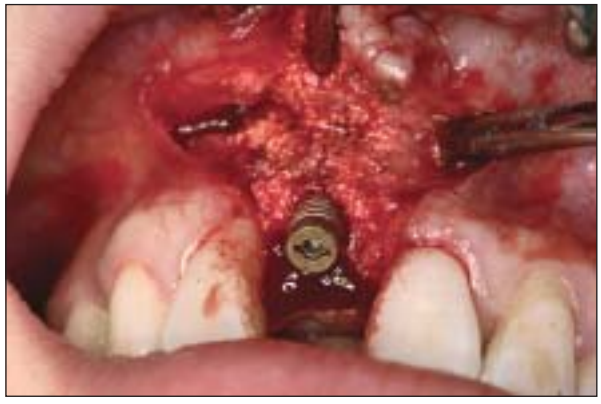

Fig 1a The failed implant in the maxillary right central incisor area. The implant's failure was related to failed bone grafting procedures.

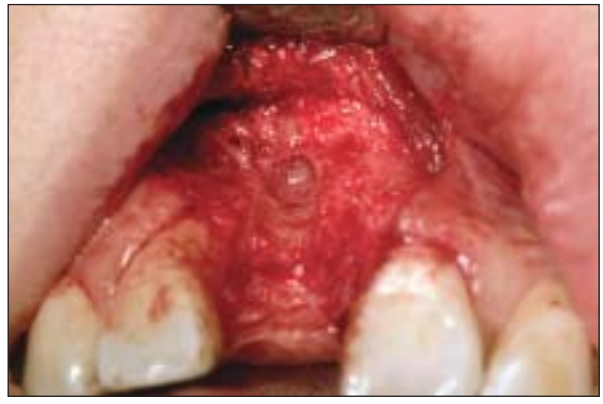

Fig 1b After removal of the implant and the bone graft, little bone was left on the labial cortex.

block grafts are commonly used. Corticocancellous blocks can be obtained in both procedures. They are particularly useful in large-scale reconstruction involving secondary alveolar bone grafting in cleft lip-palate patients and in maxillary sinus lift procedures. Block grafts must be stabilized at the recipient site with fixation screws or possibly dental implants.[2,13,14] In the particulate bone grafting procedure, nonresorbable membranes or titanium mesh have been used as devices to secure the graft.[4,5,15] Different grafts have different resorption rates,[7,10] and studies have shown that intraorally harvested intramembranous bone grafts have less resorption, enhanced revascularization, and better incorporation at the donor site.[16,17]

The use of alloplastic materials in alveolar bone augmentation before and during the placement of implants has been studied extensively.[18–21] They can be either osteoinductive or osteoconductive, depending upon the properties of the material, and work as a skeleton for new bone generation around the implant. Bone substitutes such as hydroxyapatite, demineralized bone protein, bovine bone, and demineralized freeze-dried bone have also been studied as alveolar bone graft materials, and success has been reported with all of them.[22–24] The transmission of disease and the texture of the new bone are concerns in the use of alloplastic bone graft materials.

This article describes the placement of an implant in a 1-stage protocol at the site of the maxillary right central incisor simultaneous with lateral ridge augmentation using bone harvested from the paranasal bone around the piriform aperture.

CASE REPORT

A 40-year-old woman with no relevant medical history requested replacement of a dental implant that had failed in the maxillary right central incisor area (Fig 1a). The implant was mobile and had been involved in a previous bone substitute grafting procedure. On exploration, it was found that little bone remained on the labial surface of the implant (Fig 1b). The implant was then removed and the wound allowed to heal. Radiographic examination (Scanora; Soredex, Helsinki, Finland) revealed that there was very little bone on the labial side. An onlay bone graft before placement of the implant was considered; however, it was decided to use particulate graft material placed simultaneously with the implant. A full labial flap was raised, and all the granulation tissue was removed. With a trephine bur, bone from below the piriform aperture was carefully removed (Fig 1c). This bone was then milled into particulate bone and placed onto exposed threads of a Frialit-2 implant (3.75 mm wide and 15 mm long; Friadent, Mannheim, Germany). The implant was placed and covered by a titanium membrane. Four months later, the implant was exposed after computerized tomography (CT) examination. The CT scan showed that bone had

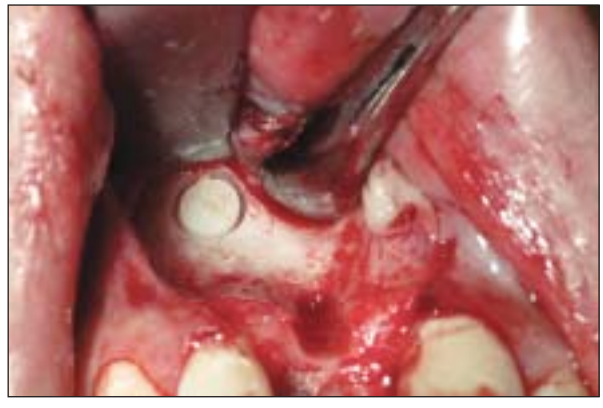

Fig 1c Bone from below the piriform aperture was removed carefully with a trephine.

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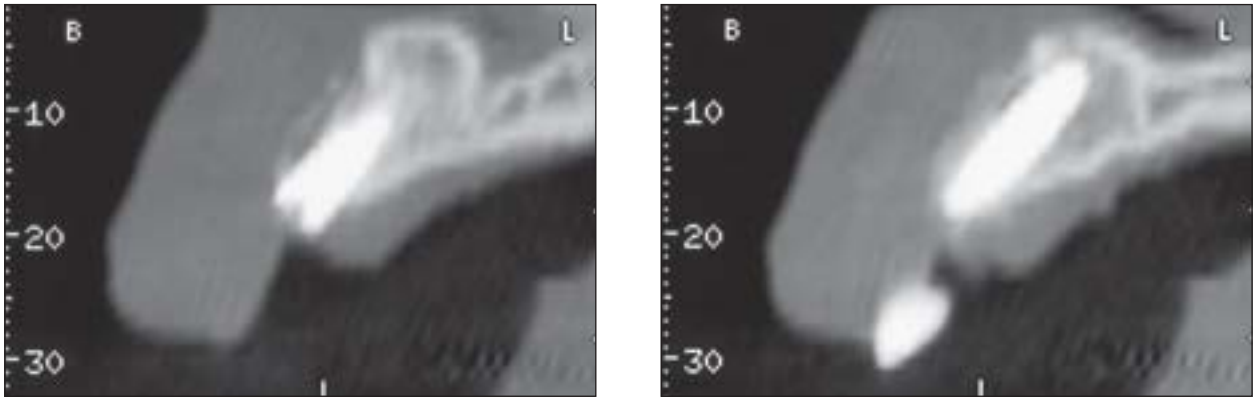

Figs 2a and 2b In the CT scan examination, the existence of bone on the labial side of the implant placed was demonstrated.

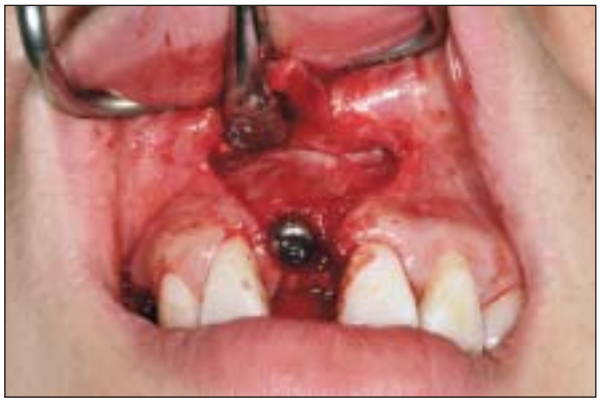

Fig 3 After exposure of the implant, new bone was evident on the labial surface of the implant.

formed on the labial surface of the new implant (Fig 2). After exposure of the implant, it was evident that new bone had formed, and osseointegration had apparently been achieved (Fig 3). A definitive crown was placed and after 6 months, there was no sign of failure or complications.

DISCUSSION

The present report provides promising evidence of immediate autogenous bone grafting to achieve lateral ridge augmentation. This method is simple and precludes the use of a second operation site. To the author's knowledge, paranasal bone around the piriform aperture has not been reported as a donor site for implant placement. The piriform aperture, bounded below by the sharp projection of the anterior nasal spine, is on the profile of the skull.[25] Embryologically, the structure is derived from the anterior maxillary process and contains intramembranous bone. The present patient was treated under local anesthesia, and little pain and no morbidity were reported. Postoperative complications included minimal pain and swelling, which can be caused by implant placement alone. Neither postoperative parasthesia nor anesthesia was seen.

One drawback of the described technique is that only a small amount of bone can be harvested (a 2- to 3-mm bone plug can be harvested with a trephine bur). Using this technique, small-scale lateral ridge augmentation is possible without causing damage to surrounding tissue. In principle, there are no contraindications for this paranasal bone–harvesting procedure. Osseointegration and stability were demonstrated; thus, simultaneous autogenous bone graft and implant placement in the maxillary incisal area can be considered another treatment option for this clinical condition.

CONCLUSION

Paranasal bone around the piriform aperture can be a suitable donor site for lateral ridge augmentation with maxillary incisor area implant placement. The simplicity of harvesting bone from this area and the shortened treatment time can be advantageous to dental surgeons.

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