Computerized Tomographic Evaluation of Symphyseal Donor Sites Used in the Reconstruction of the Posterior Maxilla: A Case Report of 2 Patients

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Autogenous bone grafts are commonly used for reconstruction of the deficient maxillary alveolar ridge. Mandibular ramus, symphysis, extraction sites, and retromolar sites are the most common sources for harvesting autogenous bone grafts from intraoral regions. Several authors have used computerized tomography (CT) to evaluate the dimensional change of bone graft, but there are limited reports evaluating donor sites for autogenous bone. In this report, 2 patients were treated with autogenous bone graft from the mandibular symphysis. Postoperative CT scans were used to evaluate the radiographic change in the symphyseal area. The patients treated with autogenous bone showed uneventful healing at the donor and recipient sites and good acceptance of the procedure. At the final evaluation, CT analysis demonstrated a persisting radiolucency in the donor area, even though the defect size was reduced. Further evaluation may be needed to evaluate the progress of remineralization and long-term results.

Key Words: computerized tomography, autogenous bone, symphysis

INTRODUCTION

Autogenous bone grafts are commonly used for reconstruction of the deficient maxillary alveolar ridge to enable placement of dental implants to support dental prosthesis. Autogenous bone grafts can be harvested from extraoral sites, but harvesting bone from extraoral sites has some major side effects and is often performed under general anesthesia. Mandibular ramus, symphysis, extraction sites, and retromolar sites are the main areas for harvesting autogenous bone grafts from intraoral regions.

Computerized tomography (CT) has been shown to give adequate, reliable information for diagnosis and treatment planning in implant surgery, and it has been used to determine the volume of bone grafts to the maxilla and the maxillary sinus. Several authors have used CT to evaluate the dimensional change of bone graft, but there are limited reports on the use of CT to evaluate donor sites for autogenous bone.

In this report, 2 patients were treated with autogenous bone graft from the mandibular symphysis. Postoperative CT
scans were used to evaluate the radiographic change in the symphyseal area.

**CASE REPORT**

**Case 1**

A 50-year-old male patient was referred to the Department of Periodontology at the Armed Forces Capital Hospital, Seongnam-si, Korea, for periodontal evaluation and treatment. The patient had a noncontributory medical history. The patient was missing the maxillary right first and second molars with a very thin ridge (Figure 1a). Horizontal ridge augmentation with autogenous block bone and sinus augmentation was indicated. The patient was given a detailed explanation concerning the procedure and informed consent was obtained.

A high-resolution CT scanner (SOMATOM sensation 4, Siemens, Germany) equipped with an image reconstruction software package was used to evaluate the radiographic condition of the right maxillary sinus and the symphyseal area. Slice thickness was set at 2.0 mm, and the bone mode algorithm was used to reconstruct the images. The axial scans were reformatted to produce radiographic sections in the sagittal and the coronal directions (Figure 1b through d).

Immediately before the procedure, the patient rinsed with 0.12% chlorhexidine digluconate solution (Hexamedine, Bukwang, Seoul, Korea) for two minutes. After an injection of 2% lidocaine with 1:100 000 epinephrine local anesthetic, a horizontal incision was made at the mucogingival junction and was completed with 2 vertical releasing incision. Full-thickness
A mucoperiosteal flap was elevated, and the borders of the bone graft to be harvested were established using carbide bur (diameter of 0.8 mm, Dentsply, Pa). A bone graft 15-mm wide by 5-mm high was carefully removed with the underlying cancellous bone using thin bone chisels (Figure 2a), and the area was closed with layered sutures (Figure 2b). The harvested block was shaped to fit in the recipient site, and 2 holes were made for the titanium screw (Figure 2c). A full-thickness flap was elevated in the upper right molar area, and the harvested block was fixed with a titanium screw. The margins of the block were packed with bone chips, which were curetted from the donor area, and the wound was closed with sutures. The sutures were removed and the area was carefully cleansed with chlorhexidine solution 7 days after surgery. Figure 3 illustrates the 1-month postoperative buccal view of the donor site demonstrating good healing without scar formation.

An additional CT scan was performed 5.5 months after surgery to assess the condition of the donor site and the postoperative evaluation results at the recipient site (Figure 4a through c and the Table). The width of the ridge was maintained at 6 months after surgery (Figure 5a). The autogenous block bone was in harmony with the adjacent area when the second operative procedure was performed (Figure 5b). The titanium screws were removed, and the sinus augmentation procedure was performed (Figure 5c). The patient was referred to the local clinic for the further treatment afterward.

**Case 2**

A 55-year-old man presented to the Dental Clinic at the Armed Forces Capital Hospital, seeking treatment of periodontal disease (Figure 6). Treatment with a dental implant in conjunction with a sinus augmentation...
procedure using autogenous bone was
planned for the maxillary right molar area
after consultation with the patient regarding
the length of the treatment period and
possible complications.

A horizontal incision was made in the
vestibule extending from canine to canine to
gain access to the mandibular symphysis. The
area where bone could safely be harvested
was determined using CT before surgery.

Three cylindrical bone blocks were harvested
with a round 8-mm trephine bur (inner
diameter; ACE Surgical Supply Company Inc,
Brockton, Mass) and the harvested bone was
particulated using a bone mill. The lateral wall
of the sinus was exposed, and an oval-shaped
osteotomy was made on the lateral aspect of
the sinus wall. Care was taken not to perforate
the membrane; elevation of the sinus mem-
brane was performed with curettes. Particu-
lated autogenous bone was mixed with bovine hydroxyapatite (0.25–1.0 mm cancellous particle; Bio-Oss, Geistlich Pharma AG, Wolhusen, Switzerland), and the material was introduced into the sinus cavity without excessive pressure. The lateral wall of the sinus was covered with an absorbable membrane (Bio-Gide, Geistlich Pharma AG; Figure 7). After 6 months of healing, 3 implants (4.3 × 10 mm, 4.3 × 10 mm, and 4.3 × 12 mm; Dentium, Seoul, Korea) were placed. The final implant-supported crowns for upper premolars and molars were inserted 5 months after implant installation. The postoperative buccal view of the recipient site revealed good healing (Figure 8).

One year after the operation, CT scans were performed to evaluate the new bone formation, the condition of the sinus membrane, and the change in the symphysis area (Figure 9a and b and the Table). All of the implants were embedded in bone three-dimensionally, and bone was extended over the top of the implants. The bone-to-implant interface surrounding all implants showed close contact. A radiolucency in the donor area could be still seen from the panoramic view of the CT scan, even though reduction of the defect was seen radiographically (Figure 9a). The prosthesis was functioning well at the final evaluation 15 months after surgery (Figure 10).

<table>
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<tr>
<th>Case</th>
<th>Time</th>
<th>Width (mm)</th>
<th>Height (mm)</th>
<th>Area (mm²)</th>
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<tr>
<td></td>
<td>6 mo after surgery</td>
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<td>5.3</td>
<td>59.9</td>
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<td>Case 2</td>
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<td>9.0</td>
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<td></td>
<td>12 mo after surgery</td>
<td>19.0</td>
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</table>
In this case report, 2 patients were treated with autogenous bone to restore the maxillary alveolar deficiency. Both demonstrated uneventful healing and good acceptance of the procedure.

Block bone grafts can be harvested from the mandibular symphysis or the ramus area. The mandibular symphysis has many advantages over other donor sites. Using the mandibular symphysis as a donor site offers ease of access, good bone quality for localized repair, and a corticocancellous block graft morphology. It also gives the benefits of using intramembranous vs endochondral bone because a shorter healing period may be applied based on the hypothesis that membranous bone grafts revascularize earlier than endochondral grafts.

However, careful planning of the surgery is needed to reduce complications. The superior osteotomy line should be made at least 5 mm below the root apices to prevent possible damage to the nerves in the mandibular incisors and subsequent loss of pulp sensitivity. The mental foramina should also be located before bone grafting to prevent damage during the procedure. Sensory disturbances may arise from damage to the anterior loop of the mandibular canal anterior to the mental foramen, and it is reported that the anterior extension of the loop ranges from 0.4 to 2.19 mm.

The maximum volume of cortical bone that can be obtained as a rectangular graft block from the mandibular symphyseal region in the Asian population was reported to be a maximum height of 1–1.5 cm and a maximum width of 4.0 cm when centered at the midline of the mandible. If larger grafts are required, an alternative method or donor site should be considered so as not to compromise the safety margins of adjacent structures.

Changes of the chin contour may be another concern for the patient, and this should always be taken into account. Care
should be taken to choose the appropriate incision design for the patient after considering the required bone volume, tissue thickness, and keratinized tissue. In this report, beveled incisions were made to ease the adaptation, and layered suture, a compression dressing pad, and adhesive tapes were applied to minimize complications.

Postoperative CT scans were used to evaluate the radiographic change in the symphyseal area. Persisting radiolucency in the chin was noticed in CT scans in both patients up to the final evaluation (at 5.5 months and 12 months, respectively) with defect fill to 50%.

The 2 patients treated with autogenous bone demonstrated uneventful healing with good acceptance of the procedure. CT evaluation revealed defect fill of the donor site with existing radiolucency. Further evaluation may be needed to see the progress of remineralization and long-term changes.

**ABBREVIATION**

CT: computerized tomography

**NOTE**

The author claims to have no financial interest in any company or any of the products mentioned in this article.

**REFERENCES**


