Nano Arthroscopy Knee Portals

Surgical Technique

Arthrex®

Introduction

Arthrex has been revolutionizing orthopedics since the beginning of arthroscopy. The NanoScope™ arthroscopic system takes the next leap in arthroscopy by providing surgeons with breakthrough visualization technology for multiple orthopedic applications.

The rod lens arthroscope has been the standard of care in the operating room for over 40 years. Arthrex's all-in-one, disposable, 1.9 mm "chip-on-tip" camera system now allows surgeons to miniaturize their treatment solutions, taking arthroscopy to the next level.

Along with the NanoScope camera, Arthrex has used its vast experience with surgical instruments to develop disposable Nano arthroscopy instrumentation for use in the operating room, procedure treatment rooms, and physician clinics. Opening up procedure rooms for orthopedic treatment will enable Arthrex to lead a paradigm shift in orthopedic innovation.

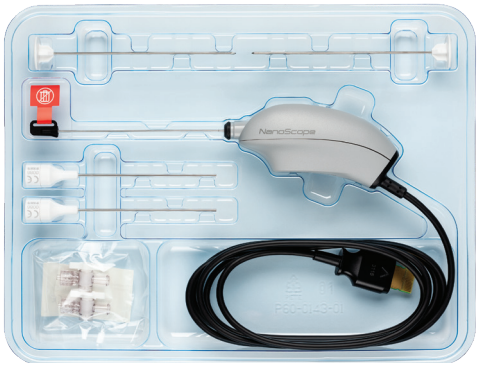
Knee Portal Equipment and Supplies

(Optional) Nano Arthroscopy Prep Kit

- (4) 30 cc syringes
- 10 cc syringe w/ 25 Ga needle
- 1 IV bag adapter
- 11 blade mini scalpel
- Disposable floor drape
- 2 sterile towels
- 1 elastic bandage

Disposable Camera Kit

- Disposable camera
- 2 inflow cannulas
- 1 sharp trocar
- 1 blunt trocar
- Fluid stopcocks



NanoScope™ Tablet Control Unit

- 13 in HD monitor
- Handpiece connector
- Microphone
- Ethernet, USB, and HDMI ports
- Wireless network capabilities

2.7 mm NanoCannula and Insertion Kit (Optional for Probe and Resection Instruments)

NanoCannula Insertion Recommendation

1. Insert calibrated 17 Ga spinal needle

2. Measure appropriate cannula length

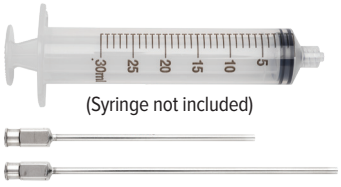
3. Insert 18 Ga guidewire through needle. Remove needle, keeping guidewire in place

4. Insert 2.7 mm cannula and obturator over the guidewire into joint space

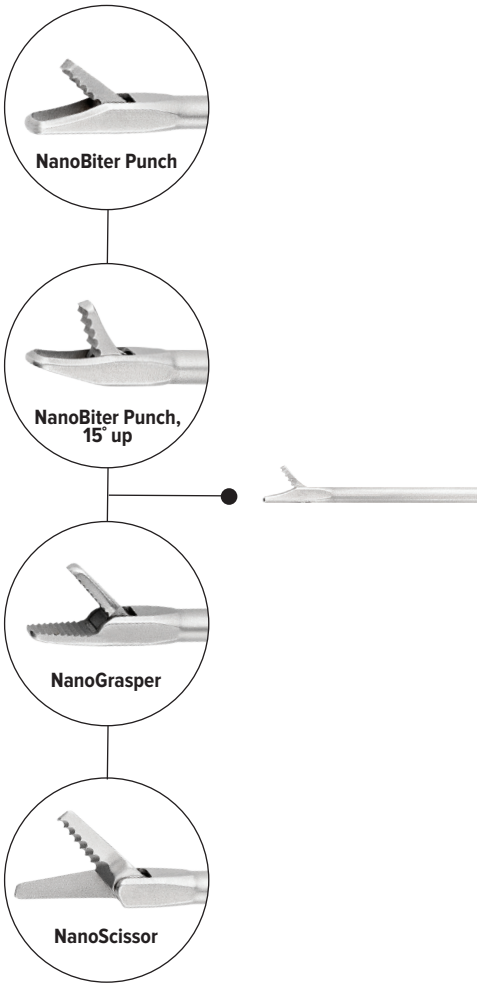
5. Remove guidewire and obturator, keeping cannula in place

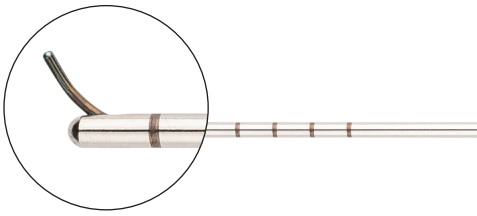
6. Add Tegaderm™* transparent film dressing adhesive for hands-free usage to prevent cannula fall out

**Tegaderm is a trademark of 3M Medical.*



(Syringe not included)



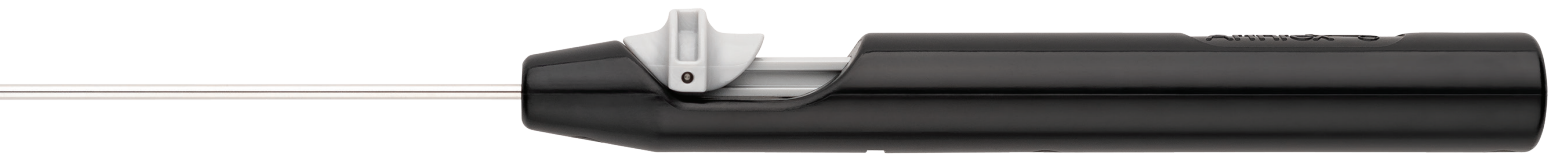


2 mm Knee, Single-Use Sterile Resection Instruments (Optional)

- NanoBiter punch
- NanoBiter punch, 15° up
- NanoGrasper
- NanoScissor
- NanoProbe
- Outflow cannula for tissue and fluid aspiration (optional)
- Short-acting local anesthetic (1% lidocaine), 50 cc to 100 cc

Small Joint NanoBiter Punch - 70 mm
(actual size)

Standard Length, Single-Use Nano Arthroscopy Instrument - 130 mm
(actual size)



Retractable NanoProbe (actual size)

Patient Positioning

Start

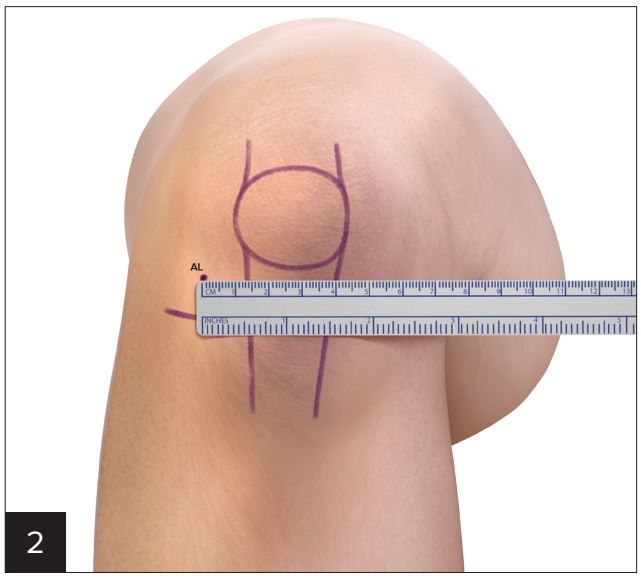
Prepare the procedure room for Nano arthroscopy of the knee. Place the patient in a supine position with lumbar support beneath the back and a bump under the legs. If the patient is awake, personal comfort is essential for successful execution of the procedure. Position an assistant in front of the patient toward the affected side.

Establish Initial Viewing Portal

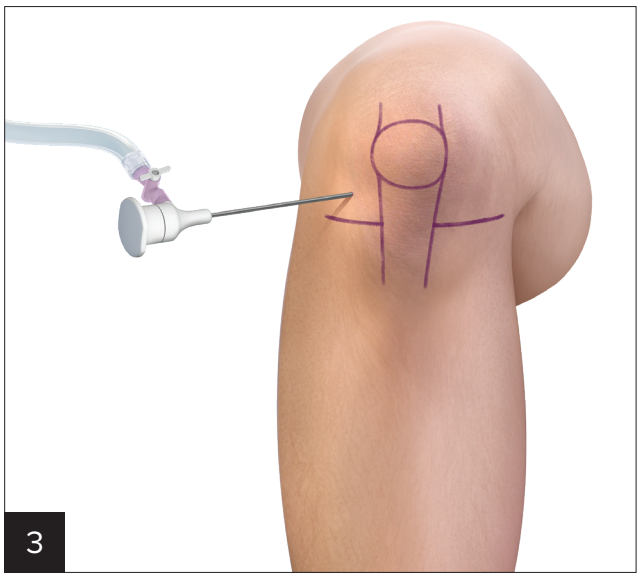
Sterilize the knee region and portal sites with a chlorhexidine sponge. Using a 10 mL syringe with a 25 Ga needle, infiltrate desired anesthesia to the posterior to the portal site and surrounding capsule to anesthetize the area.

After waiting 5 to 10 minutes for adequate local anesthesia, inject further anesthesia, 20 cc of 0.25% bupivacaine into the joint for pre-insufflation. Once cutaneous anesthesia has been achieved, the Nano arthroscopy procedure may begin.

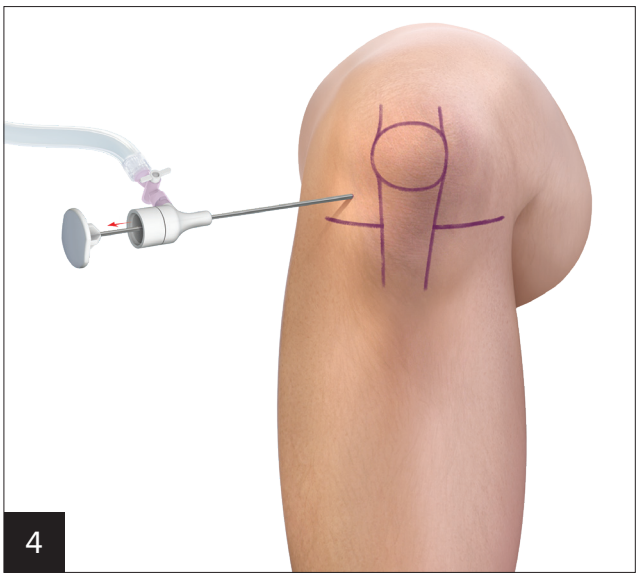
Mark the skin, identifying the surface landmarks of the patella, patella tendon, and superior margin of both the medial and lateral joint lines with the knee at 90˚ of flexion.



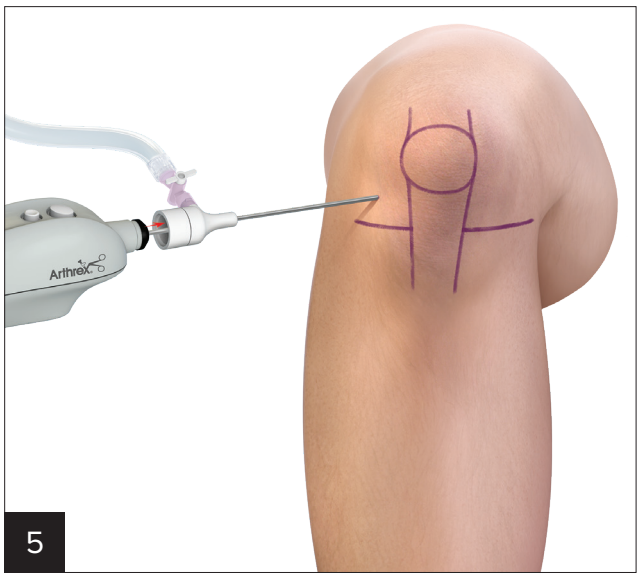
For the initial diagnostic viewing portal, insert the NanoScope™ camera system into the knee joint at a point located 1 cm to 1.5 cm lateral to the patella tendon just above the superior margin of the tibial plateau joint line. This becomes the viewing anterolateral (AL) portal.



Insert the NanoCannula and trocar into the knee joint through the AL portal toward the intercondylar notch. The NanoScope™ camera has a 0˚ viewing angle but a 120˚ field of view.



Once the joint is entered, remove the trocar to allow visualization with the NanoScope camera. Saline can be injected into the joint with the 30 mL saline syringe to distend the joint space and remove obstructing tissue blocking the NanoScope camera.

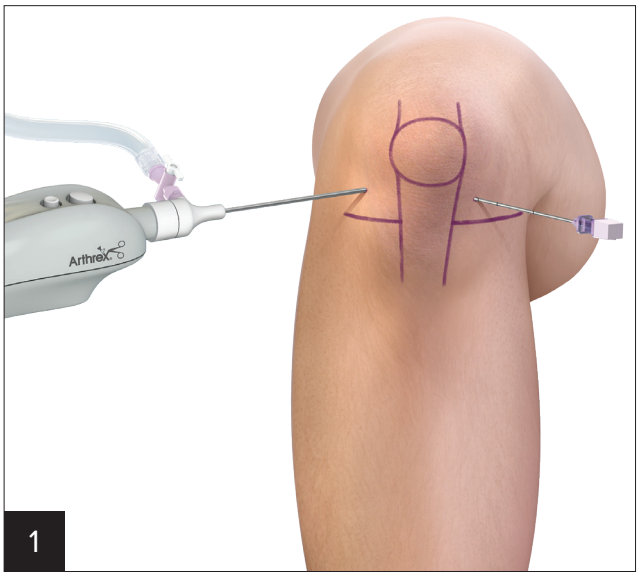


Saline can be readministered as needed throughout the case. (In a procedure room or OR setting, there can be additional fluid management options using a gravity, DualWave™, or Continuous Wave™ 4 pump system.)

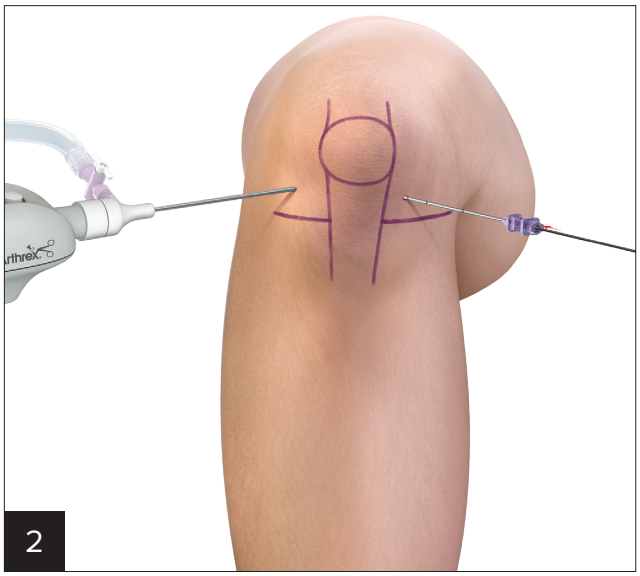
After insertion of the NanoScope camera, a standard diagnostic arthroscopy is performed.

Place valgus force on the knee to open the medial compartment and visualize the entire medial meniscus.

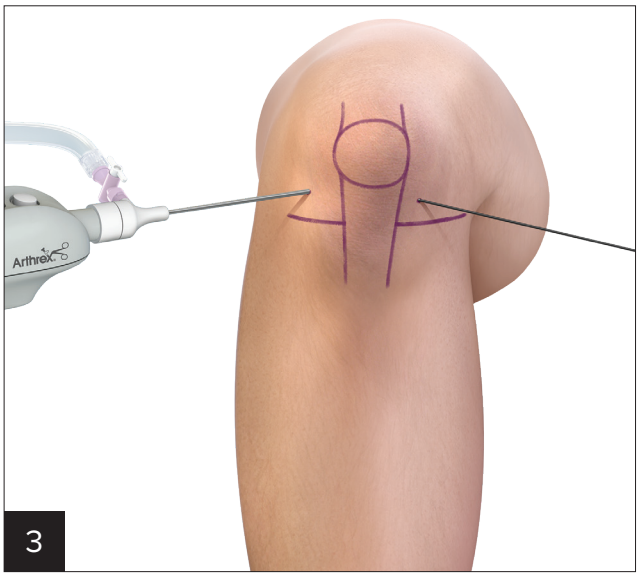
Establishing Accessory Portals With the 2.7 mm NanoCannula and Insertion Kit



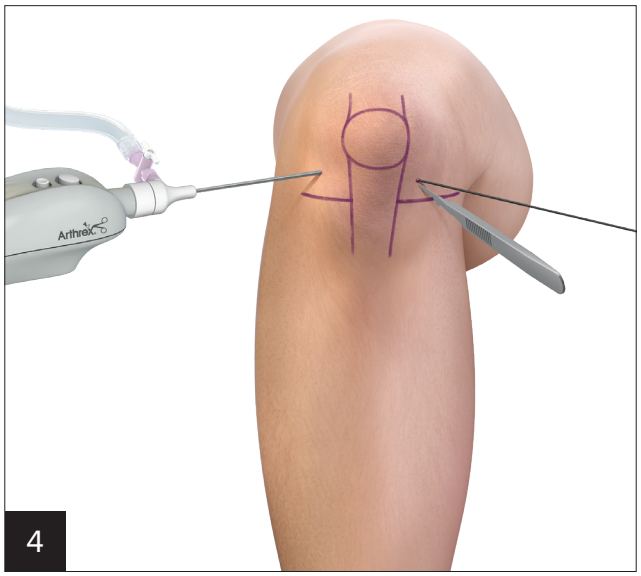
Additional working portals can be made to perform procedures using the technique above and working from a direction normal (perpendicular) to the pathology. Percutaneous working portals can be made anywhere on the anterior, medial (except for saphenous nerve and vein), and lateral aspects of the knee.



Initially, a portal should be created using the NanoScope™ disposable system. Use a syringe from the prep kit to introduce fluid into the arthroscopic environment to directly visualize insertion of the NanoCannula using the percutaneous insertion kit.



The percutaneous insertion kit contains a spinal needle and a Nitinol guidewire. Insert the spinal needle through the skin to pinpoint an arthroscopy portal in the knee joint space. Use the depth markings on the spinal needle to determine the appropriate cannula length (the depth laser line markings are measured off the surface of the skin and correspond to the available cannula lengths). Remove the stylet from the needle and insert the Nitinol guidewire through the spinal needle. Remove the spinal needle, leaving the guidewire in the joint. Before inserting the NanoCannula, make a small skin incision at the base of the guidewire.



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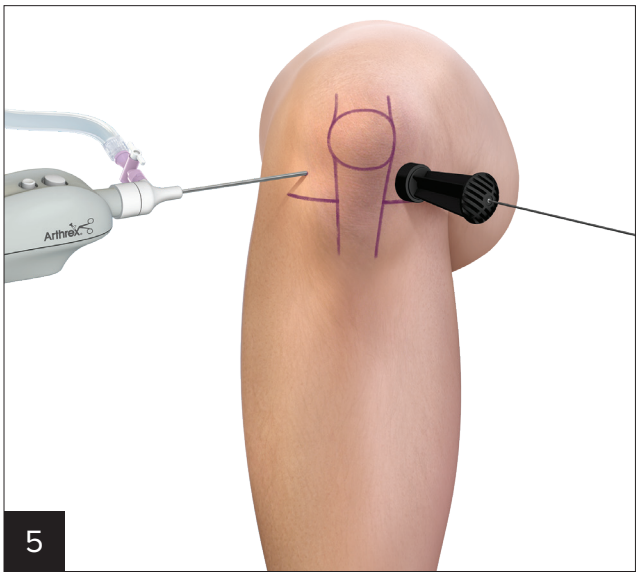
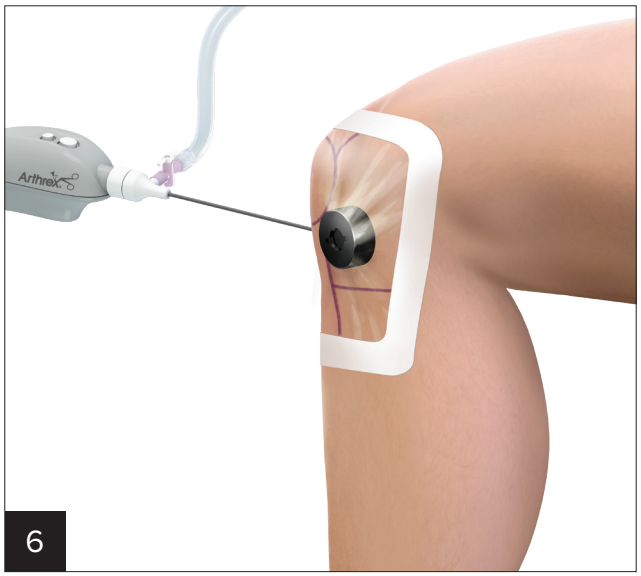
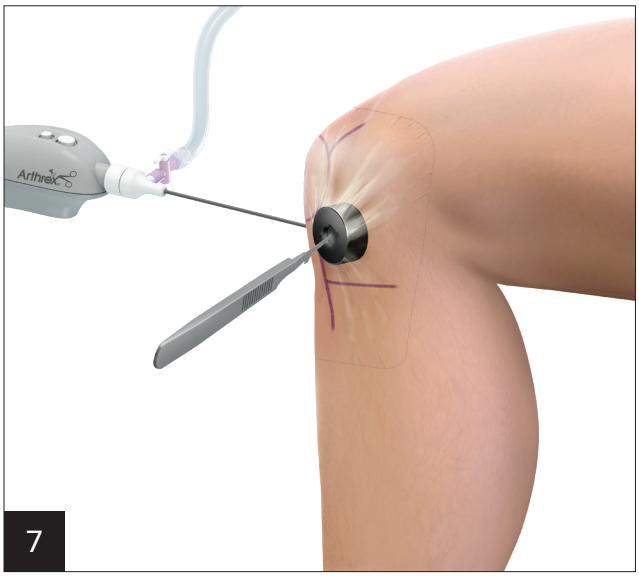


The NanoCannula comes with a cannulated obturator and an adhesive. Insert the obturator through the cannula, and then pass the obturator over the Nitinol guidewire from the percutaneous kit.

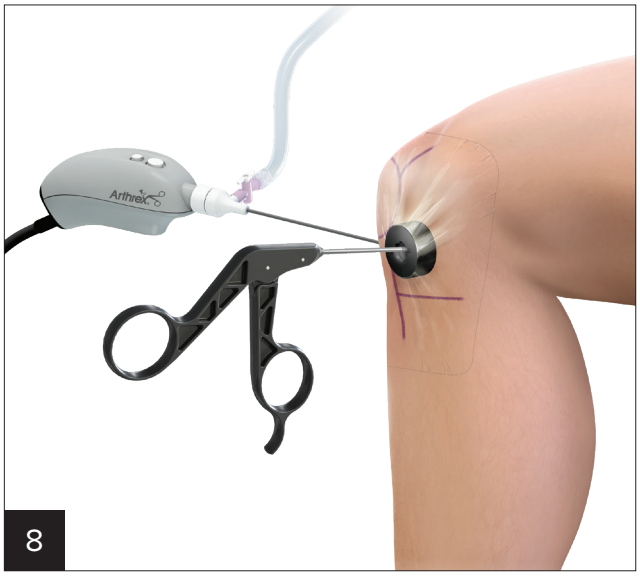


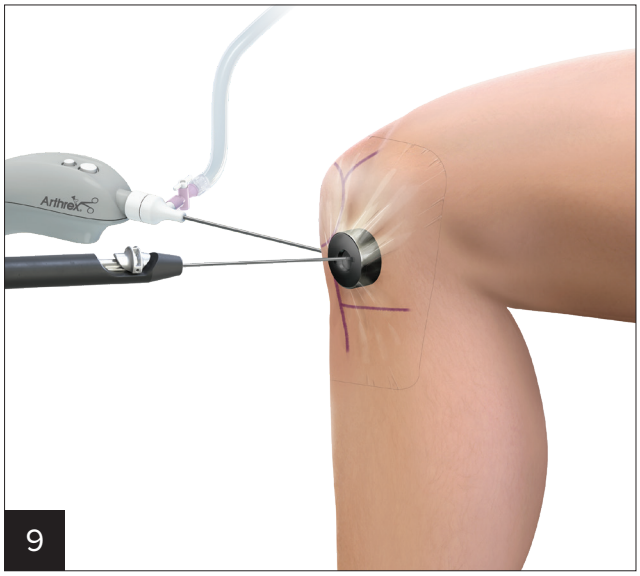
Insert the NanoCannula into the joint space until the cannula head is flush to skin. Remove the obturator and guidewire, leaving the cannula in the body.



The adhesive included with the cannula is optional and aids in holding the cannula in place. If it is used, apply the adhesive over the top of the cannula and onto the surrounding dry skin. If the surrounding skin is wet, dry the area with a towel. **(Note: Make a small incision in the adhesive prior to inserting any instrumentation.)**

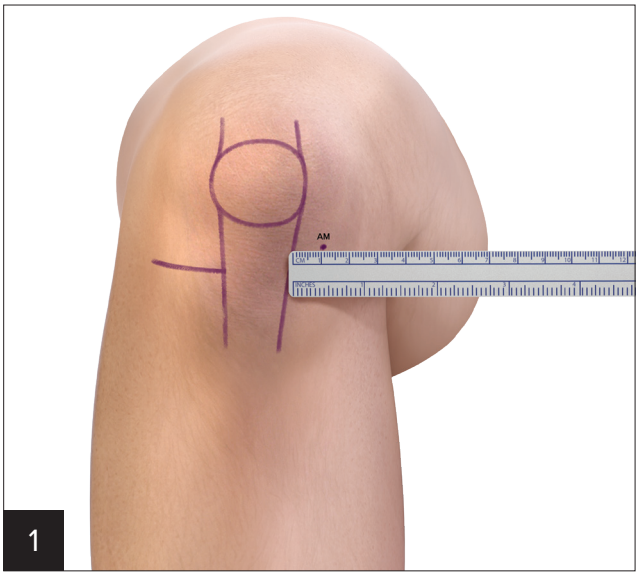
Establishing Medial Portal With the 2.7 mm NanoCannula and Insertion Kit



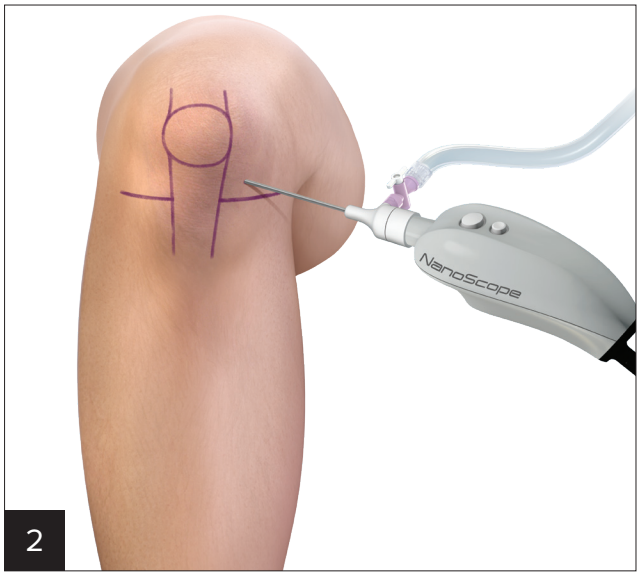


Once the working NanoCannula is established, you can easily insert the Nano instrumentation and shaver through the cannula for arthroscopic treatment.

Alternative AM Portal Creation

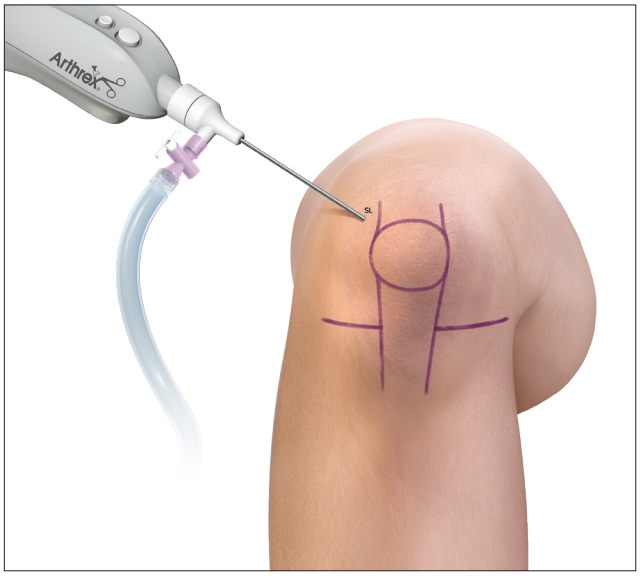


An anteromedial portal can be created just above the joint line and 1.0 cm to 1.5 cm medial to the patella tendon.

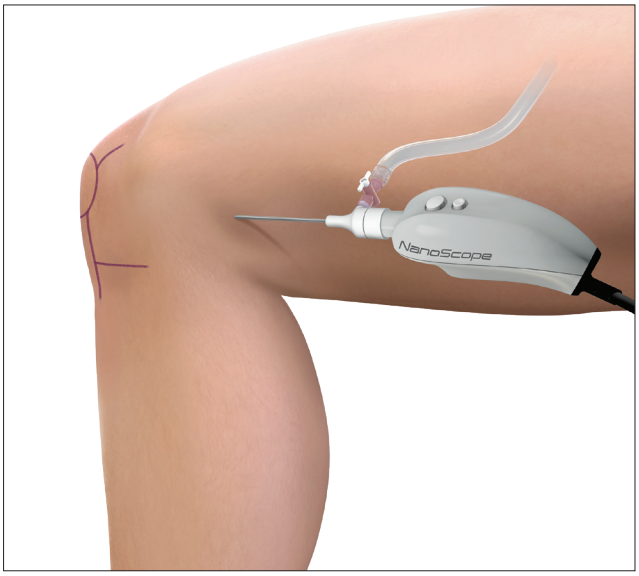


Further portals can be established as needed on a case-by-case basis under direct visualization of the AM portal.

Accessory Operative Portals



A superolateral portal can be created superior and lateral to the quadriceps tendon insertion to assess the patellofemoral joint.



A posteromedial portal can be created posterior and superior to the posterior horn of the meniscus for viewing posterior knee structures.

Post Procedure

After all of the structures have been thoroughly examined, place an empty 30 mL syringe into the inflow port of the handheld device to aspirate the saline that was injected into the joint during the procedure to aid with distention and visualization. More or less saline can be used throughout the procedure as needed, but it is important to aspirate as much saline as possible out of the joint prior to removal of the device to limit postoperative pain. Next, remove the NanoScope™ camera from the joint and cover the needle site with a compressive dressing followed by a normal adhesive bandage or JumpStart® bandage.

The patient can immediately range the knee as tolerated. Pain and swelling may be managed at the physician's discretion.

- Clean the area around each viewing and working portal, removing all blood and fluids from the skin
- Apply a bandage (or JumpStart single-layer dressing) over the properly cleaned portals

NanoScope™ Operative Arthroscopy System

Ordering Information

Imaging System

NanoScope Tablet Control Unit	13 in HD Medical-Grade Imaging Console	AR-**3200-0030**
NanoScope Camera Head and Cable Kit, single-use	1 Camera, sterile packaged	AR-**3210-0040**
NanoScope High Flow Operative Sheath Kit	Disposable kit	**AR-3210-0041**

Mobile Carts

Synergy MSK™ Ultrasound Cart	Mobile Cart	AR-**3502-CRT**
NanoScope Console Mount	MSK Cart NanoScope Conversion Kit	ATX-2601
NanoScope Console Mount for AR-6481 Cart	Conversion Kit	5010-1500
DualWave™ Pump Cart	Mobile Cart	AR-**6481**

Nano Arthroscopy 2 mm Instrumentation (130 mm Shaft Length)

NanoBiter, straight	Disposable, sterile packaged, single pack	AR-**10911D-1**
NanoBiter, 15° up	Disposable, sterile packaged, single pack	AR-**10922D-1**
NanoGrasper, straight	Disposable, sterile packaged, single pack	AR-**10913D-1**
NanoScissor, straight	Disposable, sterile packaged, single pack	AR-**10915D-1**
NanoProbe	Disposable, sterile packaged, single pack	AR-**10100N**

Nano Arthroscopy 2 mm Instrumentation (70 mm Shaft Length)

NanoBiter, straight	Disposable, sterile packaged, single pack	AR-**10911D-1**
NanoBiter, 15° up	Disposable, sterile packaged, single pack	AR-**10902D-1**
NanoGrasper, straight	Disposable, sterile packaged, single pack	AR-**10903D-1**
NanoScissor, straight	Disposable, sterile packaged, single pack	AR-**10905D-1**
Small Joint Probe	Reusable, single pack	AR-**30000**

Patient Prep Kit

NanoScope Arthroscopy Prep Kit	Disposable, sterile packaged	74312-01M

Tissue and Fluid Outflow Cannula

Outflow Cannula, Nano arthroscopy	Disposable, sterile packaged	AR-**109OS-10**
Outflow Cannula, Nano arthroscopy	Disposable, sterile packaged	AR-**109OS-70**

Fluid Management Tube Set Options

Gravity Tube Set	Disposable, sterile packaged	AR-**6412**
Extension Tube Set	Disposable, sterile packaged	AR-**6220**

NanoScope™ Operative Arthroscopy System

Ordering Information (Cont)

Nano Arthroscopy 2.7 mm Diameter NanoCannula and Insertion Kits		
2.7 mm Cannula and Cannulated Obturator, 1.5 cm length	Disposable, sterile packaged, single pack	AR-**1090C-15-1**
2.7 mm Cannula and Cannulated Obturator, 3 cm length	Disposable, sterile packaged, single pack	AR-**1090C-30-1**
2.7 mm Cannula and Cannulated Obturator, 4 cm length	Disposable, sterile packaged, single pack	AR-**1090C-40-1**
2.7 mm Cannula and Cannulated Obturator, 5 cm length	Disposable, sterile packaged, single pack	AR-**1090C-50-1**
2.7 mm Cannula and Cannulated Obturator, 7 cm length	Disposable, sterile packaged, single pack	AR-**1090C-70-1**
Nano Arthroscopy Percutaneous Insertion Kit	Disposable, sterile packaged, single pack	AR-**1090PK-1**


NanoScope
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