BONE GRAFT SYSTEM

Surgical Technique

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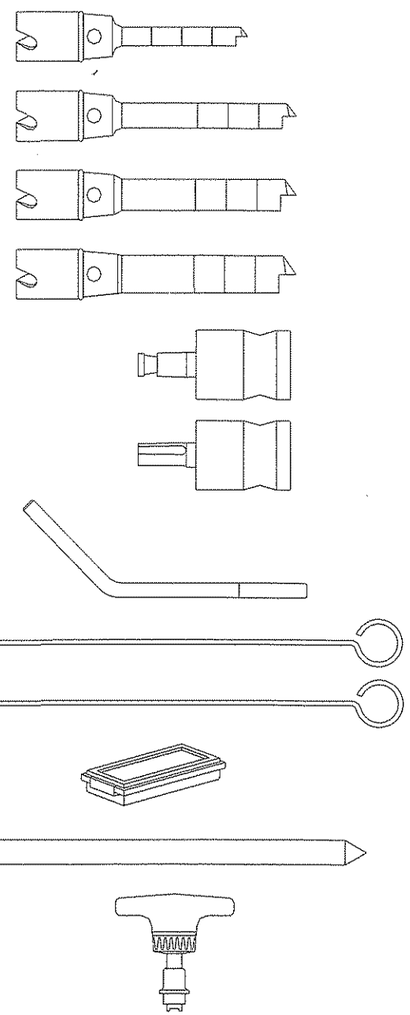
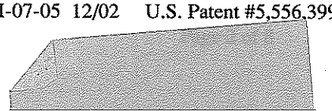
Introduction

Autogenous bone graft remains the most effective treatment for fracture non-unions, pseudarthroses and for optimizing the success rate of arthrodeses. It is safer and more effective than artificial hydroxyapatite materials or allograft but involves additional morbidity from the donor site. This can be minimized by a limited approach and the use of a cylindrical biopsy needle, although the technique can be difficult and potentially dangerous because of inadvertent plunging with the needle and difficulty extracting the plug of graft from the bone.

The Acumed bone graft harvesting instrument facilitates safe, rapid harvest of morsellized autogenous graft through a small skin incision which minimizes the patient's discomfort and morbidity. The device reliably extracts the graft and is used with a drill which affords a greater degree of control, thus preventing inadvertent plunging. This safe and effective technique makes autogenous bone graft available for fusions, pseudarthroses and metaphyseal fractures with minimum donor morbidity.

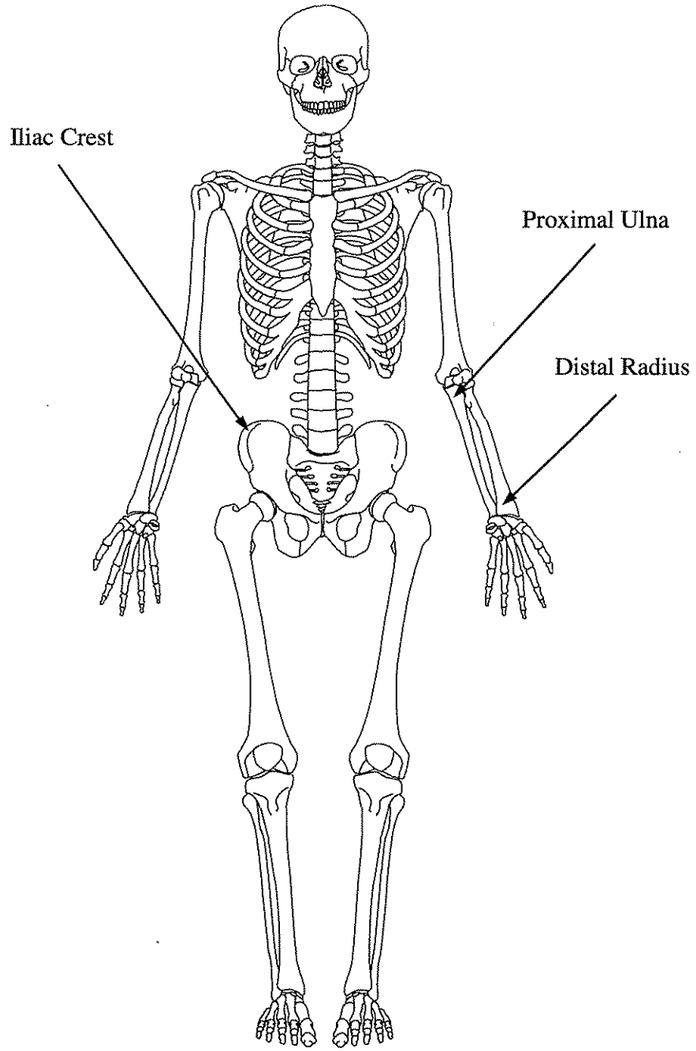
6.0mm Drill (Optional)	BG-8006
8.0mm Drill	BG-8010
10.0mm Drill	BG-8020
12.0mm Drill	BG-8030
Hudson Fitting Adaptor	BG-8040
Jacobs Chuck Adaptor (Optional)	BG-8044
Removal Key	BG-8050
Bone Plug Extractor	BG-8060
6mm Plug Extractor (Optional)	BG-8064
Bone Graft Tray	BG-8070
Bone Graft Punch	BG-8080
(Optional) Bone Graft Ratcheting T-Handle	BG-8043





Graft Sites

The Acumed system may be used to harvest graft from a variety of locations. While the iliac crest is the most popular site and provides the best quality graft, harvest from other diaphyseal locations such as the distal radius or proximal ulna also provide suitable graft.



Harvest from the Ilium:

The Acumed's trephine is available in three sizes depending upon the amount of graft required and the thickness of the ilium. The appropriate size should be selected to permit harvest of the requisite amount of graft with the minimal number of passes while not injuring the inner and outer tables with a trephine of excessively large diameter.

Anterior Ilium Crest Technique:

1) Iliac crest harvest is usually performed under general anesthesia, although in selected patients, a small amount of graft can be obtained with local anesthesia and I.V. sedation. A 2cm. incision is located over the iliac crest at least 3 cm. posterior to the anterior superior iliac spine (ASIS) to protect the lateral femoral cutaneous nerve which may course over the crest up to 2cm. posterior to the ASIS in 10% of normal individuals. (Massey, E.W. Meralgia Paresthetica Secondary to Trauma of Bone Graft, J. Trauma 20:342-3, 1980) **(FIG. 1)** Infiltrating the area of the incision and periosteum with 0.5% Marcaine solution with epinephrine 1:100000 several minutes prior to incision will minimize bleeding and post-op discomfort.

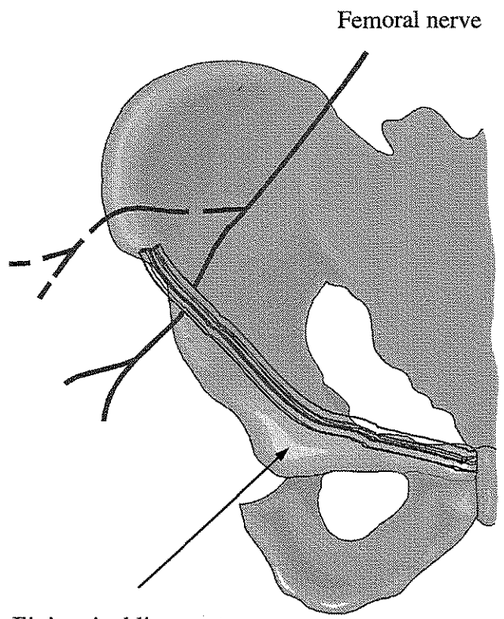


FIG. 1

2) After incising the skin and subcutaneous layers, sharply incise the white fascial confluence of the gluteal/tensor and abdominal musculature over the iliac crest and the periosteum. A Cobb elevator is used to perform a limited subperiosteal dissection over the crest. Small Homan-type retractors can be introduced to facilitate the exposure and help identify the center of the crest. The elevator or retractors are also used to probe the orientation of the ilium so that the Acumed trephine can be accurately directed between the inner and outer tables of the ilium.

3) Using the sharp pointed awl and a mallet, make a starting hole over the center of the iliac crest at the desired entrance point. This hole prevents the trephine from "walking off" the bone. Insert the appropriate size trephine into the Hudson adapter rotating it clockwise until it locks, and attach this assembly to a drill or hand brace.**(Fig. 2)** The trephine is then drilled into the crest, between the inner and outer tables. Drilling at low or medium speed or using a hand brace transmits some "feel" of the instrument to the surgeon's hands and will help to protect the inner and outer tables. Advance the trephine to the laser-etched ring on the instrument and then withdraw the instrument from the bone.

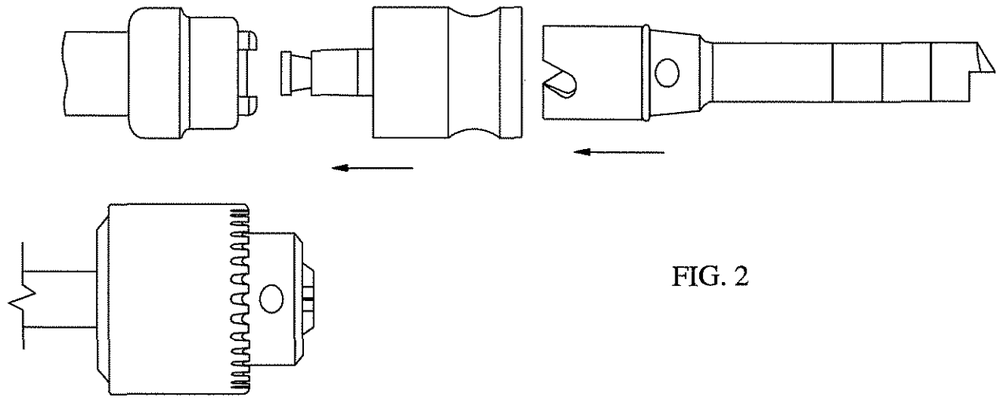


FIG. 2

4) Detach the trephine from the Hudson adaptor using the removal key which is inserted through the holes in the trephine. Use the Acumed plug extractor, inserted in the pointed end of the trephine, to expel the graft from the open end of the trephine.**(Fig. 3)** With practice, variations in the speed of drilling and the pressure on the trephine can be used to vary the texture of the graft from coarse to fine.

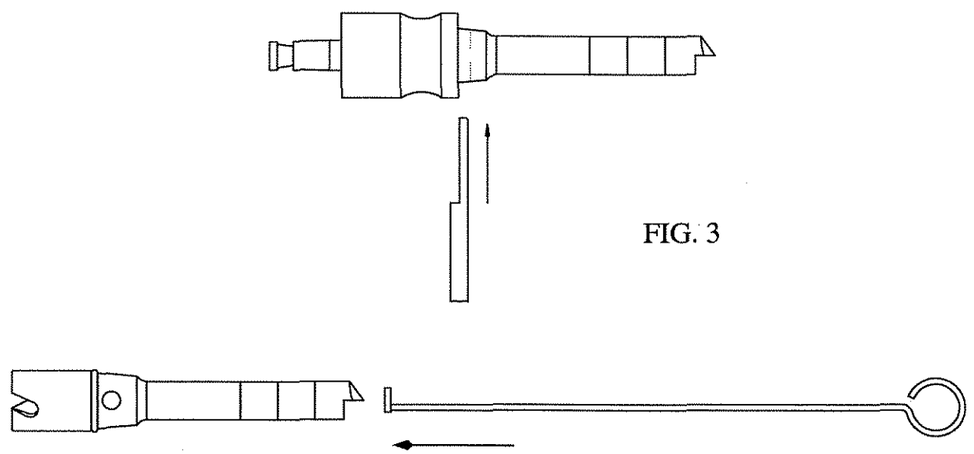


FIG. 3

5) Additional graft may be harvested through the same entrance hole in the iliac crest by redirecting the trephine in a radial pattern from the original hole.**(Fig. 4)** A large volume of graft may be harvested by this means. Bone is most easily harvested from the superior edge of the iliac crest as this area has a larger cross-sectional area than the deeper portions of the ilium.

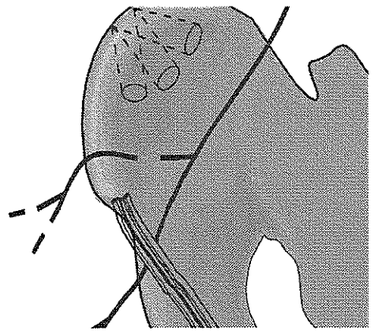


FIG. 4

Posterior Ilium Crest Technique:

The Acumed bone harvesting system can also be used to harvest bone from the posterior portion of the ilium, as is frequently done during spine surgery. The posterior superior iliac spine (PSIS) can be approached from a midline incision via the subcutaneous plane or from a separate oblique incision. The dissection should not extend toward the superior cluneal nerves which cross approximately 8 cm. supero-laterally to the PSIS.**(Fig. 5)** A limited subperiosteal dissection is performed to permit entry of the Acumed trephine. Care should be taken not to direct the trephine inferior to the level of the PSIS to prevent inadvertent entry into the greater sciatic notch and injury to the superior gluteal vessels or sciatic nerve. The sacro-iliac joint should also be avoided.

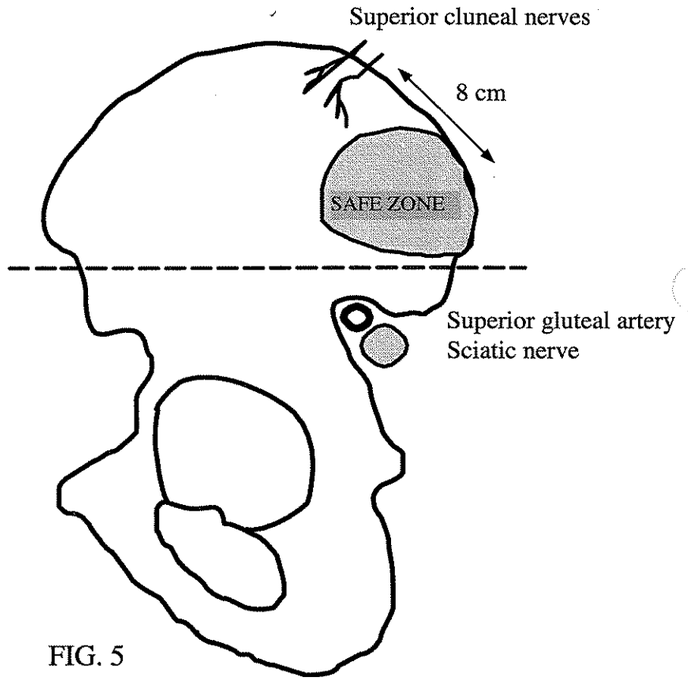


FIG. 5

Suggestions for wound closure:

Either donor site should be thoroughly irrigated with saline solution and inspected for bleeding. Some surgeons find Gelfoam to be of help, but the bone bleeding usually subsides with time. Significant residual bleeding at the time of closure is an indication for a small suction drain. The fascia should be carefully and tightly reapproximated with interrupted 0 or 2-0 absorbable sutures. A subcuticular closure or staples can be used to close the skin. Steri-strips, if used, should be applied longitudinally along the axis of the incision to prevent blistering.

Technique for harvest from the distal radius:

1) A tourniquet is recommended to minimize bleeding. The distal radius may be approached from the dorsal or radial side, depending upon the surgical procedure being performed. A 2cm. incision placed over the second dorsal compartment approximately 3 cm. proximal to the dorsal lip of the radius will provide good exposure with minimal morbidity and risk to the branches of the superficial radial sensory nerve. **(Fig. 6)**

2) Incise the fascia proximal to the extensor retinaculum. The incision can be extended into the proximal portion of the retinaculum if needed.

3) Retract the ECRB and ECRL tendons to expose the dorsal cortex of the radius and harvest the graft in the manner described above. The trephine should be directed palmarly and distally, taking great care not to damage the subchondral bone or articular surface.

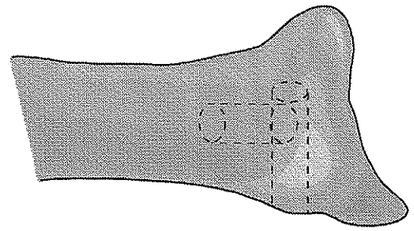


FIG. 6

Technique for harvest from the olecranon:

A limited amount of graft may be harvested from the proximal ulna. Like the distal radial graft, this tends to be somewhat fattier than the iliac crest, but it may be sufficient for certain applications.

1) The incision may be placed over the tip of the olecranon or 2-3cm. distal to the tip. The first incision permits easy intramedullary passage of the trephine, but violates the bursa and may be associated with healing problems, post-operative bursitis, or chronic tenderness. The more distal incision requires greater care to avoid damaging the articular surface with the trephine, but heals without difficulty because it is not over the extensor surface of the joint. A tourniquet may be used to facilitate the exposure and minimize bleeding

2) Incise the skin, subcutaneous tissue and periosteum. Small Homan-type retractors or Ragnell retractors help protect the soft tissues.

3) Harvest the graft by means of a longitudinal pass with the trephine (incision #1) or multiple oblique passes (incision #2). **(Fig. 7)**

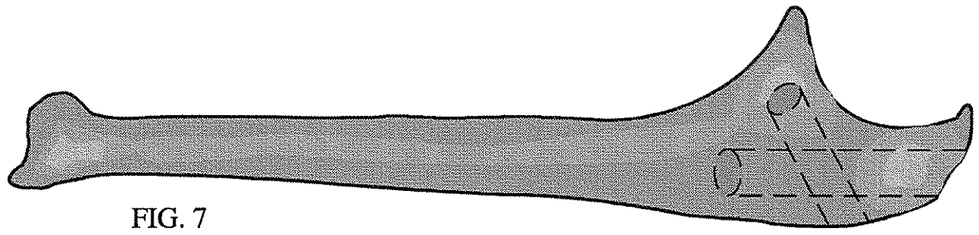


FIG. 7

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