Autogenous Bone Ridge Augmentation Using the Mandibular Symphysis as a Donor

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Potential host sites often present less than optimal dimensions or quality than are required for implant placement. This paper emphasizes a variety of surgical technique designed to optimize these areas. There are a number of anatomic sites available to serve as donors for autogenous bone grafting. They include the tibial plateau, the calvarium, the mandibular rami, the iliac crests and the symphysis of the mandible. Although each has the potential of presenting risks, the symphysis serves a singularly beneficial source. The techniques of harvesting bone, and utilizing it for a variety of grafting procedures is described, the benefits of such utilization are emphasized and the risks of such operations are reviewed.

INTRODUCTION

The sequel of tooth loss caused by biological or physical factors is bone loss. The best way to reconstruct that bone to ensure adequate support for an implant and the prosthesis it will support is to use the patient's own bone. The symphysis is a source of cortical and cancellous bone that can be used as a predictable donor site. The technique of harvesting bone from the symphysis and using it to augment deficient ridges is a significant and beneficial procedure.

A careful evaluation of the host site is necessary to determine the need and extent of the required augmentation. A radiographic and clinical examination of the symphysis is necessary to decide whether enough hard tissue exists to supply the deficient ridge. The symphysis can provide adequate bone to augment a site that had been occupied by two to six teeth. It will never offer a quantity sufficient to augment an entire arch. If full-arch augmentation is required, if the patient has a deficient chin, or if the extent of periodontal or alveolar bone loss is significant, another source of bone must be considered. The calvarium, the tibial plateau, or the iliac crests are all viable sources. Autogenous and allograft sources may be combined to enhance graft quantity.

The patient is to be made aware of the risks and benefits of every procedure. A chance exists of transient paresthesia of the lip, and larger grafts can introduce temporary and sometimes permanent anesthesia to the lower incisors. If the operator is not careful or is overly aggressive, parasymphysial fractures can occur as well.
**MATERIALS AND METHODS**

A clinical examination and panoramic and periapical radiographs are required. After the host site is examined, the clinician must decide whether vertical or horizontal augmentation is required. After the operative requirements are ascertained, the symphysis, as a potential donor site, is evaluated. If teeth are present, the distance of the roots from the mandibular inferior border are noted, as are the locations of the mental foramina. These critical landmarks are obvious limiting factors. Mandibular bulk also plays a critical role in donor site selection. If the available bone seems adequate, the anterior mandible may be selected.

Strict surgical protocol should be followed when harvesting bone from the symphysis. The patient should have adequate blood levels of antibiotic at the time of incision. In addition, the patient should have been rinsing with chlorhexidine for at least 3 days before surgery. At the surgery appointment, the patient is asked to rinse with diluted 50% betadine and 50% normal saline before being prepared and draped with sterile covers. The host site and the symphysis are anesthetized. Bilateral inferior alveolar nerve blocks and local infiltrations down to the inferior border are introduced for the requisite anesthesia.

By using a number 15 blade, a crestal incision and two releasing incisions are made to expose the host site (Fig 1). The flap should be broad based and include a full tooth at either end. The host site is exposed, and a sterilized piece of lead foil (from a periapical film) is placed over the site (Fig 2). The foil, which will serve as a surgical template, is manipulated, cut, and adjusted to record the configuration of bone required for the site. Once the template has been made, the host site is irrigated with saline, and the flap is replaced and maintained by wedging a saline-soaked sponge over it. The symphysis is the next site of operation.

The area has been infiltrated with 1:50,000 epinephrine to aid in hemostasis. The locations of the mental foramina must be noted. The incision is performed with a number 15 blade and made in the mucosa at least 5 mm below the gingival attachment. This allows adequate tissue to permit a closure in layers. The incision is made with the lip drawn anteriorly, thus placing the soft tissues under tension.
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and 5 mm from the apices. The midline
to clench histeeth in centric occlusion,
a mallet. The patient should be asked
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space. Once this communication is
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round, high-speed bur under copious
irrigation is used to outline the periph-
ergy of the template at a rightangle to
701 surgical-length bur to “connect the
dots” (Fig 8). When the outline is com-
plete, the osteotomy is deepened into
the marrow space. Tactile sense, as well
as bleeding from the outline form, will
indicate penetration into the marrow
space. Once this communication is
completed, a spatula osteotome (KLS
Martin) is tapped into the outline with
a mallet. The patient should be asked
to clench his teeth in centric occlusion,
and the surgical assistant must support
the chin during the tapping phase,
which should be started in one of the
vertical cuts. The inferior osteotomy
should be avoided or reserved for last
to prevent endangering the border. If,
during the tapping, the osteotome ref-
fuses to advance, it is probable that the
marrow space has not been reached.
The osteotome might be too thick. Af-
ter tactile purchase has been achieved
around the entire periphery with the
osteotome, it is used as a lever that will
raise the graft. When slight mobility
is noted at the first site, the same strat-
ey is used on the opposing side. This
maneuver is employed at a variety of
sites until the block becomes mobil-
ized. This permits it to be elevated
from the donor site (Figs 9, 10). The
graft is stored in a mixture of saline
and the patient’s blood, with the addi-
tion of 80 mg gentamicin. A gouge
(KLS Martin) is used that will harvest
the marrow that does not come away
with the block. A moistened sponge is
placed into the donor site, and the flap
is replaced passively.23

To maximize success, the graft will
have to be immobilized, and it should
be offered adequate blood supply.
Once the graft is secured, the flap will
have to be undermined to adequately
cover the newly expanded area of the
graft.

The graft is taken to the host site. Be-
fore it is manipulated, the host site
must be contoured to receive the graft;
it responds best to decontouring which,
it is thought, will stimulate active
bleeding. The graft and the host should
be modified to fit as closely as possible
in or on the host site (Fig 11). Once this
is accomplished, a hole is drilled in the
graft to facilitate lag screw fixation of
the graft to the host. The hole is made
large enough to permit the fixation
screw to slip passively through the
graft, but not large enough to allow
passage of the screw head (Fig 12).
Thus, as the screw actively penetrates
the host (which requires tapping; Fig
13), its head will passively lock the
graft, rivet-style, into position (Fig 14).
The smallest size screw that is effective
should be chosen. If the graft is large,
several intelligently placed screws will
be required. After the graft is secured
firmly, remaining discrepancies should
be filled with the remaining harvested
marrow (Fig 15). The flap, as a result
of the undermining, can be sutured
without tension with polyglyact su-
ture. Interrupted, box-lock, or vertical
footstool techniques can be used. Pri-
mary closure is mandatory (Fig 16).4,5

After the host site is completed, clo-
sure of the donor site is undertaken.
The saline-soaked sponge is removed,
the area irrigated with saline, and any
bony irregularities adjusted with bone
files or rongeur forceps. For the miss-
ing bone to regenerate (to the site to be
used again), a resorbable graft material
should be placed (ie, Osteograft N-300,
700). Enough graft should be placed to
restore the contour of the mandible to
its initial outline (Fig 17). After the
graft has been infiltrated with the pa-
tient’s blood, a resorbable membrane
is placed over it (ie, Vicryl mesh) (Fig 18).
Suturing of the donor site is done in
layers. The periosteum and muscle are
sutured first (Fig 19), followed by the
overlying mucosa. Primary closure
must be obtained (Fig 20). Adequate
retraction and toothed tissue forceps
(Adson or Gerald forceps) are of ben-
efit. A pressure dressing is applied to
the patient’s chin, antibiotic therapy is
continued, and anti-inflammatory and
analgesic agents are prescribed. The
patient is directed to avoid severe
physical activity, to continue with the
chlorhexidine rinses, and to stay on a
pureéd diet.

**Discussion**

People who have lost permanent teeth
in their adolescence or adulthood be-
cause of trauma, caries, or periodontal
disease find benefits from dental im-
plants. However, such procedures often require ridge augmentation. When necessary, the symphysis can provide an adequate amount of bone to allow implant placement. The procedure can be done in the office, and this keeps the cost of treatment under control. Harvesting bone from the symphysis is a predictable procedure, and the site can be made to regenerate so that it may be used again.

Strict surgical protocol must be observed when performing bone surgery. Powderless surgical gloves, drapes, and sterile solutions are to be used. Careful dissection and surgical management of the host and donor sites are of paramount importance. Considerations of the soft tissues, the bony anatomy, and techniques of primary graft coverage must be planned before surgery. Radiographic and clinical assessment must be satisfied before surgery.

**Conclusion**

Autogenous grafting has always been the gold standard when predictable viable bone is sought. The symphysis provides both cortical and medullary bone necessary for osteoinduction and conduction, and it is in an area familiar to clinicians. The approach is simple and does not require extensive dissection, nor is there significant morbidity. In addition, it limits the discomfort to just one area of the body. Pain and infection management is simple, and the
patient can be discharged the same day.

The procedure of harvesting mandibular symphyseal bone is predictable if performed in the correct manner, with the patient’s care in mind. A knowledgeable, experienced clinician can provide his patients with this valuable service.

REFERENCES