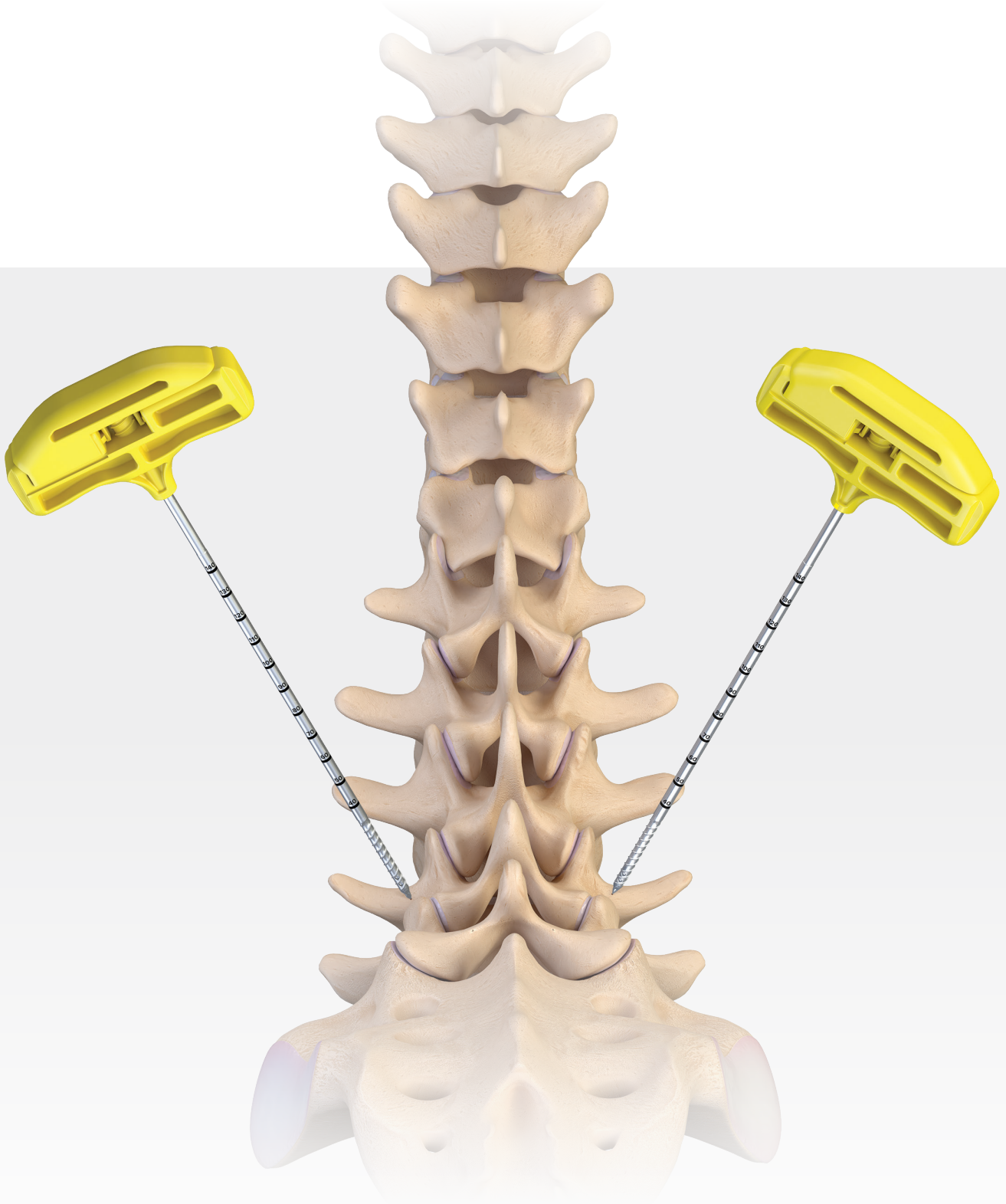
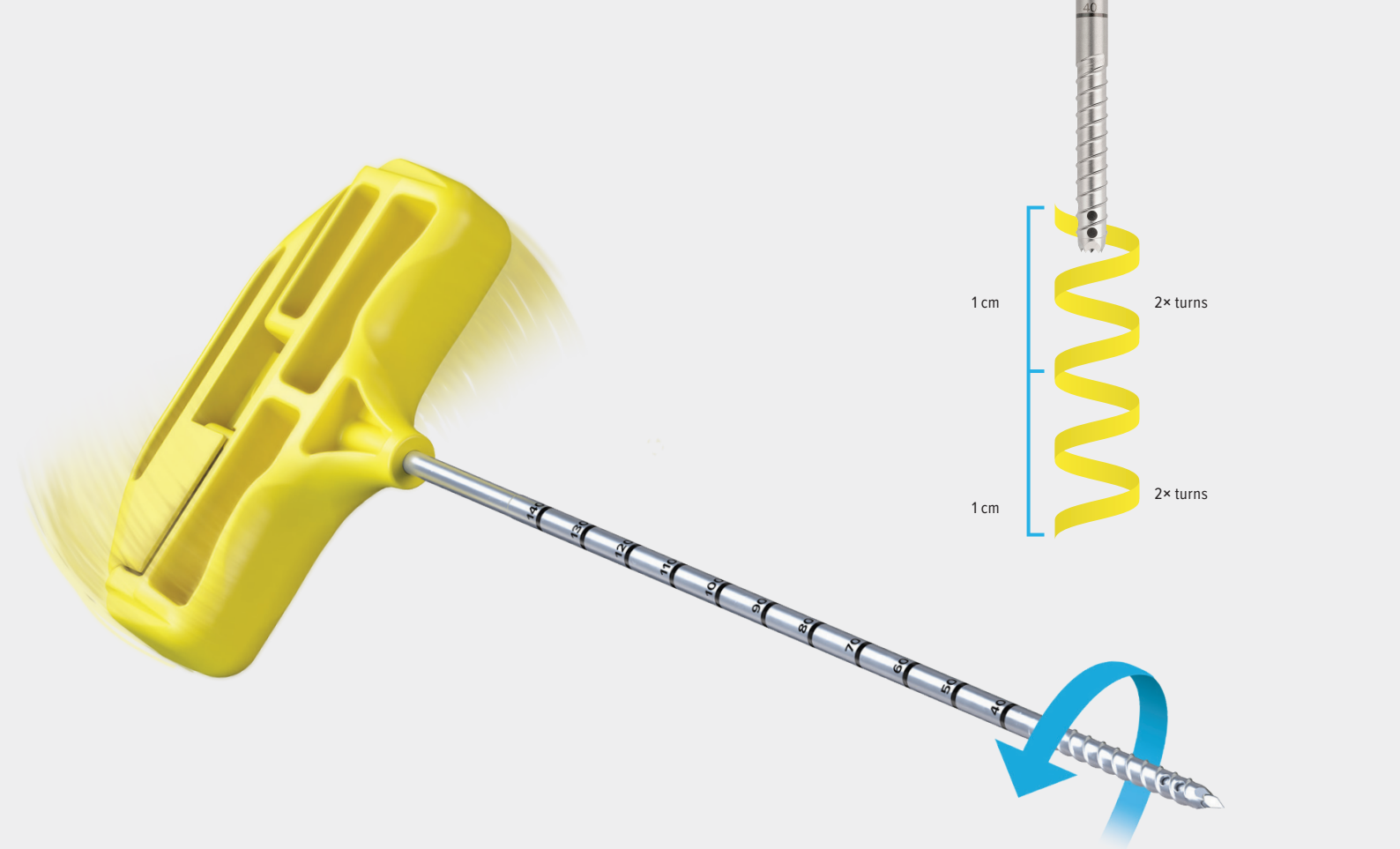


Vortex™ Threaded Bone Marrow Recovery Needle

Surgical Technique





Vortex™ Threaded Bone Marrow Recovery Needle

Arthrex continues to deliver on its mission statement of Helping Surgeons Treat Their Patients Better® with the introduction of the Vortex threaded recovery needle. The unique, patent-pending design, which includes a threaded tip and vent holes, prioritizes precise depth and directional control to allow the user to easily and accurately reposition the tip of the needle within the bone for optimal aspiration volume and maximum osteoprogenitor cell recovery.¹

Product Overview

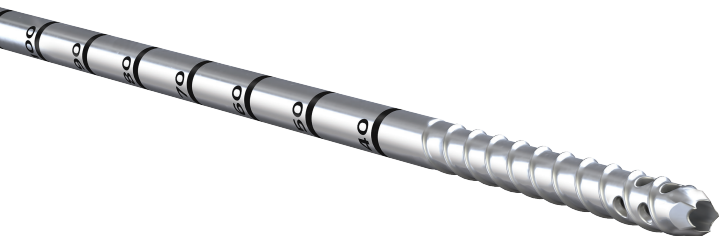
- › The unique threaded tip and vent holes in the Vortex needle allow the surgeon to control the depth and direction of aspiration within the anterior superior iliac spine (ASIS), posterior superior iliac spine (PSIS), or vertebral body.

Key Features and Benefits

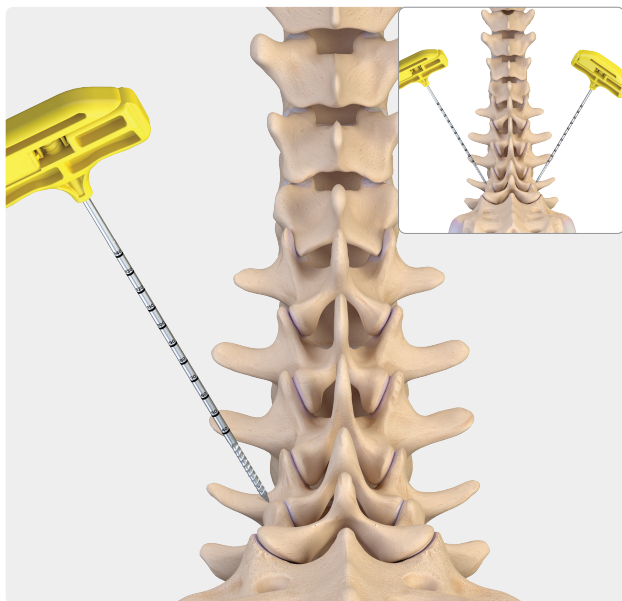
- › Precise depth control
- › Open- and closed-tip options
- › Multiple size options, either 13 ga or 8 ga

Technical Pearls

- › As the syringe begins aspirating bone marrow, it is recommended to change the depth of the needle after every 2 cc of aspiration to maximize the concentration of osteoprogenitor cells collected. This is done by alternating between ½ turns and 1½ turns of the needle.
- › The use of a C-arm is recommended to assist with safe and proper targeting

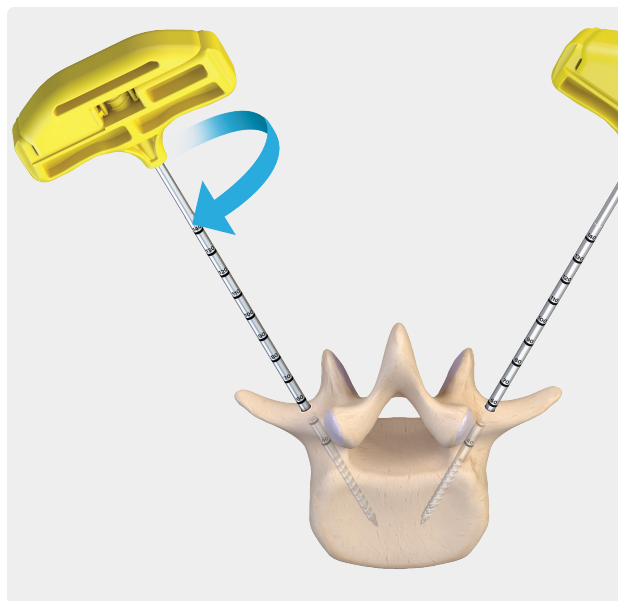


Vertebral Body Bone Marrow Recovery Technique



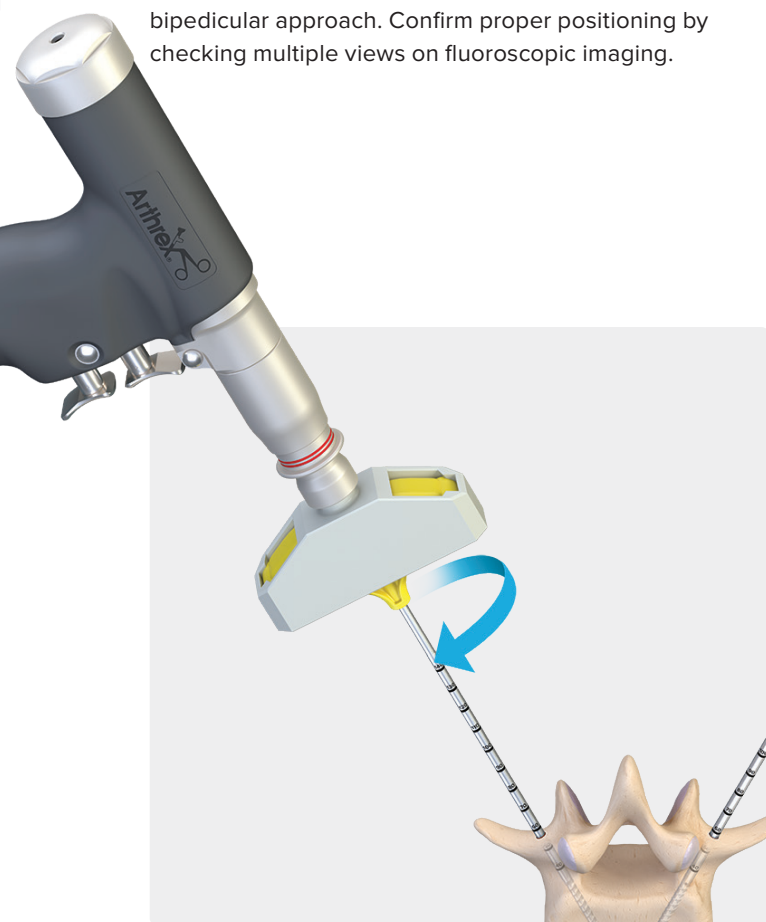
1a

Use a transpedicular approach to the vertebral body. To maximize volume, it is recommended to also use a bipedicular approach. Confirm proper positioning by checking multiple views on fluoroscopic imaging.



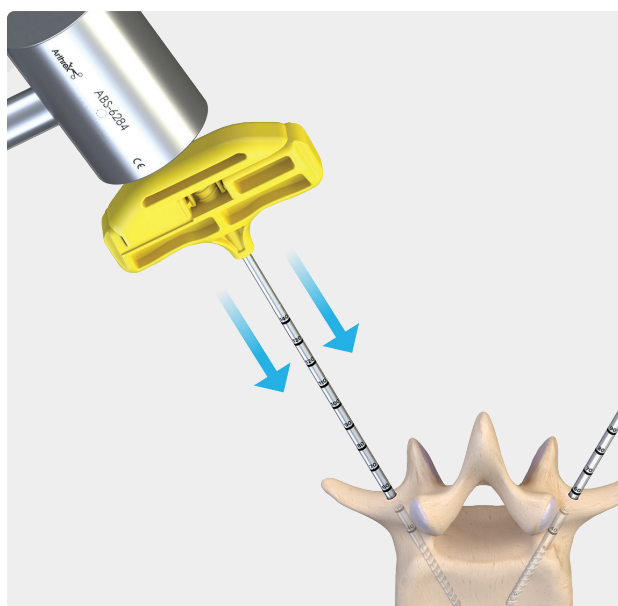
1b

There are three methods of needle insertion that can be used. First, the needle can be twisted manually into the bone.



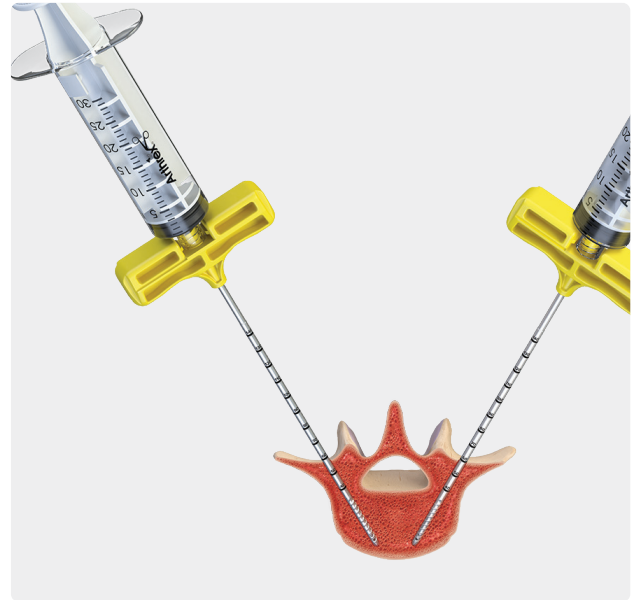
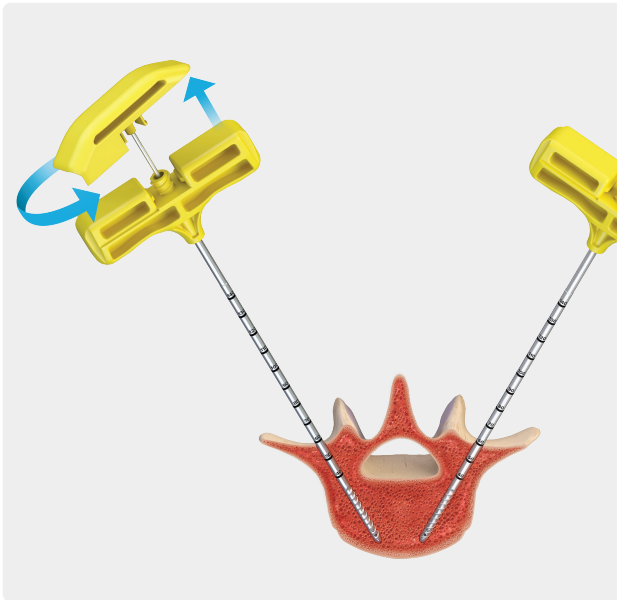
1c

Second, a specially designed power adapter connected to a power drill can be used to insert the needle.



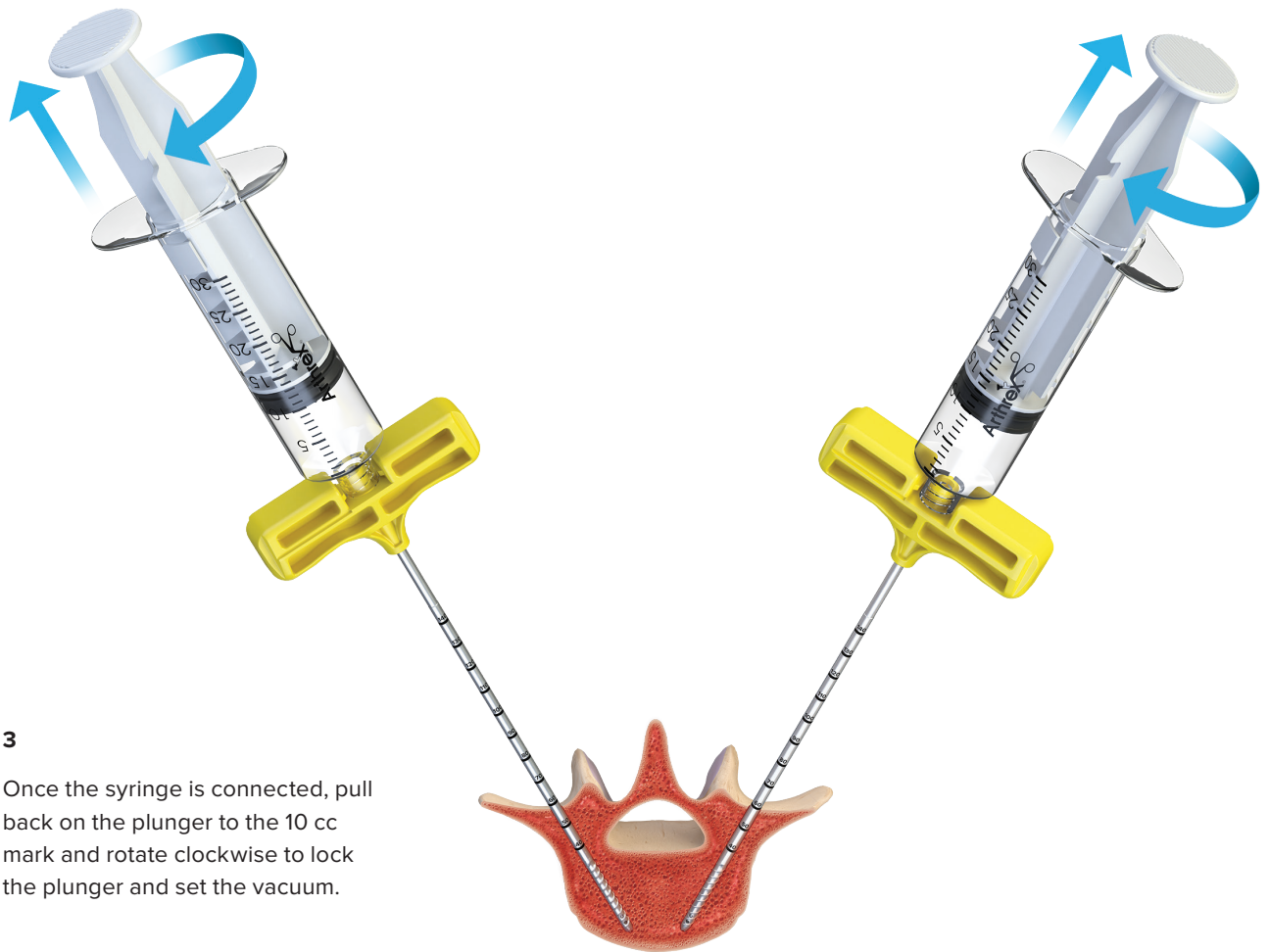
1d

Finally, a mallet can be used to gently tap the needle into the bone. These methods can also be used in combination.



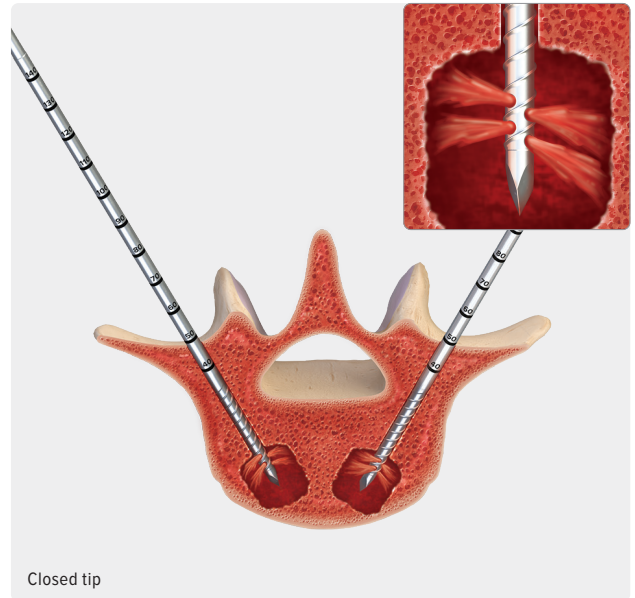
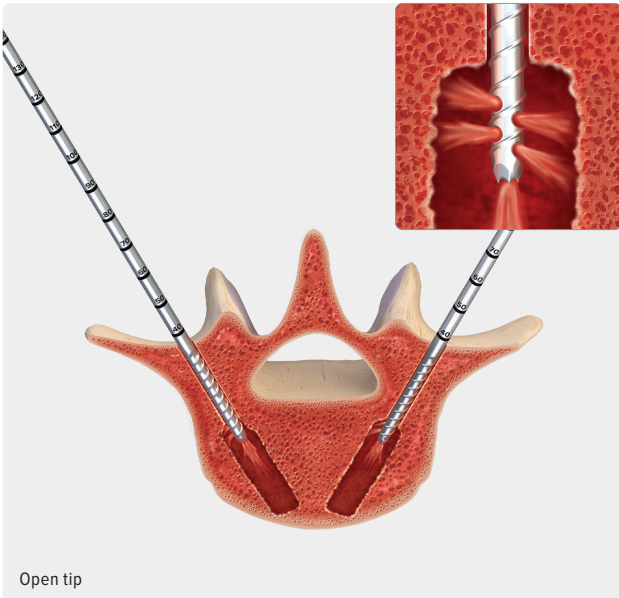
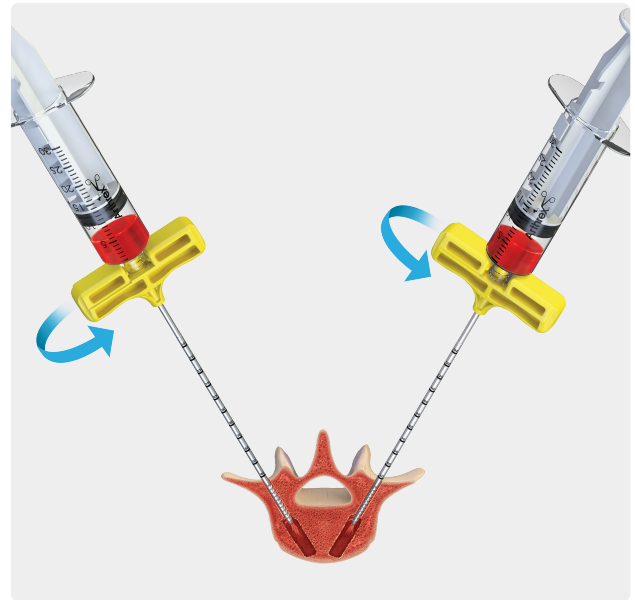
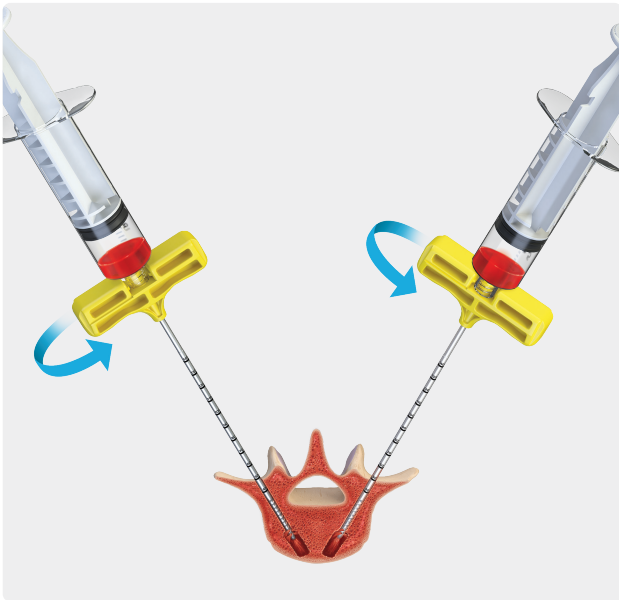
2

After the needle is inserted to the desired depth, remove the stylet and connect the syringe. Confirm positioning on fluoroscopic imaging to ensure there is no breach of the anterior cortex of the vertebral body.



3

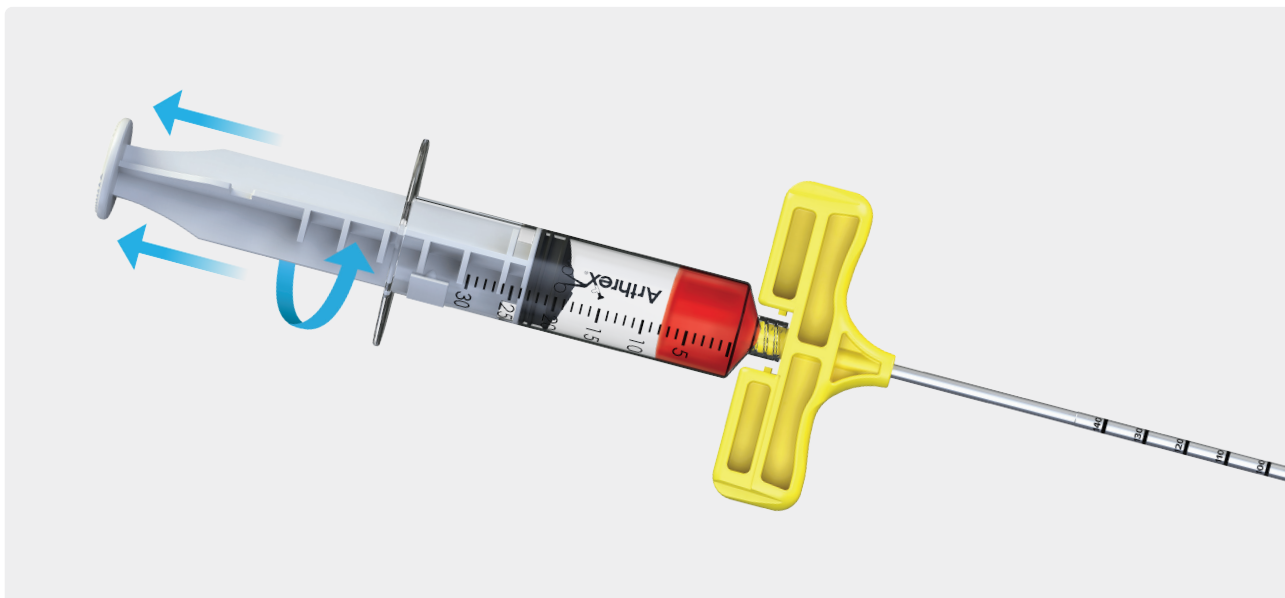
Once the syringe is connected, pull back on the plunger to the 10 cc mark and rotate clockwise to lock the plunger and set the vacuum.



4

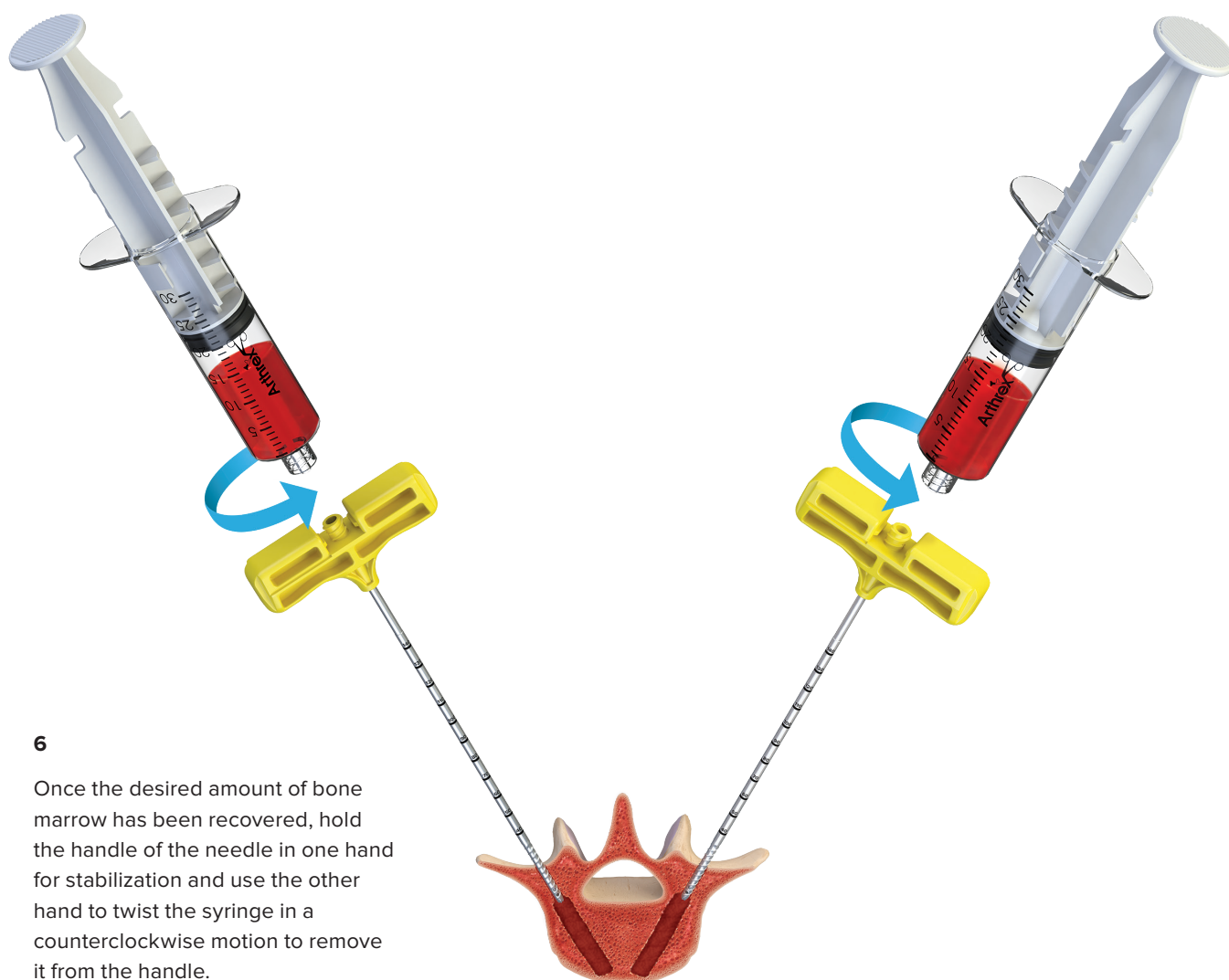
After 2 cc of aspiration, rotate the handle of the needle counterclockwise to reposition the tip and aspirate bone marrow from a different location.

Note: Research has shown the first 2 cc of aspiration for any one depth and location have the highest concentration of osteoprogenitor cells.¹



5

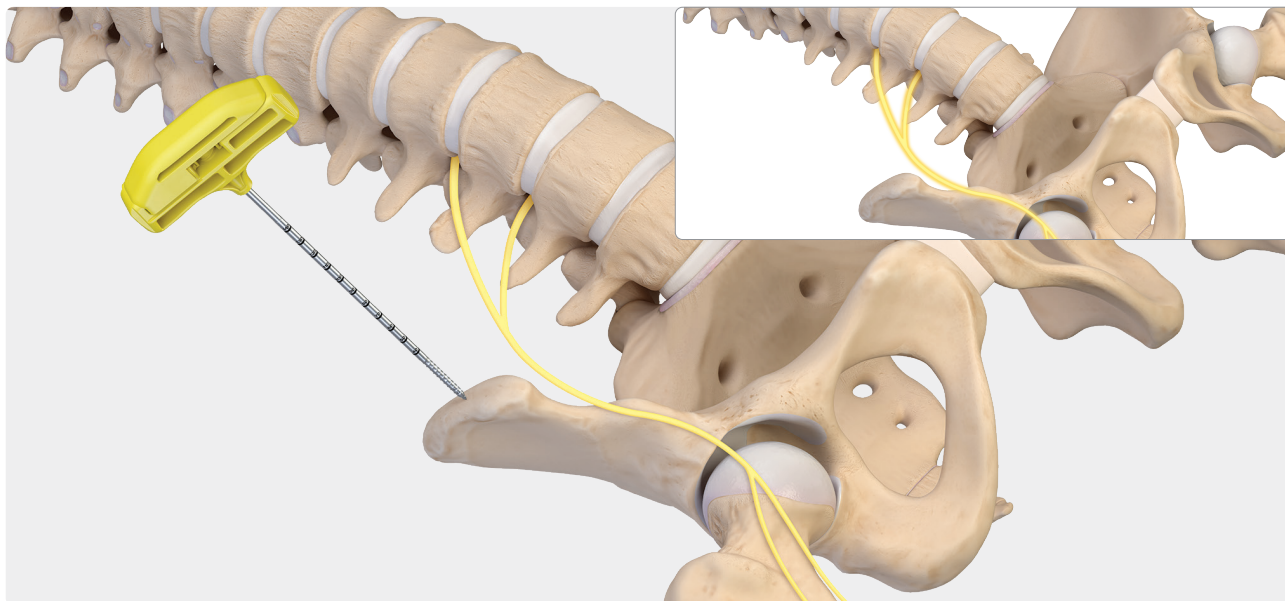
Continue to rotate the Vortex™ needle handle after every 2 cc of aspiration. If more than 10 mL of aspirate is desired, reset the vacuum on the syringe by unlocking and pulling the plunger up.



6

Once the desired amount of bone marrow has been recovered, hold the handle of the needle in one hand for stabilization and use the other hand to twist the syringe in a counterclockwise motion to remove it from the handle.

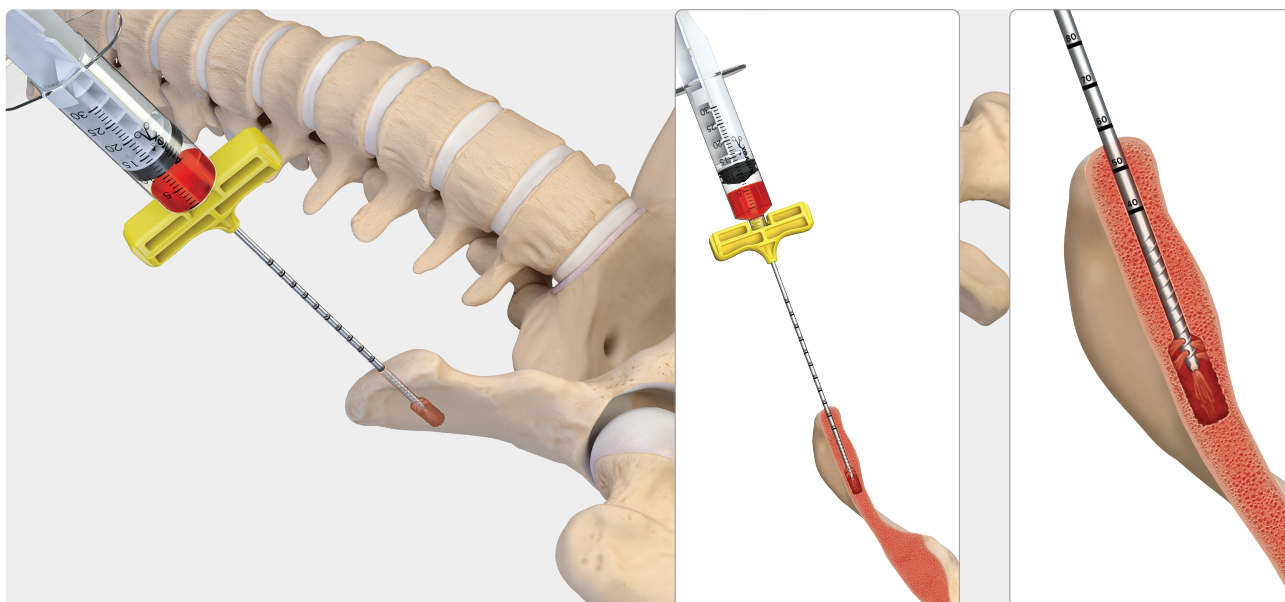
ASIS Bone Marrow Recovery Technique



1

Using the Vortex™ threaded bone marrow recovery needle, insert the needle into the ASIS.

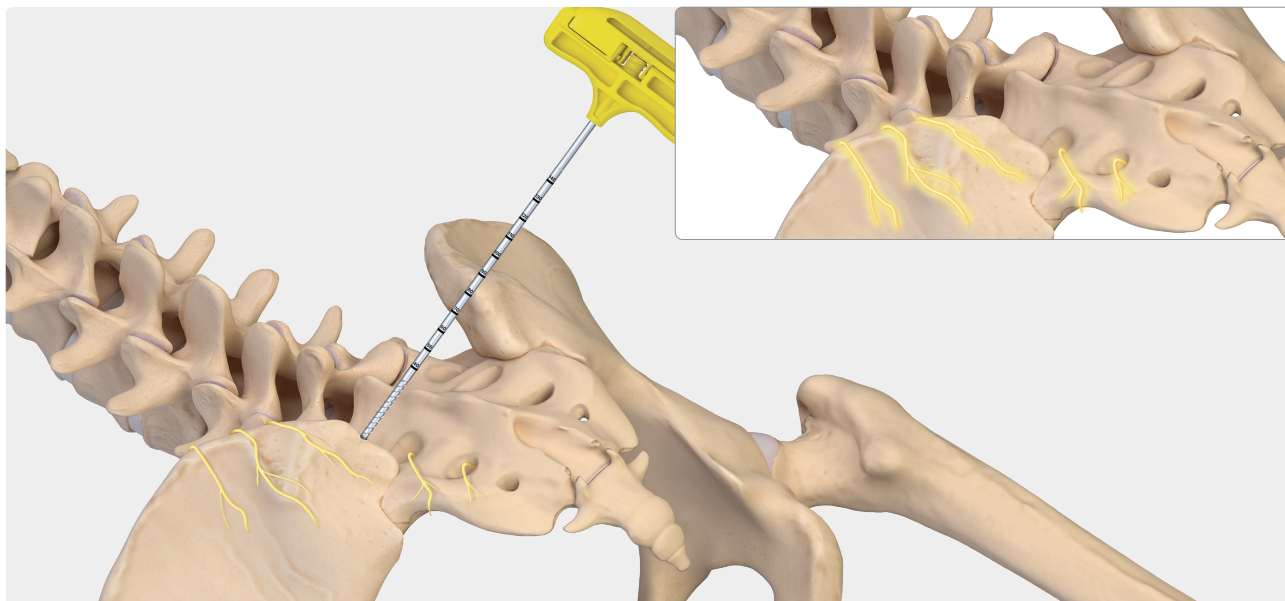
Note: Use an insertion point 4 cm posterior to the ASIS to avoid damaging the lateral femoral cutaneous nerve (inset).²



2

After 2 cc of aspiration, rotate the handle of the needle counterclockwise to reposition the tip and aspirate bone marrow from a different location.

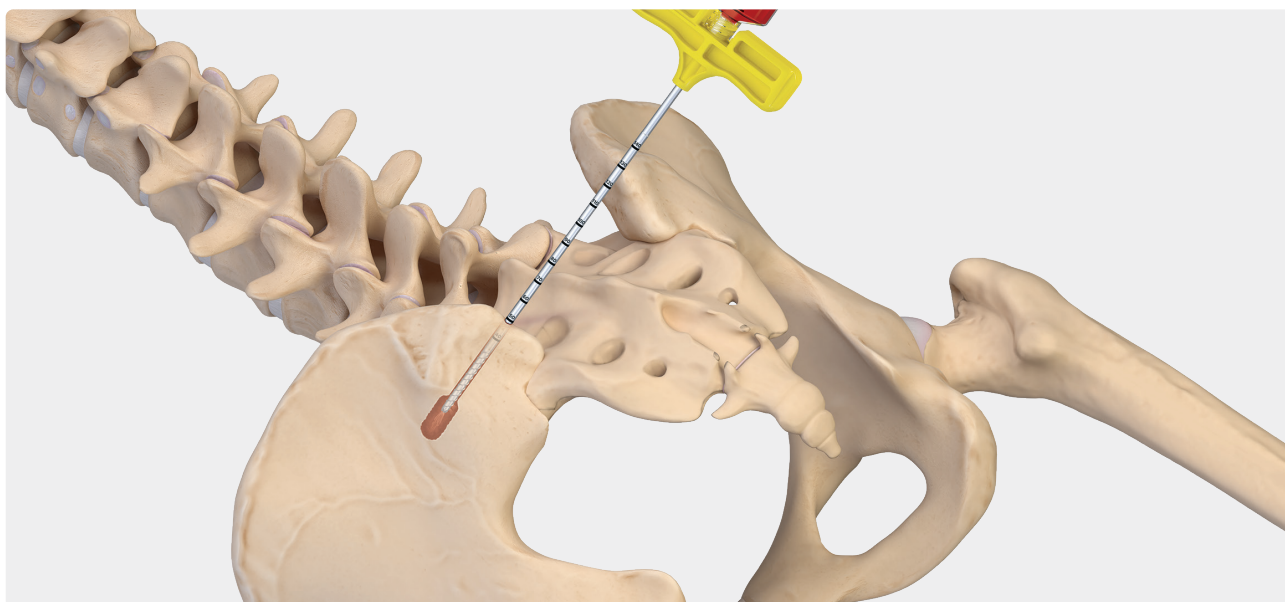
PSIS Bone Marrow Recovery Technique



1

Using the Vortex™ threaded bone marrow recovery needle, insert the needle into the PSIS.

Note: Use an insertion point 3 cm superior to the PSIS to avoid damaging the cluneal nerves.



2

After 2 cc of aspiration, rotate the handle of the needle counterclockwise to reposition the tip and aspirate bone marrow from a different location.

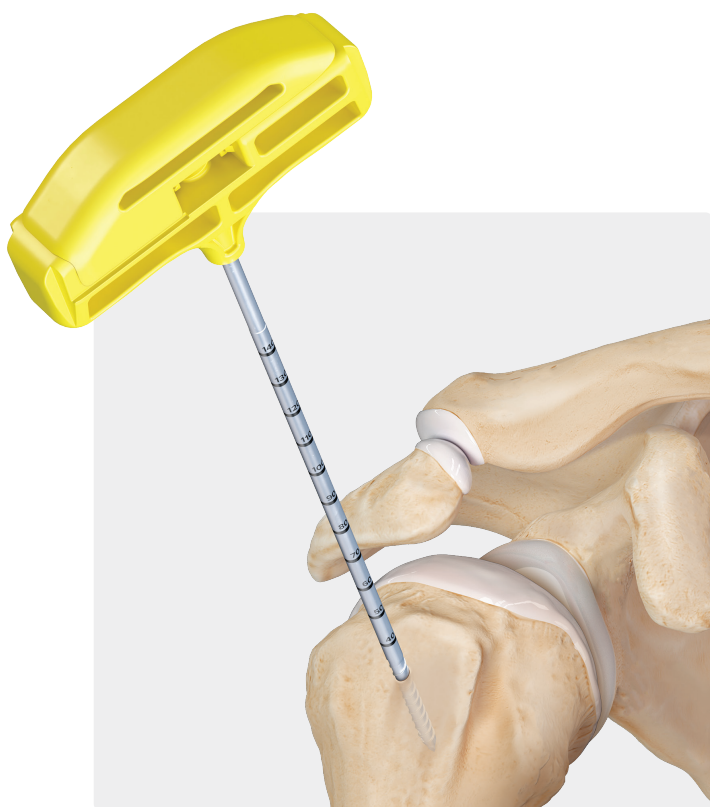
Additional Bone Marrow Aspiration Site Options



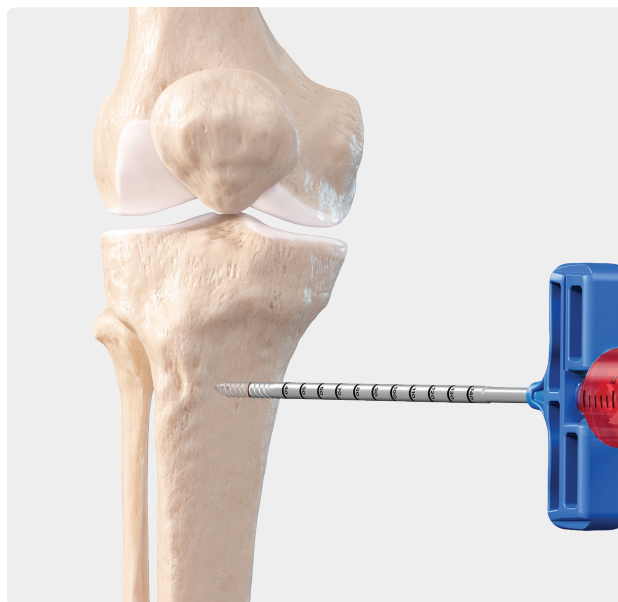
Use a 13 ga open-tip needle to aspirate bone marrow from the calcaneus.



Use an 8 ga open-tip needle to aspirate bone marrow from the femur.



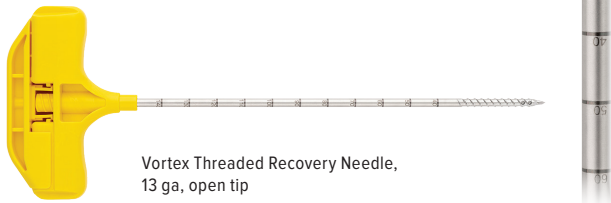
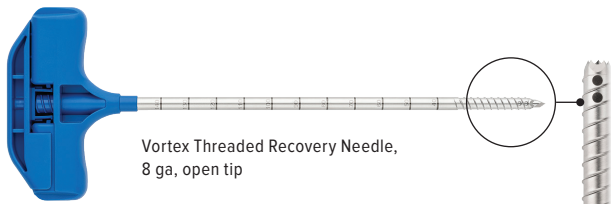
Use a 13 ga open-tip needle to aspirate bone marrow from the shoulder.



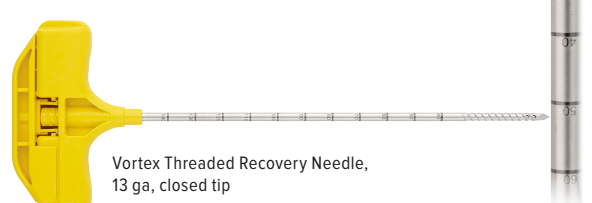
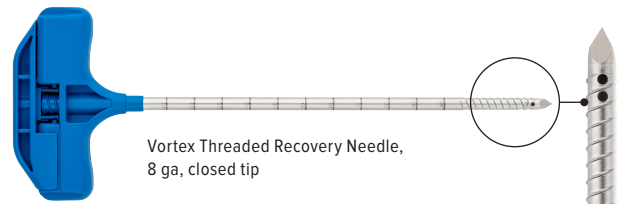
Insert the trochar in the medial metaphyseal-diaphyseal junction. Position the 8 ga open-tip needle low enough to avoid subchondral bone and close to the insertion of the pes anserinus. Aim approximately 30° distally.

Vortex™ Threaded Recovery Needles, Accessories, and Kits

Open-Tip Needles



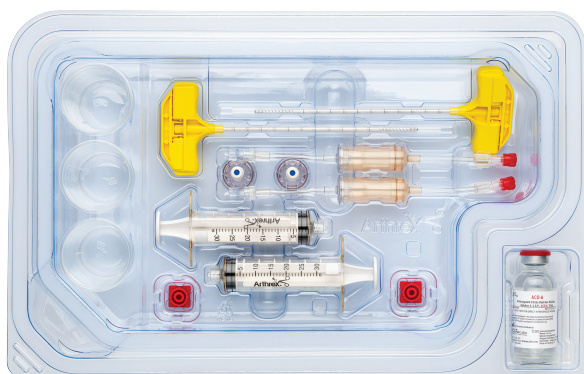
Closed-Tip Needles



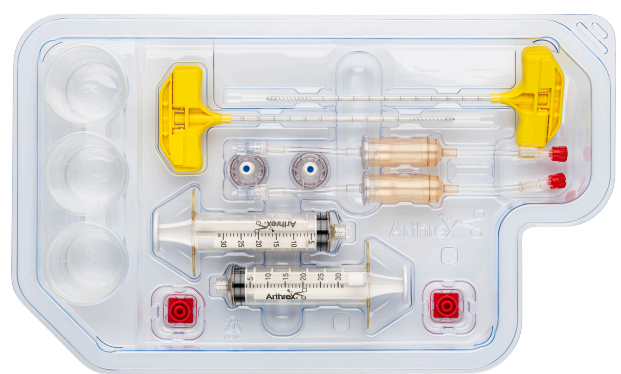
Vortex Threaded Recovery Needle Kits



Angel BMA Processing Kit with Vortex Threaded Recovery Needle, with ACD-A



Angel BMA Processing Kit With Vortex Threaded Recovery Needle



Arthrex Angel® cPRP and Bone Marrow Processing System

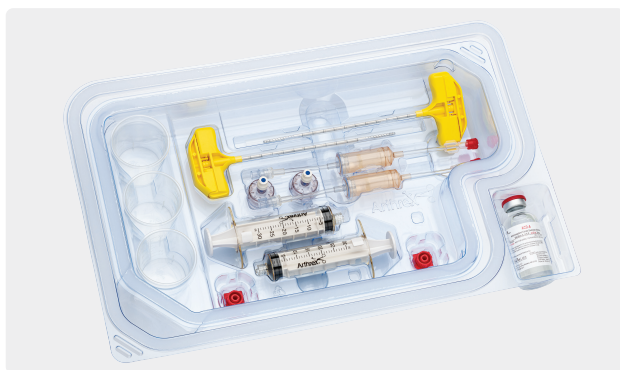
Product Features

Technology is what sets the Angel system apart from the competition. The Angel system uses a proprietary platelet sensor and 1-button automation to prepare customized PRP concentrate (cPRP) from BMA.

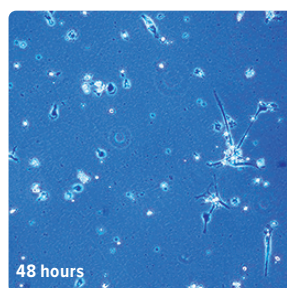
Bone marrow is a rich source of platelets, nucleated cells, and progenitor cells. The Angel device is the only option on the market to provide PRP concentrate from BMA with adjustable cellular levels. The PRP can be mixed with autograft or allograft bone prior to application to an orthopedic surgical site to improve handling characteristics.

Features and Benefits

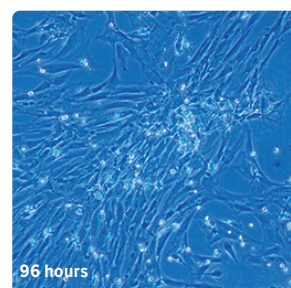
- › Proprietary platelet sensor system
- › Adjustable platelet concentrations
- › Adjustable white blood cell (WBC) concentrations
- › Flexible processing volume of 40-180 mL
- › Each processing kit can process, on the same patient, 3 cycles up to 180 mL
- › Programmable; can store up to 30 custom processing protocols
- › Closed system delivers PRP, platelet-poor plasma (PPP), and red blood cells (RBCs) into separate, sterile compartments



Angel BMA Processing Kit With Vortex Threaded Recovery Needle, with ACD-A

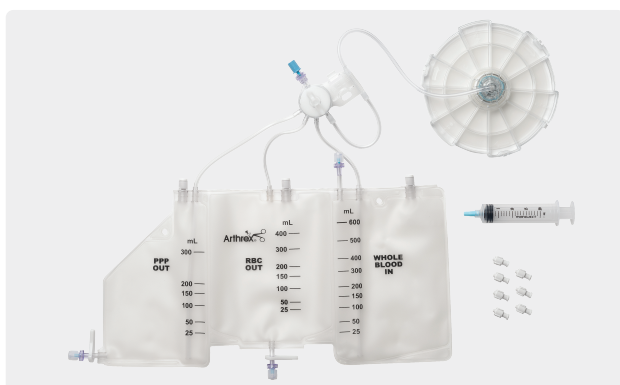


48 hours



96 hours

In vitro culture expansion of progenitor cells over 96 hours

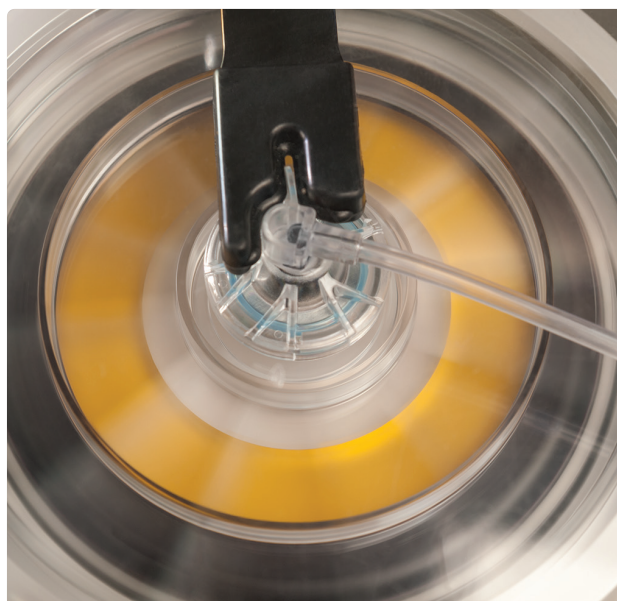


Angel® cPRP Processing System



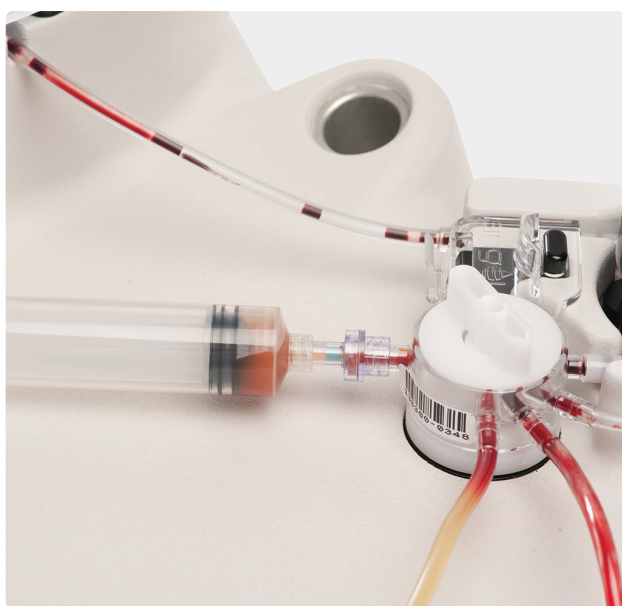
1

After the Angel system has been assembled and the operator has connected the heparin-flushed bone marrow filter to the “whole blood in” compartment, introduce the citrated BMA. The ratio of citrate anticoagulant to whole blood, BMA, or a mixture of both is 1:7.



2

The Angel system can process 40 to 180 mL of whole blood, BMA, or a mixture of both in a single cycle. The approximate spin time for a 40-mL sample is 15 minutes. The approximate spin time for a 180-mL sample is 26 minutes.



3

PRP collection is automated. No manual steps are required for preparation and there are no syringes to change, buffy coats to resuspend, or plasma to decant. The automated process is driven by the 3-sensor technology employed by the Angel system centrifuge.



4

The Angel system first collects PPP. Collection will stop when the 470 nm wavelength of light is absorbed by platelets. The Angel system will adjust the valve position to collect PRP until red blood cells are detected by the absorption of the 940 nm wavelength of light.

Angel® cPRP Processing System with Bone Grafting Solutions

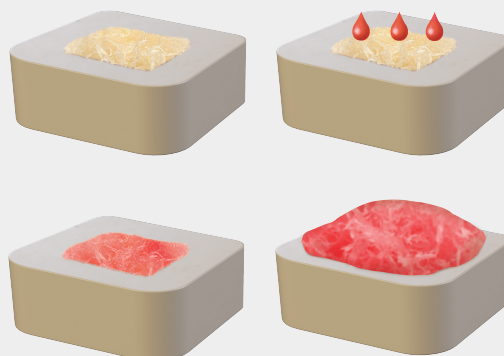
Allograft demineralized bone matrix (DBM) is optimal for combination with autologous, biologically active products. DBM putty, sponges, and cortical fibers provide a grafting material with excellent handling characteristics when hydrated with a fluid such as PRP concentrate from BMA. Hydrated DBM provides a scaffold that is rich in growth factors, natural architecture, and interconnected porosity.

The Angel cPRP and BMA processing kit is a convenient and rapid means of concentrating the cellular contents and growth factors contained in BMA.

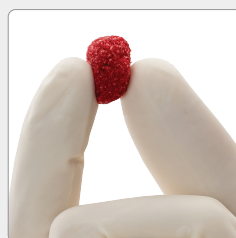
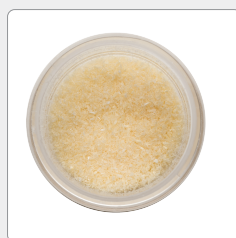
BoneSync™ Putty and Strips



AlloSync™ Expand Demineralized Cortical Fibers



AlloSync Pure DBM

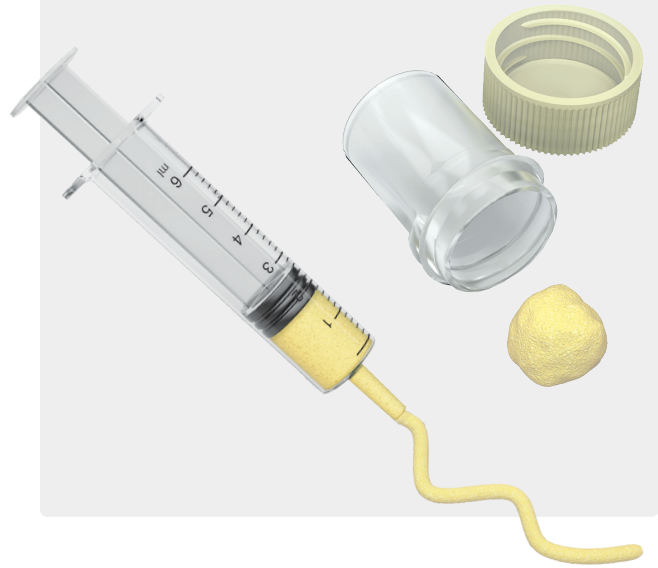


Additional Bone Repair Solutions

ArthroCell™ Cellular Bone Graft



AlloSync™ Putty, Gel, and Paste



Ordering Information

| | |
|---|--------------------|
| Vortex™ Threaded Recovery Needle | |
| Threaded BMA needle, 8 ga, closed tip | AR-1101TH-8CT |
| Threaded BMA needle, 8 ga, open tip | AR-1101TH-8OT |
| Threaded BMA needle, 13 ga, closed tip | AR-1101TH-13CT |
| Threaded BMA needle, 13 ga, open tip | AR-1101TH-13OT |
| Vortex Threaded Recovery Needle Kit | AR-1101THK-8 |
| <ul style="list-style-type: none"> > Vortex threaded recovery needle, 8 ga, open tip > Prep tray > Syringe | |
| Vortex Threaded Recovery Needle Kit | AR-1101THK-13 |
| <ul style="list-style-type: none"> > Vortex threaded recovery needle, 13 ga, open tip > Prep tray > Syringe | |
| Vortex needle power adapter | AR-1001-TH-PWR |
| DrillSaw Sports 400™ Power System | |
| Handpiece | AR-400 |
| Lithium-ion battery housing, for AR-400 | AR-400UBH-1 |
| Aseptic Transfer Kit, for AR-400 | AR-400ATK-1 |
| Battery pack, for AR-400, nonsterile | AR-400UB |
| Reamer attachment, Hudson style | AR-400RZH |
| Angel® System | |
| Angel BMA processing kit, 8 ga closed tip, w/o ACD-A | ABS-10062-TH8CT |
| Angel BMA processing kit, 8 ga open tip, w/o ACD-A | ABS-10062-TH8OT |
| Angel BMA processing kit, 13 ga closed tip, w/o ACD-A | ABS-10062-TH13CT |
| Angel BMA processing kit, 13 ga open tip, w/o ACD-A | ABS-10062-TH13OT |
| Angel BMA processing kit w/ Vortex threaded recovery needle, 8 ga closed tip, w/ ACD-A | ABS-10062K-TH8CTA |
| Angel BMA processing kit w/ Vortex threaded recovery needle, 8 ga open tip, w/ ACD-A | ABS-10062K-TH8OTA |
| Angel BMA processing kit w/ Vortex threaded recovery needle, 13 ga closed tip, w/ ACD-A | ABS-10062K-TH13CTA |
| Angel BMA processing kit w/ Vortex threaded recovery needle, 13 ga open tip, w/ ACD-A | ABS-10062K-TH13OTA |
| Angel system centrifuge | ABS-10060 |
| Angel system centrifuge, refurbished | ABS-1006OR |
| Arthrex biologics cart | ABS-10100 |

Products advertised in this brochure / surgical technique guide may not be available in all countries. For information on availability, please contact Arthrex Customer Service or your local Arthrex representative.

To order, please call Arthrex, Inc. at 800-933-7001. Contact your local Arthrex representative for additional information.

Reference

1. McLain RF, Boehm CA, Rufo-Smith C, Muschler GF. Transpedicular aspiration of osteoprogenitor cells from the vertebral body: progenitor cell concentrations affected by serial aspiration. *Spine J.* 2009;9(12):995-1002. doi:10.1016/j.spinee.2009.08.455
2. Majkrzak A, Johnston J, Kacey D, Zeller J. Variability of the lateral femoral cutaneous nerve: An anatomic basis for planning safe surgical approaches. *Clin Anat.* 2010;23(3):304-311. doi:10.1002/ca.20943

This description of technique is provided as an educational tool and clinical aid to assist properly licensed medical professionals in the usage of specific Arthrex products. As part of this professional usage, the medical professional must use their professional judgment in making any final determinations in product usage and technique. In doing so, the medical professional should rely on their own training and experience and should conduct a thorough review of pertinent medical literature and the product's directions for use. Postoperative management is patient-specific and dependent on the treating professional's assessment. Individual results will vary and not all patients will experience the same postoperative activity level or outcomes.



Arthrex manufacturer, authorized
representative, and importer
information (Arthrex eIFUs)



US patent
information