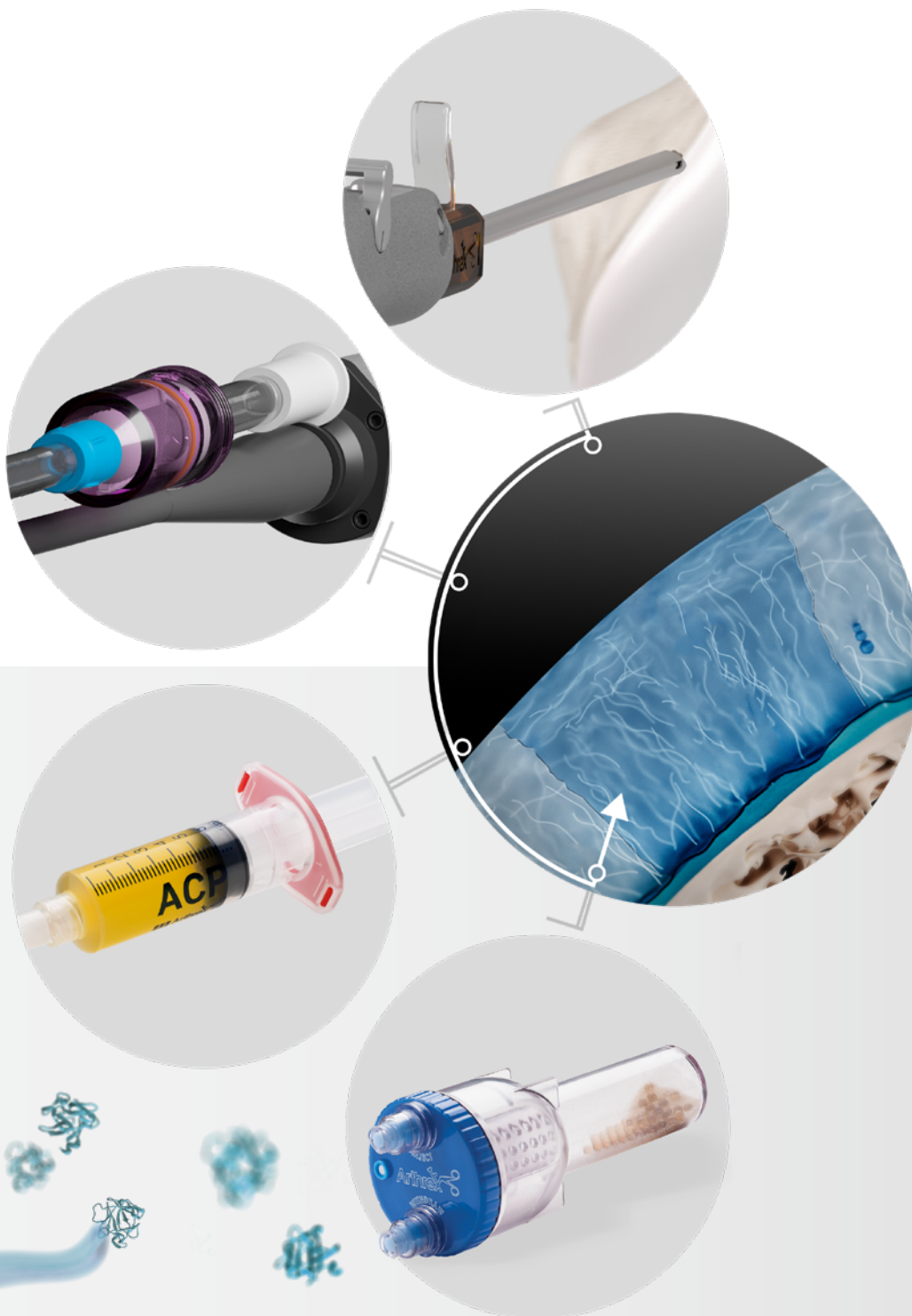


AutoCart™

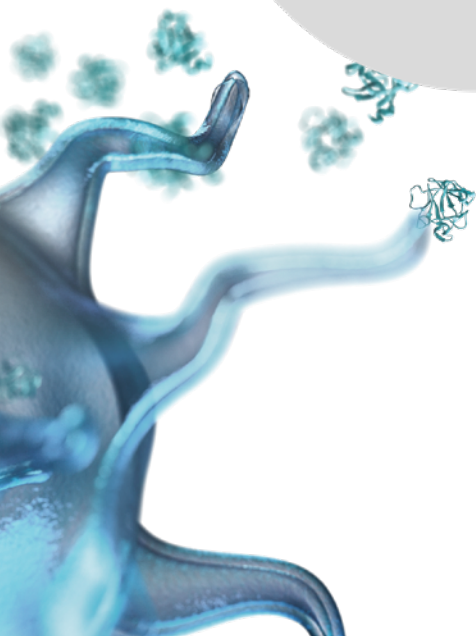
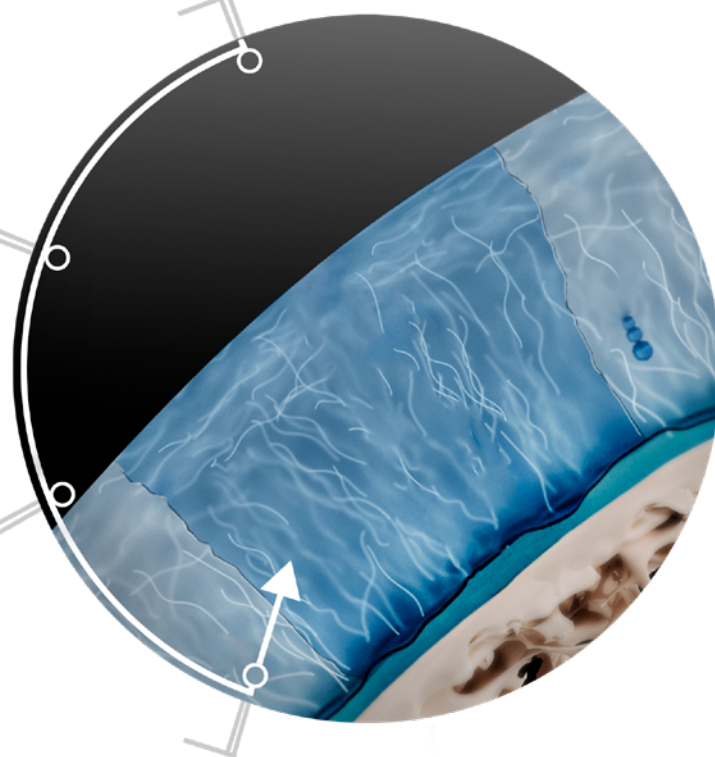
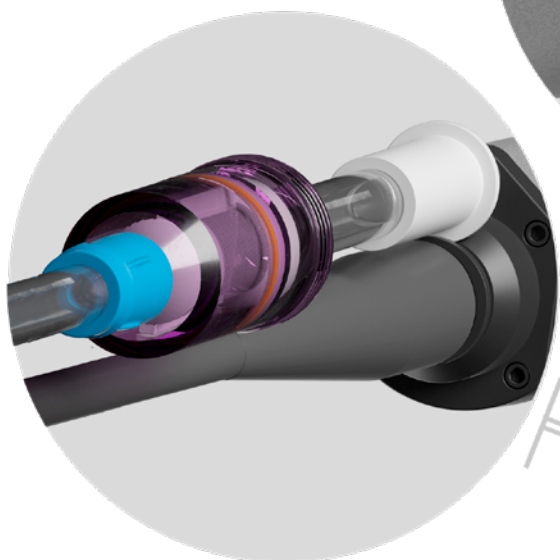
All Autologous Cartilage Regeneration



Arthrex®

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1983

As long ago as 1983, Albrecht et al.¹ were able to show that in an animal model, osteochondral lesions filled with chondral fragments and fastened with specially made fibrin, led to rapid proliferation of chondrocytes and, ultimately, to the development of hyaline cartilage.

2006

In other preclinical testing in 2006, Lu et al.² reported the formation of hyaline cartilage in full thickness lesions after introducing chondral fragments on a bioabsorbable carrier.

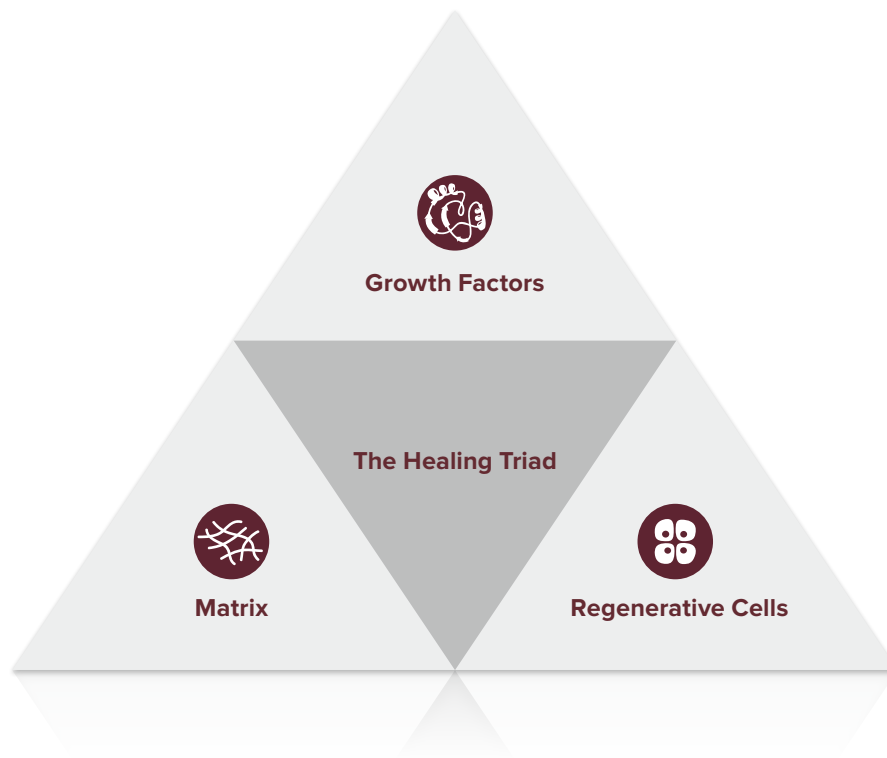
A publication by Stone et al.³ in 2006 described the successful treatment of 125 patients with grade IV cartilage damage, according to the Outerbridge classification, using an articular cartilage paste with the conclusion: “Paste grafting is a low-cost, 1-stage arthroscopic treatment for patients with Outerbridge classification grade IV arthritic chondral lesions. The procedure offers excellent, long-lasting pain relief, restored function, and potential tissue regeneration for patients with painful chondral lesions in both arthritic and traumatically injured knees.”

2015

In 2015, Christensen et al.⁴ reported successfully treating 8 patients with osteochondral lesions using a combination of autologous bone and cartilage fragments and concluded: “Treatment of OCD using autologous dual-tissue transplantation (ADTT) resulted in very good subchondral bone restoration and good cartilage repair. Significant improvements in patient-reported outcome was found 1 year postoperative. This study suggests ADTT as a promising, low-cost treatment option for osteochondral injuries.”

2019

In 2019, Massen et al.⁵ published a study describing the successful treatment of 27 patients with chondral and osteochondral lesions, with the conclusion: “Overall, the findings of this study demonstrated that patients undergoing a single-step autologous minced cartilage procedure had a satisfactory outcome at 2-year follow-up. As a result, the single-step autologous minced cartilage procedure does represent a possible alternative to standard autologous chondrocyte implantation.”



The Healing Triad

Successful tissue formation requires 3 main components: A scaffold, growth factors, and regenerative cells. These components form the so-called “healing triad.” A scaffold is needed to provide a structure for tissue growth. It assures mechanical integrity and provides a substrate for cell growth. Growth factors are bioactive signaling molecules. They induce differentiation, proliferation, and metabolic activity, and determine the phenotype of the cells. Regenerative cells, such as vital chondrocytes, also stimulate tissue regeneration.

In the case of cartilage regeneration, the Healing Triad describes the combined use of vital chondrocytes (regenerative cells), platelet-rich plasma (growth factors), extracellular chondral fragments, and an autologous thrombin solution (scaffolds).

Material Originating Only From the Patient

Starting with the techniques successfully carried out in the literature, the procedure was further developed, simplified, and standardized.¹⁻⁵

By using the products listed below, only material from the actual patient is used, so there is no need for a synthetic carrier.



Shaver Blades

Harvesting chondrocytes and autologous cartilage tissue



GraftNet™

Autologous cartilage tissue collector



AutoCart™
All autologous
cartilage
regeneration



Arthrex ACP® (Autologous Conditioned Plasma)

For the preparation of growth factors



Thrombinator™ System

For the preparation of autologous thrombin serum

Shaver Blades



Introduction

A 3 mm Sabre shaver blade or a 4 mm bone cutter shaver blade is used to harvest autologous chondral fragments. Cartilage is harvested either from the edge of the lesion or from a non-loadbearing area. Using these shaver blades produces fragments approximately 1 mm across, while maintaining good chondrocyte vitality.³

Arthroscopic Shaver Blades with Cartilage Fragments⁶



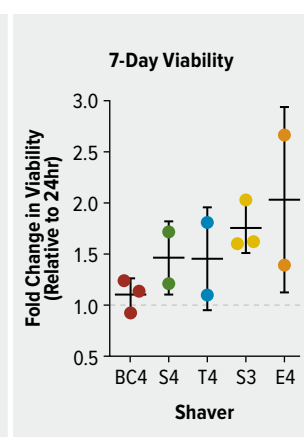
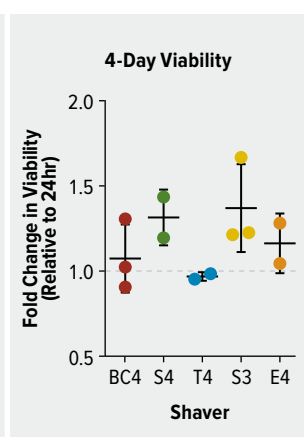
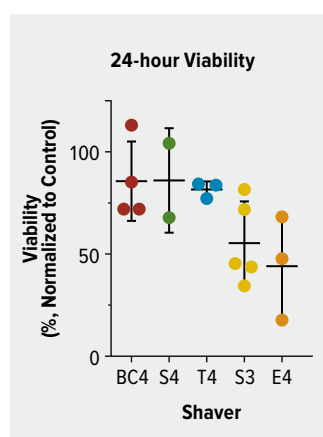
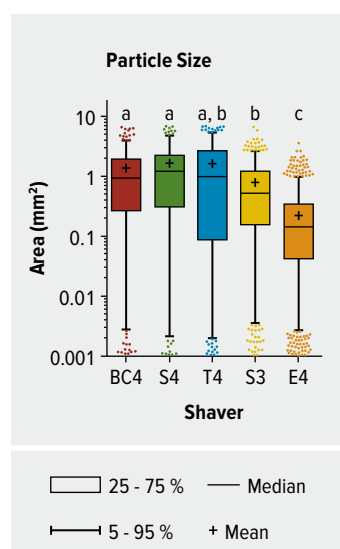
Bone cutter, 4 mm

Sabre, 4 mm

Torpedo, 4 mm

Sabre, 3 mm

Excalibur, 4 mm



Diagrams, Mean $\pm$ SD, n = 2 - 3:

Lifetime (24 hours, 4 and 7 days) of the chondrocytes in the cartilage particles harvested using the shaver blade.⁶

GraftNet™

Autologous Cartilage Tissue Collector



Introduction

The GraftNet system is connected to a suction device to collect autologous tissue for a variety of applications. The GraftNet tissue collector is mounted between the shaver handpiece and the tubing system. The autologous chondral fragments obtained are collected in an easily accessible, sterile filter chamber. The tissue collector is opened and the filter chamber is removed together with the chondral fragments.

Features and Benefits

- Universal adapters make for easy assembly
- Autologous bone or cartilage fragments can be harvested
- Quick access to the harvested tissue
- Control over the particle size when using a shaver blade system

Arthrex ACP® Double Syringe



Introduction

The Arthrex ACP double syringe is used for the preparation of platelet-rich plasma and the associated concentrated growth factors.

How It Works

Platelets are activated outside the bloodstream and release proliferative and morphogenic proteins. These proteins appear to work in synergy to produce the following positive effects:⁷⁻⁹

- Induce proliferation and differentiation of various cell types (such as progenitor cells, osteoblasts, and epidermal cells)
- Enhance / modulate production of collagen, proteoglycan, and tissue inhibitors of metalloproteinases (TIMP)
- Stimulate angiogenesis and chemotaxis

Features and Benefits of the Arthrex ACP® Double Syringe

- 2-in-1 – unique system for preparation of ACP
- ACP preparation and use takes just minutes using the Arthrex ACP double syringe
- The Arthrex ACP double syringe is a sealed, sterile system for use in the doctor's office and the operating room
- The system is simple, practical, and safe to use

Thrombinator™ System

An Autologous Thrombin Solution



Introduction

The Thrombinator system for use with the Arthrex ACP double syringe is designed to obtain an autologous thrombin solution directly at the point of care. Autologous thrombin solution improves handling and fixation by causing platelets to form a gel that serves as a binding agent for cartilage graft material.

The Thrombinator process uses the blood-clotting cascade mechanism to produce an autologous thrombin solution and avoids the use of aggressive chemical reagents such as ethanol. The design of the Thrombinator eliminates the need for prolonged incubation times and heating. An autologous thrombin solution can be produced from platelet-rich plasma at the point of care in as little as 10 minutes.

Features and Benefits

- Rapid preparation: 10 - 15 minutes
- Preparation from whole-blood (WB) platelet-rich plasma (PRP)
- Produces clotting in as little as 15 seconds
- Centrifugation not required
- Heating step not required

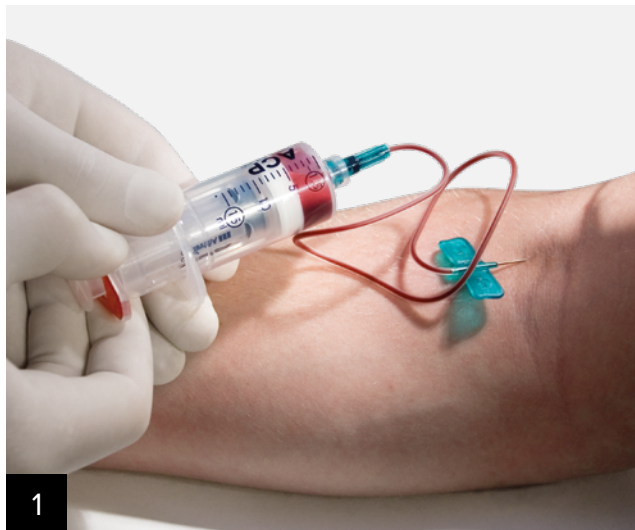
Indications

The Thrombinator system for use with the Arthrex double syringe is designed for the production of an autologous thrombin solution from whole-blood, platelet-rich plasma.

User Instructions

Preparation of ACP

Option Using Arthrex ACP® Double Syringe*



Draw 15 ml of venous blood using 3 Arthrex ACP double syringes. Then seal the double syringes using the red caps.



Centrifuge at 1 500 rpm for 5 minutes.



Carefully decant the ACP supernatant into the small syringe.



Unscrew the 3 small syringes from the large syringes and transfer the ACP obtained into a sterile container in the sterile area.

*See ACP instructions for more information

Preparation of Autologous Thrombin Solution



Pour 3 ml of ACP into the Thrombinator system via the port labeled “Inject.”



Mix for 5 seconds.



Lay down flat and wait 10 - 15 minutes.



Shake the system to break up the clot.



Pour 6 ml of ACP into the Thrombinator system via the port labeled “Inject.”



Place filter over port labeled “Withdraw” and shake the system for 5 seconds.



Lay down flat and wait 1 minute.



Shake the system to break up the clot.

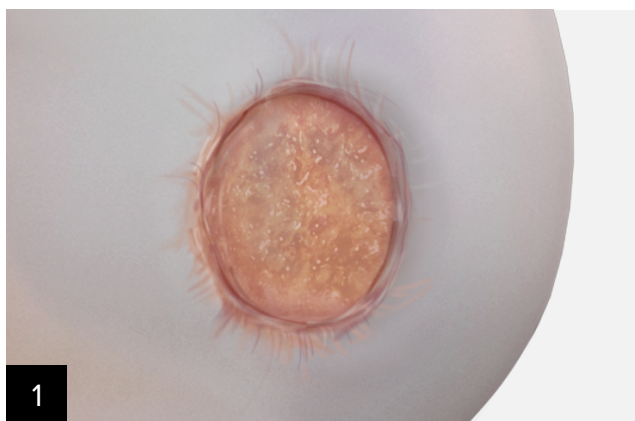


Turn upside down and withdraw autologous thrombin solution out through the filter over the port.

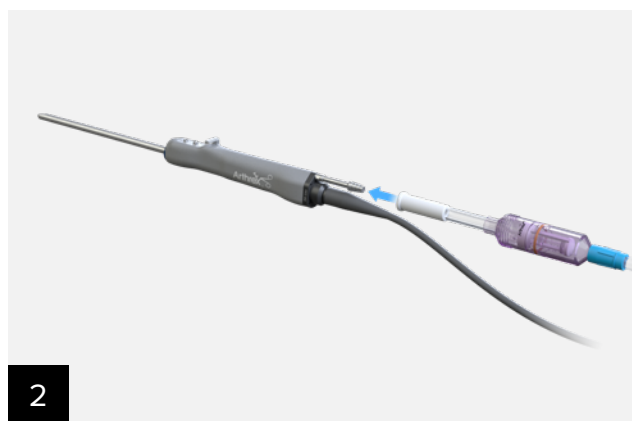


The thrombin solution is now ready for use.

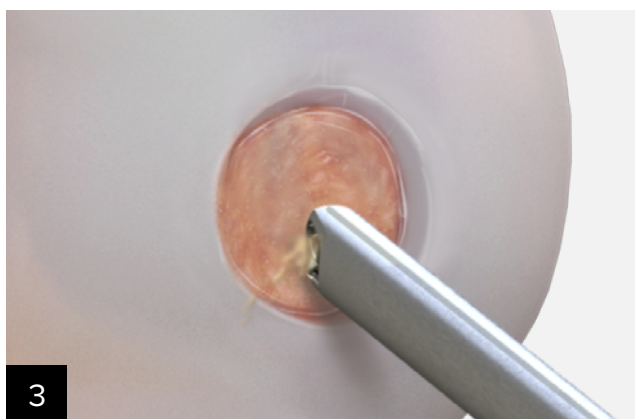
Cartilage Treatment



Debride and prepare the cartilage defect as appropriate. Take care to create steep edges.



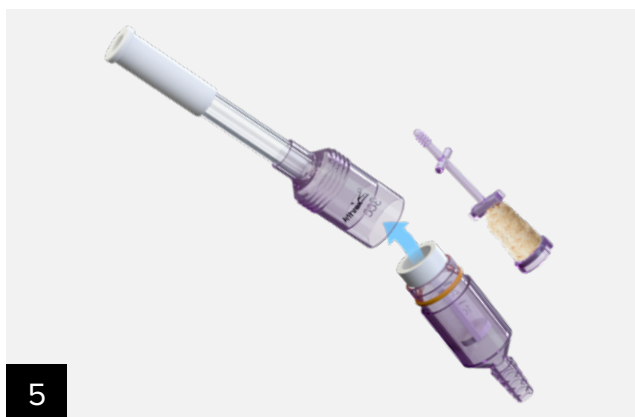
Mount the GraftNet tissue collector between the shaver handpiece and tubing system.



Option 1:
Harvest chondral fragments from around the lesion edges.



The harvested chondral fragments are collected in the tissue collector.



Separate the tissue collector from the handpiece and tubing system. Open the collector and carefully take out the filter chamber.

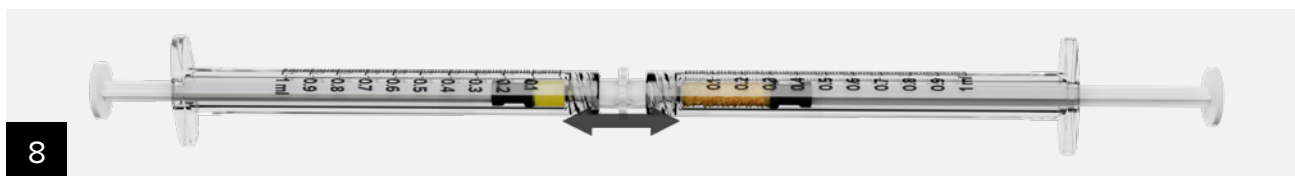


Transfer the harvested chondral fragments into a 1 ml syringe with Luer lock connection. Filling from behind is recommended.



7

Using the plunger, push the chondral fragments forward.



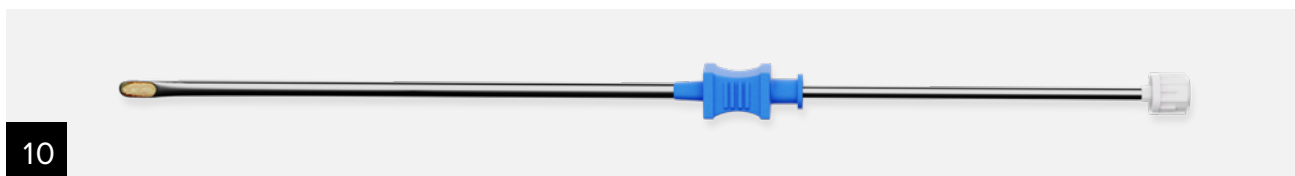
8

Mix the chondral fragments with ACP in the ratio 3:1 through a “female to female” adapter. By pushing back and forth several times, a uniform, pasty mass is created.



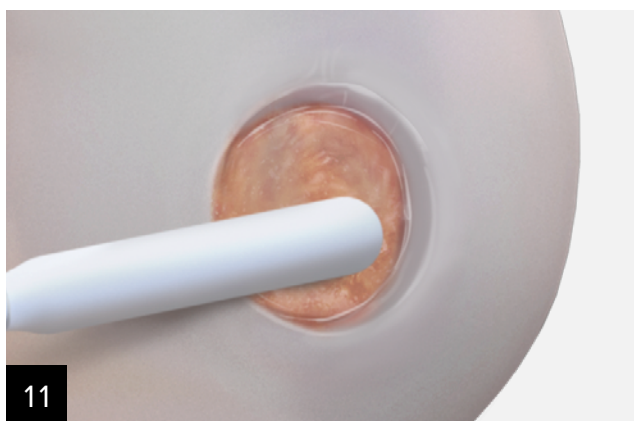
9

Connect the 1 ml syringe to the application cannula and transfer the fragments into the cannula.



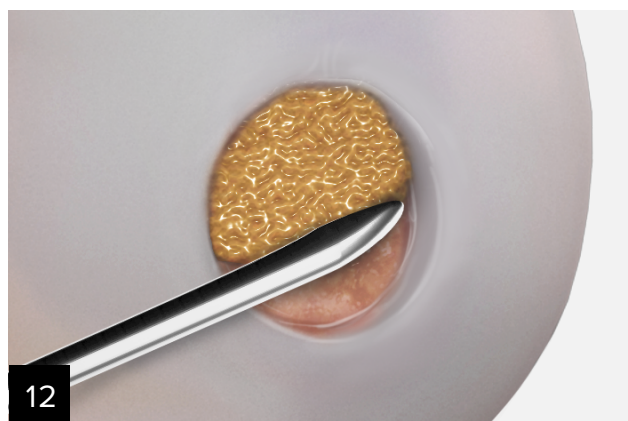
10

Then carefully push the fragments to the cannula tip using the trocar of the cannula, until they appear in the opening.



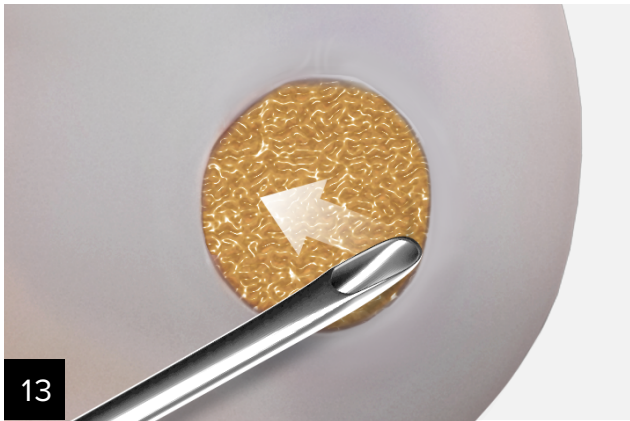
11

Drain the arthroscopic fluid from the knee and dry the lesion as much as possible.

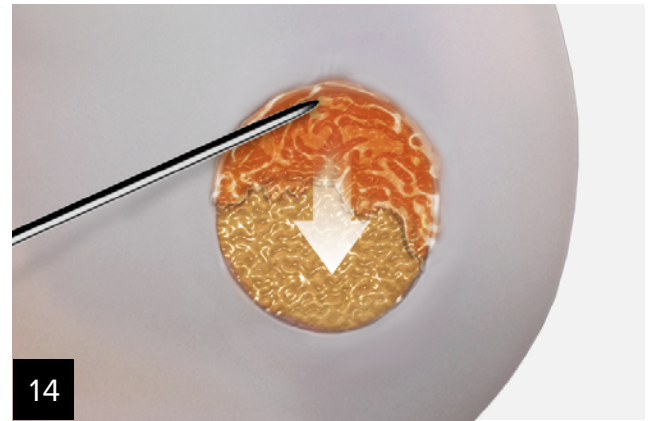


12

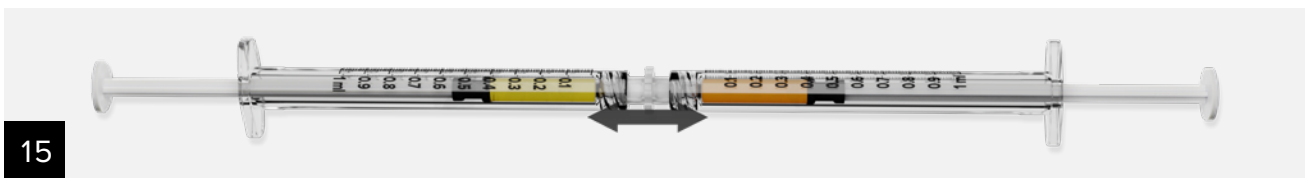
Carefully extend the trocar to apply the fragment mixture into the lesion.



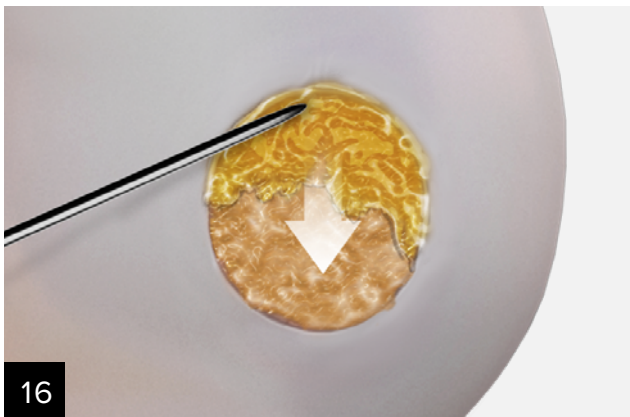
Use the back of the cannula to mold the mixture into the desired position and shape. Make sure that the fragment paste only reaches to about 80 - 90 % of the height of the lesion.



Then carefully cover the fragment paste with the prepared thrombin serum. Start from the top. The Thrombinator method relies on the blood clotting cascade mechanism. The combination of the fibrinogen contained in the paste and the thrombin applied creates a stable clot that holds the mixture in the lesion.



For the final seal, mix the PRP with thrombin in the ratio 1:1.

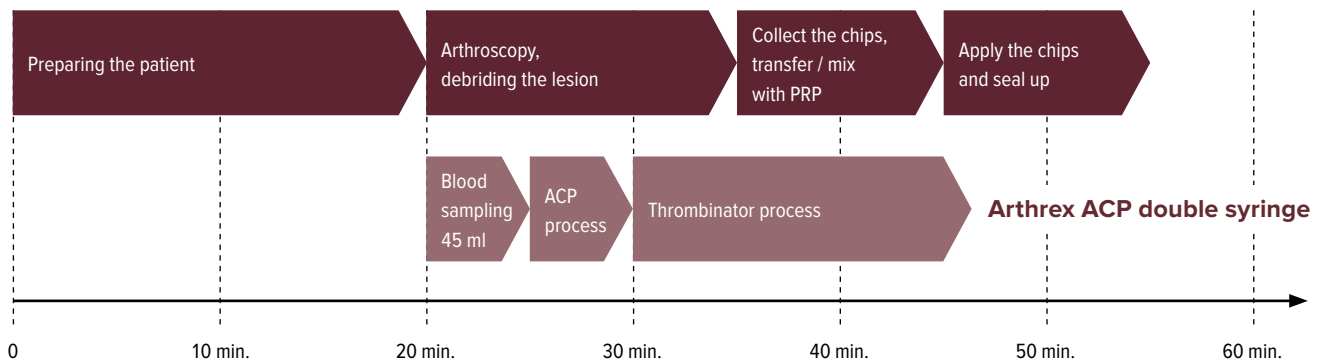


After mixing, apply the mixture quickly to the lesion from the top, drop by drop, as in step 14. Then wait for approximately 2 minutes.

Quick Guide to Procedure

This diagram shows the approximate chronological sequence of the individual procedural steps and shows information about when the blood has to be processed in parallel (depending on the system selected). The times are for guidance only and may vary.

Workflow



Ordering Information

Product Description	Item Number
Arthrex ACP® Double Syringe System	
Arthrex ACP® double syringe	ABS-10014
Arthrex ACP® kit, series I	ABS-10011
Drucker Centrifuge	
6-tube horizontal general purpose centrifuge (human use)	HORIZON 24-AH
Hettich Centrifuge	
Centrifuge, Hettich Rotofix 32 A, with swing out rotor, 220 V	1206-Art
Centrifuge, Hettich Rotofix 32 A, with swing out rotor, 110 V	1206-01-Art
Tubes, for Hettich Rotofix 32 A	1491
Screw cap, for Hettich tubes	1492
Counterweight, for centrifugation of Arthrex ACP® double syringe, 15 ml	ABS-10027
Thrombinator™ System	
Thrombinator™ system	ABS-10080
GraftNet™	
GraftNet™ autologous tissue collector	ABS-1050
Shaver Blades	
Sabre, shaver blade, 3 mm × 7 cm	AR-7300SR
Bone cutter, 3.8 mm × 13 cm	AR-8380BC
Accessories	
Tuohy insertion needle, curved, with obturator	ABS-1001

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

References

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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 and/or outcomes.

View U.S. patent information at www.arthrex.com/corporate/virtual-patent-marking

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