# VirtaMed ArthroS™

## Module descriptions – Fast 1.6, Knee 1.6, Shoulder 1.6, Hip 1.2, Ankle 1.0

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Version 2004

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# ArthroS™ FAST

Fundamentals of Arthroscopic Surgery Training

## Module description

Motor skill training tasks on the FAST workstation guide the trainee through the first steps of arthroscopy. Basic camera navigation tasks include steadiness and image centering, horizon control and telescoping as well as the use of different optics - using both left and right hand for camera handling as well as frontal and posterior access to the FAST shell. This very basic arthroscopy skills training also teaches periscoping. Trainees learn how to detect and center an object, probe and grasp static objects, and develop triangulation skills.

## FAST – Fundamentals of Arthroscopic Surgery Training

The major American Orthopedic associations ABOS (American Board of Orthopedic Surgery), AAOS (American Academy of Orthopedic Surgeons) and AANA (Arthroscopy Association of North America) implemented a mandate in 2013 to further improve and standardize surgical education in the field of arthroscopy. They created a program called FAST (Fundamentals of Arthroscopic Surgery Training) which VirtaMed has now incorporated into the ArthroS™ surgical training simulator.

This virtual reality module is based on the Sawbones FAST workstation, which was developed with specifications and refinements from a team led by Robert Pedowitz, MD, PhD. The fusion of the Sawbones FAST dome with our virtual reality simulator offers exciting new training opportunities: surgeons can now practice the basic skills needed before they perform complex knee or shoulder arthroscopies.

## Learning objectives

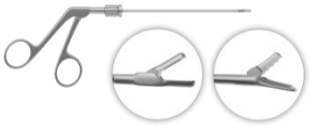
- Control camera movements and to center an image
- Control image orientation (i.e. Camera horizon)
- Perform basic triangulation
- Acquire steadiness of the camera and arthroscope
- Minimize unnecessary movements of the scope
- Develop of ambidextrous motor skills
- Practice deliberate linear scope movements
- Track a moving target with the scope
- Correctly periscope, i.e. Properly use the angled optics
- Find and grasp stationary targets
- Plan and perform deliberate object manipulation

# Instruments

Arthroscope



Probe



Grasper/Punch

# Contributors

We would like to acknowledge the following experts who greatly contributed and helped to create the ArthroS™ FAST module:

We would like to extend a special thank you to the Arthroscopy Association of North America (AANA), specifically Dr. Joe Tauro (Chairman of the Orthopedic Learning Center of AANA), and Dr. Gregg Nicandri (University of Rochester Medical Center), Robert Pedowitz, MD, PhD, Assistant. Professor Jacqueline Brady (Oregon Health and Science University).

# Courses

**FAST Program Basic Camera Navigation Course**

The objective of this training course is to develop the basic ambidextrous motor skills that are prerequisites for training and clinical performance of arthroscopic surgical procedures. In this course, the learner will be guided through relevant motor skill elements in a logical sequence to achieve ambidextrous technical proficiency with the camera and arthroscope.

**FAST Program Basic Triangulation Course**

The objective of this training course in to develop the basic ambidextrous motor skills that are prerequisites for training and clinical performance of arthroscopic surgical procedures. In this course, the learner will be guided through relevant motor skill elements in a logical sequence to achieve ambidextrous technical proficiency with basic arthroscopic hand instruments.

**AANA FAST Training Course 1 – Basic and Combined Tasks**

In this course, participants will learn how to handle arthroscopic instruments. They will familiarize themselves with basic elements of arthroscopy and learn how to combine them.

**AANA FAST Training Course 2 – Probing and Grasping Tasks**

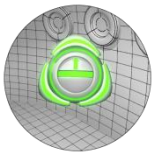
In this course, participants will learn how to handle arthroscopic instruments. They will practice upon the skills learned in the AANA FAST Training Course 1 and add probing and grasping skills.

# Didactic module

## General concepts of arthroscopy

- Equipment overview
- Imaging principles
- Clinical issues

# Training cases



## Horizon control

- Ten VirtaTeds
- Control the horizon of the camera for three seconds on each VirtaTed

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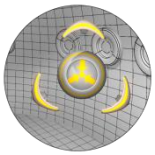

## Image centering

- Ten VirtaTeds
- Visualize each VirtaTed for three seconds

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## Telescoping

- Ten VirtaTeds with different perspective depths
- Visualize each VirtaTed for three seconds

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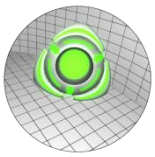

## Periscoping

- Ten VirtaTeds
- Visualize each VirtaTed for three seconds using the angled optics

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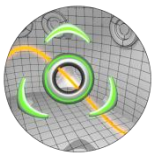

## Trace the lines

- Eight VirtaTeds moving along lines
- Center each VirtaTed and follow them along the lines

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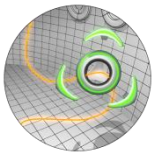

## Trace the curve

- One VirtaTed, two laps
- Center the VirtaTed and follow it along the path

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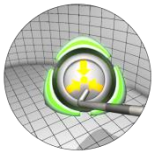

## Image centering and periscoping

- Ten VirtaTeds
- Visualize each VirtaTed for three seconds, while touching its center with the probe

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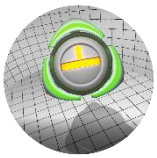

## Image centering and periscoping 2

- Ten VirtaTeds
- Visualize each VirtaTed for three seconds, while touching its center with the probe

## Probing: wide field of view

- Ten VirtaTeds
- Visualize each VirtaTed for three seconds, while touching its center with the probe

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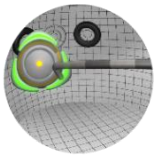

## Probing: close-up view

- Ten VirtaTeds
- Visualize each VirtaTed for three seconds, while touching its center with the probe

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## Probing: approach out of view

- Ten VirtaTeds
- Visualize each VirtaTed for three seconds, while touching its center with the probe

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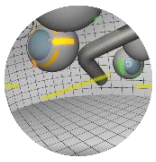

## Number probing: easy

- Eight VirtaTeds
- Visualize the numbers, in order, while touching each VirtaTed for three seconds with the probe

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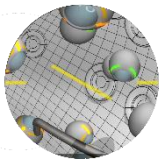

## Number probing: difficult

- Ten VirtaTeds
- Visualize the numbers, in order, while touching each VirtaTed for three seconds with the probe

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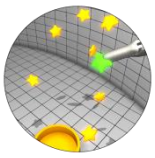

## Collect the stars

- Ten stars
- Grasp the stars and let them fall into the dish

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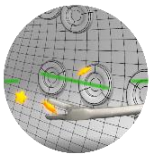

## Remove the stars

- Ten stars
- Grasp the stars and remove them from the FAST shell

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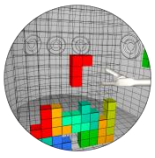


## Stack the blocks

- Align all the objects of different sizes and colors in the grid
- Maximum points: 40

# ArthroS™ Knee

Basic skills, diagnostic, and therapeutic cases for knee arthroscopy

## Module description

The module presents basic skills, diagnostic and surgical cases for knee arthroscopy, as well as didactic teaching slides. Nine guided basic skill training cases are fully integrated into a highly realistic simulation. Mastering these basic tasks enables trainees to perform a complete arthroscopy more easily and in an efficient, professional way. Numerous patient cases with varying levels of difficulty offer the trainee the chance to perform complete diagnostic arthroscopic interventions. Patients include different meniscus lesions, unhappy triad and arthrosis grades I, III, and IV. Multiple patients with various lesions in different locations provide training for the first steps in operative arthroscopy using the original operating equipment from the OR. Pathologies include different meniscus lesions, synovial membrane inflammations and loose body removal.

## Learning objectives

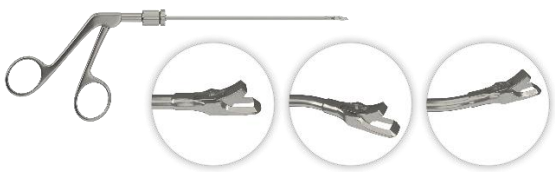
- Navigate the camera in the knee joint
- Manipulate the knee joint to optimally visualize the retropatellar pouch and the medial knee joint
- Avoid unnecessary tool movements and unwanted contact with the cartilage surfaces in the joint
- Control two instruments at the same time and to triangulate whilst avoiding cartilage damage
- Correctly use the following instruments: grasper, probe, punch and shaver

## Instruments

Arthroscope



Probe/Electrocautery Device



Grasper/Punch

Shaver/Hooded Burr

# Contributors

We would like to acknowledge the following experts who greatly contributed and helped to create the ArthroS™ Knee module:

Dr. Robert Burks (University of Utah), PD Dr. Sandro Fucentese and Dr. Stefan Rahm (Balgrist University Hospital, Zurich), PD Dr. Peter Koch (KSW Kantonsspital Winterthur), Robert Pedowitz, MD, PhD, Dr. Stephan Reppenhagen (König-Ludwig-Haus, Würzburg), and Prof. Dr. Michael Strobel (Sporthopaedicum, Straubing).

We would also like to extend a special thank you to the Arthroscopy Association of North America (AANA), specifically Dr. Joe Tauro (Chairman of the Orthopedic Learning Center of AANA), Dr. Kevin Bonner (Jordan-Young Institute for Orthopedic Surgery & Sports Medicine), Dr. Christopher Uggen (Borgess Bone & Joint Institute), and Dr. Brian Waterman (Wake Forest Baptist Health) for assisting us in providing expertise and input into developing the AANA knee diagnostic, AANA knee diagnostic and palpation, horizontal cleavage tear, hidden flap, radial tear, and hidden ramp diagnostic cases.

# Course descriptions

**Knee Basic Skills Course**

This course guides students through basic arthroscopy skills training. Participants prepare for the OR by using original surgical instruments to learn scope triangulation and how to orient common instruments such as the probe, punch, and shaver. Diagnostic arthroscopy cases teach participants to identify the key anatomical landmarks of the knee, and a therapeutic meniscectomy case allows students to practice what they have learned in a risk-free environment.

**Knee Course in Diagnostics**

This course uses original surgical instruments and high-fidelity simulation to teach scope orientation and triangulation. The goal of the course is for students to become comfortable with the instruments necessary for an arthroscopic diagnostic tour, to use these instruments effectively, to identify key anatomical landmarks in the knee, and to identify various pathologies.

**Knee Advanced Course in Diagnostics**

This course builds upon the skills practiced in the Knee Course in Diagnostics. Using original surgical instruments, participants practice their skills in scope orientation and triangulation. The goal of this course is to have participants learn essential skills in a risk-free environment and then use these skills to perform a complete knee arthroscopy where they will identify key anatomical landmarks and a variety of pathologies.

**Knee Advanced Course**

This builds upon the skills gained in the Knee Basic Skills Course and the Knee Advanced Course in Diagnostics. Using original surgical instruments, this course prepares participants for the OR by training them to perform a complete knee arthroscopy for meniscus, arthrosis, and loose body treatments.

**AANA Knee Course**

The AANA Knee Course was jointly developed by the Arthroscopy Association of North America (AANA) and VirtaMed. The course incorporates feedback from a panel of AANA experts and uses ten cases to guide end-users through AANA's recommended steps for performing a standardized knee arthroscopy.

**Balgrist Knee Arthroscopy Course**

This course uses original surgical instruments to train the psychomotor skills required to perform a knee arthroscopy. Using a combination of high-fidelity simulation and haptic feedback, the different diagnostic parts of a knee arthroscopy are performed. Participants prepare for the OR by learning scope triangulation and how to orient common instruments such as the probe, punch, and shaver. The learning curve is accelerated through competency-based cases which increase in difficulty as the course progresses.

This course was developed by Dr. med Stefan Rahm specifically for the learning needs of PGY 1-3 residents at Balgrist University Hospital, Zurich. The training impacts and outcomes of this simulator course on resident learning were assessed and published at:

https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/s12891-018-2072-0

# Didactic modules

## General principles of arthroscopy

- Equipment overview
- Imaging principles
- Clinical issues

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## Basic principles of knee arthroscopy

- Background and basics
- Diagnostic arthroscopy
- Therapeutic interventions

# Didactic videos

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## Diagnostic knee scope handling – teaching video

- Watch an expert, Dr. R. Burks (University Salt Lake City, Utah), performing a structured diagnostic knee arthroscopy

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## AANA Diagnostic Video

- Background and basics
- Diagnostic arthroscopy
- Therapeutic interventions

# Instructional videos

## How to use the simulator

- Logging on to the simulator
- Using the touch screen
- Navigating the task bar

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## How to use the arthroscope

- Background and basics
- Diagnostic arthroscopy
- Therapeutic interventions

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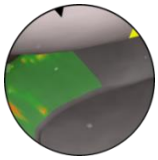
## How to use the knee

- Background and basics
- Diagnostic arthroscopy
- Therapeutic interventions

# Basic skills cases



## Guided Diagnostics I: Menisci

- Healthy right knee
- Step by step guided inspection of lateral and medial meniscus

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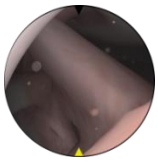

## Guided Diagnostics II: Knee

- Healthy right knee
- Step by step guided inspection of the entire knee

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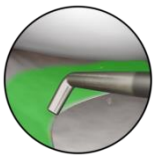

## Guided Diagnostics and Palpation

- Healthy right knee
- Step by step guided inspection of the entire knee
- Learn to bring the probe to all relevant anatomical structures

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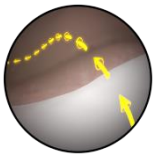

## AANA Guided Diagnostics

- Healthy right knee
- Step by step guided inspection of the knee
- Identify and visualize key landmarks of the knee

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## AANA Guided Diagnostics and Palpation

- Healthy right knee
- Identify key landmarks of the knee
- Step by step guided inspection of the entire knee

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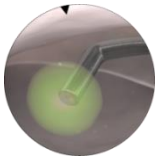

## Triangulation I

- Locate virtual spheres in the knee joint
- Touch all the spheres with the probe for two seconds

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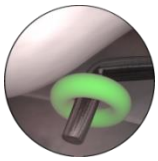

## Triangulation II

- Locate the virtual rings in the knee joint
- Place the probe inside the rings for two seconds

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## Triangulation III

- Locate the virtual rings in the knee joint
- Place the probe inside the rings for two seconds

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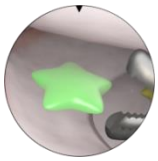
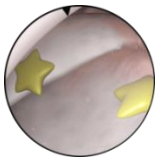


## Catch the stars I

- Locate the virtual stars in the knee joint
- Use the grasper to remove the stars



### Catch the stars II

- Locate the virtual stars in the knee joint
- Use the grasper to remove the stars

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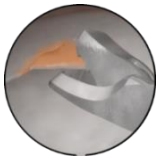

### Guided Meniscectomy I

- Guided resection of a meniscus tear with guidance for each step
- Flap tear lateral meniscus

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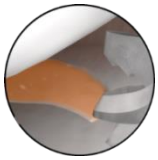
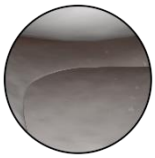


### Guided Meniscectomy II

- Guided resection of a parrot beak meniscus tear supported by step by step instructions

## Diagnostic cases



### Pathology Unknown case

- Perform a diagnostic tour of a knee. The case will randomly select a patient example
- Discover and remember all abnormalities you observe
- Report discovered abnormalities at the end of the diagnostic tour

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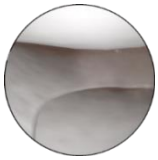

### Diagnostic I

- Healthy right knee
- Menisci can be palpated

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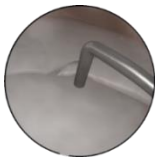

### Diagnostic II

- Flap tear in the lateral meniscus
- Tear can be palpated with the probe

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### Diagnostic III

- Bucket handle tear in the medial meniscus
- Tear can be palpated with the probe

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### Diagnostic IV

- Parrot beak tear in the medial meniscus
- Tear can be palpated with the probe

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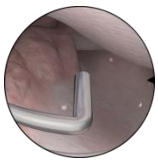
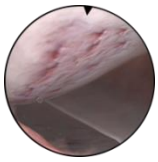


### Diagnostic V

- Arthrosis Grade I
- Lateral meniscus flap tear and parrot beak tear medial meniscus



## Diagnostic VI

- Arthrosis Grade III
- Lateral meniscus flap tear and parrot beak tear medial meniscus

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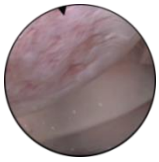

## Diagnostic VII

- Arthrosis Grade IV
- Radial meniscus tear lateral meniscus and parrot beak tear medial meniscus

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## Diagnostic VIII

- Unhappy triad
- Rupture of anterior cruciate and medial collateral ligaments
- Parrot beak tear medial meniscus

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## Diagnostic IX

- Medial side, Meniscus root tear

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## Diagnostic X

- Peripheral meniscus tear, medial compartment

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## Diagnostic XI

- Synovitis in the lateral recess
- Partial cartilage damage femoral and tibial side

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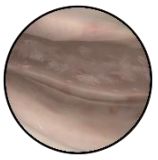

## Diagnostic XII

- Synovitis in suprapatellar pouch
- Partial cartilage damage femoral and tibial side

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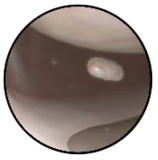

## Diagnostic XIII

- Loose bodies

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## Diagnostic XIV

- Chondromalacia, partial damage to the retro patellar cartilage

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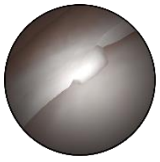

## Diagnostic XV

- Hidden flap tear of the medial meniscus

### Diagnostic XVI

- Horizontal cleavage tear of the lateral meniscus

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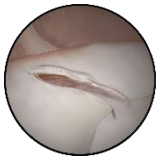


### Diagnostic XVII

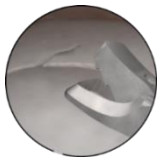
- Radial tear of the lateral meniscus

---

### Diagnostic XVIII

- Hidden ramp tear of the medial meniscus

## Therapeutic cases



### Meniscectomy I

- Lateral meniscus flap tear
- Remove damaged parts of the meniscus and smooth the borders with the shaver

---

### Meniscectomy II

- Bucket handle tear in the medial meniscus
- Remove damaged parts of the meniscus and smooth the borders with the shaver

---

### Meniscectomy III

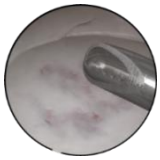
- Parrot beak tear in the medial meniscus
- Remove damaged parts of the meniscus and smooth the borders with the shaver

---

### Arthrosis Grade I

- Arthrosis grade I
- Flap tear lateral meniscus, parrot beak tear medial meniscus

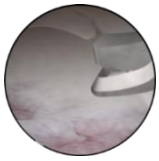
---



### Arthrosis Grade III

- Arthrosis grade III
- Flap tear lateral meniscus, parrot beak tear medial meniscus

---



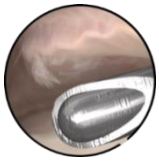
### Arthrosis Grade IV

- Arthrosis grade IV
- Flap tear lateral meniscus, parrot beak tear medial meniscus

## Unhappy Triad

- Rupture of the anterior cruciate ligament and medial collateral ligament
- Parrot beak tear medial meniscus

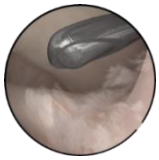
---



## Synovitis I

- Inflammations on the inner skin of the joint capsule
- Use the shaver to remove the synovitis

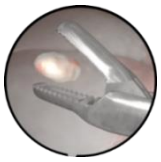
---



## Synovitis II

- Inflammations on the inner skin of the joint capsule
- Use the shaver to remove the synovitis

---



## Loose body removal I

- Find and remove two loose bodies floating in the joint with the grasper

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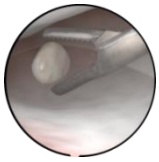


## Loose body removal II

- Find and remove the four loose bodies floating in the joint with the grasper

# ArthroS™ Concepts of ACL Reconstruction

Understanding mechanisms of ACL injury, reconstruction, and correct graft placement

## Module description

This module is for specialization in ACL reconstruction. Trainees learn how to navigate the 3D anatomy of the knee joint in relation to the relevant landmarks for ACL reconstruction and learn about the consequences and effects of graft malpositioning. Mastering correct graft positioning is paramount for safe and effective ACL reconstruction.

There are six different learning cases for the ACL reconstruction module. The first two cases cover the main principles of ACL reconstruction and anatomical concepts, and the other four cases present therapeutic patient cases based on the different features and complications of ACL reconstruction surgery. The cases vary from complete ACL tear to partial rupture of the ACL.

## Learning objectives

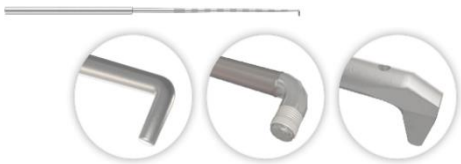
- Understand the mechanisms of ACL injury
- Identify and visualize anatomical landmarks using the scope and angled optics
- Locate correct grafting points for ACL reconstruction
- Manipulate the knee to access the femoral attachment site of the ACL
- Know how to place the tunnels for an anatomical ACL reconstruction
- Understand the consequences of typical graft malpositioning
- Correctly use the following instruments: grasper, probe, punch, tibia targeting tool, and shaver

## Contributors

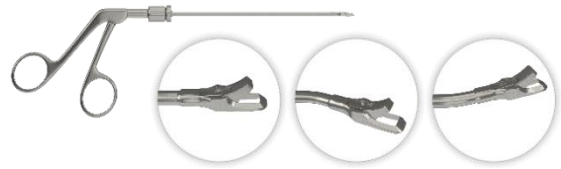
We would like to acknowledge the assistance of Robert Pedowitz, MD, PhD, who greatly contributed to the creation of the ArthroS™ Concepts of ACL Reconstruction module.

# Instruments

Arthroscope



Probe/Electrocautery Device

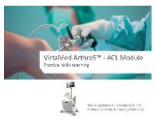


Grasper/Punch

Shaver/Hooded Burr

Guidewire

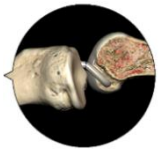
# Didactic modules



## Principles of ACL reconstruction

- Learn basic ACL biomechanics
- Understand principles of ACL reconstruction
- Understand the mechanism of injury

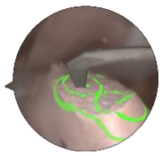
---



## Anatomical concepts

- Identify anatomical landmarks using scope and angled optics
- Understand the anatomical concepts and kinematics of the ACL
- Understand graft malpositioning consequences

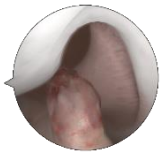
# Therapeutic cases



## Guided ACL reconstruction I

- Complete ACL tear
- Patient in chronic state
- Step by step guided ACL reconstruction

---



## ACL reconstruction I

- Complete ACL tear
- Patient in chronic state
- Trainee is free to choose sequence of procedure

---

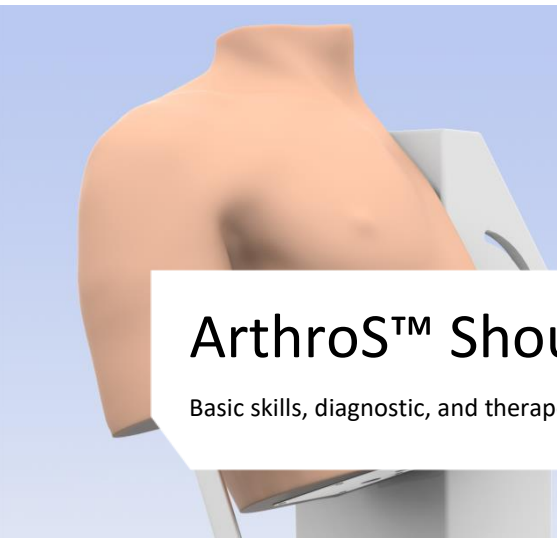
## ACL reconstruction II

- Complete ACL rupture
- Patient in subacute state
- Trainee is free to choose sequence of procedure

---

## ACL reconstruction III

- Partial rupture of the ACL
- ACL is present, but knee is unstable
- Trainee is free to choose sequence of procedure



# ArthroS™ Shoulder

Basic skills, diagnostic, and therapeutic cases for shoulder arthroscopy

## Module description

The ArthroS™ Shoulder includes guided basic skill training cases fully integrated into a realistic simulation, as well as didactic teaching slides. Mastering these basic tasks enables trainees to perform a complete shoulder arthroscopy more easily and in an efficient, professional way. Diverse patients with varying level of difficulty offer the trainee the chance to perform complete diagnostic arthroscopic interventions. Patients include different lesions in rotator cuff and impingement syndrome. Therapeutic cases include loose body removal, subacromial debridement, and decompression.

## Learning objectives

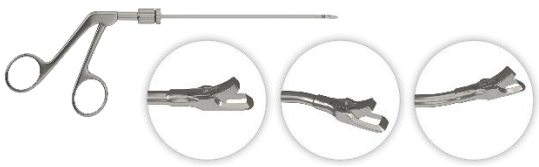
- Navigate the camera and the instruments in the glenohumeral and subacromial spaces
- Visualize the most important anatomical structures and to identify pathological conditions
- Practice triangulation either in beach chair or in lateral decubitus position
- Control two instruments at the same time and to triangulate whilst avoiding unnecessary tool movements and unwanted contact with the cartilage surfaces in the shoulder joint
- Perform different therapeutic procedures

## Instruments

Arthroscope



Probe/Electrocautery Device



Grasper/Punch

Shaver/Hooded Burr

# Contributors

We would like to acknowledge the following experts who greatly contributed and helped to create the ArthroS™ Shoulder module:

Dr. Wolfgang Birkner (Klinik für Orthopädische Chirurgie, Rheinfelden), Dr. Robert Burks (University of Utah), Prof. Dr. Christian Gerber, Dr. Stefan Rahm, and PD Dr. Karl Wieser (Balgrist University Hospital, Zurich), Robert Pedowitz, MD, PhD.

We would also like to extend a special thank you to the Arthroscopy Association of North America (AANA), specifically Dr. Victor Goradia (Richmond Shoulder & Knee Specialist, G2 Orthopedics and Sports Medicine), Dr. Mary Mulcahey (Director, Women's Sports Medicine Program Tulane University School of Medicine), Dr. Joe Tauro (Chairman of the Orthopedic Learning Center of AANA), Dr. Patrick St. Pierre (Director, Shoulder and Elbow Surgery at Desert Orthopedic Center), and Dr. Keith Nord (Chief of Orthopedics, Jackson-Madison County General Hospital).

# Course descriptions

**Shoulder Basic Skills Course**

This course covers basic arthroscopy skills training. Participants will learn scope triangulation and how to orient common instruments such as the probe, punch, and shaver. Participants perform an exploratory arthroscopy and identify the key anatomical landmarks in the shoulder (glenohumeral and subacromial spaces).

**Shoulder Course in Diagnostics**

This course teaches scope orientation and triangulation for diagnostics in shoulder arthroscopy. Participants will learn how to inspect the shoulder (glenohumeral and subacromial spaces), perform a diagnostic arthroscopy, and learn how to identify key pathologies and anatomical landmarks in the shoulder (glenohumeral and subacromial spaces).

**Shoulder Advanced Course in Diagnostics**

This course trains advanced scope orientation and triangulation for diagnostics in shoulder arthroscopy. Participants perform a diagnostic arthroscopy and learn how to identify a variety of pathologies and key anatomical landmarks in the shoulder (glenohumeral and subacromial spaces).

**Shoulder Advanced Course**

This advanced course trains participants to perform a complete shoulder arthroscopy on a variety of different pathologies.

**AANA Shoulder Diagnostic Training Course**

The AANA Shoulder Diagnostic Training Course was jointly developed by the Arthroscopy Association of North America (AANA) and VirtaMed. The course incorporates feedback from a panel of AANA experts and uses selected cases to guide end-users through AANA's recommended steps for performing a standardized Shoulder arthroscopy.

**Balgrist Shoulder Arthroscopy Course: Lateral or Beach Chair**

These courses original surgical instruments to train the psychomotor skills required to perform a shoulder arthroscopy. Using a combination of high-fidelity simulation and haptic feedback, the different diagnostic parts of a shoulder arthroscopy are performed. Participants prepare for the OR by learning scope triangulation and how to orient common instruments such as the probe, punch, and shaver. The learning curve is accelerated through competency-based cases which increase in difficulty as the course progresses.

These courses were developed by Dr. med Stefan Rahm specifically for the learning needs of PGY 1-3 residents at Balgrist University Hospital, Zurich. The training impacts and outcomes of this simulator course on resident learning were assessed and published at:

https://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/s12891-018-2072-0

# Didactic modules

General concepts of arthroscopy

- Equipment overview
- Imaging principles
- Clinical issues

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Basic principles of shoulder arthroscopy

- Background and basics
- Diagnostic arthroscopy
- Therapeutic interventions

# Didactic videos

AANA diagnostic video

- Beach chair position

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AANA Diagnostic video

- Lateral decubitus position

# Basic skills cases

Guided diagnostics glenohumeral

- Healthy right shoulder
- Guided inspection of glenohumeral joint

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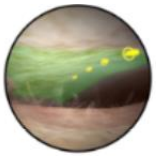

Guided diagnostics subacromial

- Healthy right shoulder
- Guided inspection of the subacromial space

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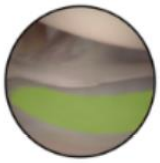

Guided 15-point shoulder examination

- Guided inspection of the healthy right shoulder joint
- Switch the scope from the posterior to the anterior portal to visualize the dorsal labrum and the subscapularis recess

---

AANA guided diagnostics

- Healthy right shoulder
- Step-by-step guided inspection of the shoulder
- Identify and visualize key landmarks of the shoulder

## Guided diagnostics and palpation

- Healthy right shoulder
- Guided inspection of the shoulder joint
- Learn how to bring the probe to all relevant structures

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## AANA guided glenohumeral diagnostic tour with palpation

- Healthy right shoulder
- Step-by-step guided inspection of the shoulder with palpation
- Visualize and palpate key landmarks of the shoulder

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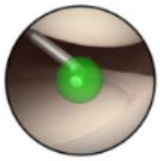


## Triangulation I – Spheres - glenohumeral

- Locate virtual spheres in the glenohumeral joint
- Touch all the spheres with the probe for two seconds

---

## Triangulation II – Rings - glenohumeral

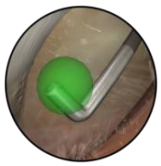
- Locate the virtual rings in the subacromial space
- Place the probe inside the rings for two seconds

---

## Catch the stars glenohumeral

- Locate the virtual stars in the glenohumeral joint
- Use the grasper to remove the stars

---



## Triangulation I – Spheres - Subacromial

- Locate virtual spheres in the subacromial space
- Touch all the spheres with the probe for two seconds

---

## Triangulation II – Rings - Subacromial

- Locate the virtual rings in the subacromial space
- Place the probe inside the rings for two seconds

---

## Catch the stars subacromial

- Locate the virtual stars in the subacromial space
- Use the grasper to remove the stars

# Diagnostic cases

## Unknown pathology

- Perform a diagnostic tour of a shoulder. The case will randomly select a patient example
- Discover and remember all abnormalities you observe
- Report discovered abnormalities at the end of the diagnostic tour

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## Diagnostic I

- Healthy right glenohumeral joint

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## Diagnostic II

- Healthy right subacromial space

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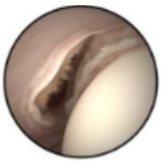

## Diagnostic III

- Acromion with bony hook
- Superficial rotator cuff tear

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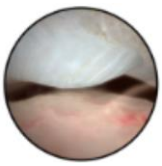

## Diagnostic IV

- Superficial calcification of the rotator cuff
- Acromion with bony hook

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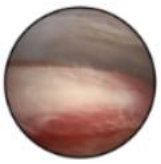

## Diagnostic V

- SLAP II lesion; detachment of the biceps tendon anchor system from the glenoid

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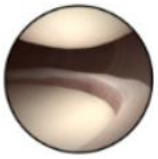

## Diagnostic VI

- Bankart lesion; detachment of the anterior inferior labrum from the glenoid

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## Diagnostic VII

- Complete rotator cuff tear
- Rupture of the supraspinatus tendon

---

## Diagnostic VIII

- Superior labral tear from anterior to posterior (SLAP III)

### Diagnostic IX

- Posterior labral tear

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### Diagnostic X

- L-shaped supraspinatus tear

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### Diagnostic XI

- Superior subscapularis tear

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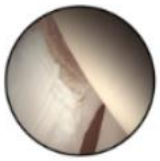


### Diagnostic XII

- Partial articular supraspinatus tendon avulsion (PASTA)

---

### 15 Point shoulder examination

- Healthy right shoulder
- Switch scope to from the posterior to the anterior portal to visualize the dorsal labrum and the subscapularis recess

## Therapeutic cases

### Subacromial debridement

- Use shaver to debride soft tissue/ bursitis from the subacromial space

---

### Subacromial decompression

- Locate the hook on the acromion
- Use burr to resect the part of the acromion causing impingement

---

### Loose body removal

- Locate the loose bodies in the glenohumeral joint
- Use the grasper to remove the loose bodies

# ArthroS™ Hip

Basic skills, diagnostic, and therapeutic cases for hip arthroscopy

## Module description

The ArthroS™ Hip module features zero radiation fluoroscopy simulation for the trainee to practice how to access the hip joint and to learn to establish proper and safe portals. Using a 70-degree scope, trainees learn to navigate both central and peripheral compartments, applying traction and rotation when necessary.

This module contains eight basic guided skill training cases fully integrated into realistic simulation. By mastering these tasks, trainees are more equipped to perform a complete hip arthroscopy. There are four different patients with varying levels of difficulty, which offer the trainee the chance to perform complete diagnostic arthroscopic interventions. Patient cases include different lesions in the labrum and cartilage as well as a cam impingement. Therapeutic cases include loose body removal and cam decompression.

## Learning objectives

- Navigate the camera and the instruments in the central and peripheral aspects of the hip joint
- Visualize the most important anatomical structures and to identify pathological conditions
- Get used to triangulation either in supine or lateral position
- Control two instruments at the same time and to triangulate while avoiding unnecessary tool movements and unwanted contact with the cartilage surfaces in the hip joint
- Learn how to establish safe access to the hip joint using zero radiation fluoroscopy simulation

## Contributors

We would like to acknowledge the following experts who greatly contributed and helped to create the ArthroS™ Hip module:

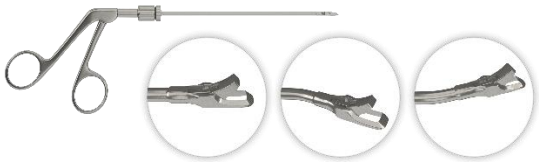
Prof. Dr. Michael Dienst (OCM, Munich), Prof. Dr. Claudio Dora (Schulthess Klinik Zurich), Dr. Anil Ranawat (Hospital for Special Surgery, New York), PD Dr. Patrick Zingg (Balgrist University Hospital Zurich)

# Instruments

Arthroscope



Probe/Electrocautery Device



Grasper/Punch

Shaver/Hooded Burr

Guidewire

# Course descriptions

The ArthroS™ Hip comes with several pre-defined courses. Each course contains a selection of cases organized in a hierarchy designed to guide users to the course objective.

**Hip Basic Skills Course**

This course covers the training of arthroscopy basic skills. An exploratory arthroscopy is performed, identifying the key anatomical landmarks in the peripheral and central compartment of the hop joint. In addition, the trainee learns how to triangulate and orient the arthroscopy instruments.

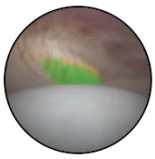
**Hip Course in Diagnostics**

This course trains the participant in camera orientation and triangulation for diagnostics in hip arthroscopy. The participant should learn how to inspect the hip joint (central and peripheral compartments) and how to triangulate the camera with the instrument. Furthermore, the participant should learn to correctly identify various abnormalities seen in the joint.

**Hip Advanced Course**

This advanced course allows the trainee to learn how to perform a complete hip arthroscopy on different pathologies. The participant should learn how to inspect the hip joint, triangulate the camera and the instruments, identify pathologies, and perform treatments such as loose body removals or cam decompression.

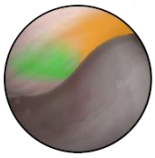
# Basic skills cases



## Guided diagnostics central

- Healthy left hip joint
- Guided inspection of the central compartment of the hip joint

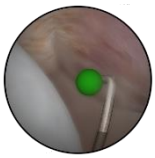
---



## Guided diagnostics peripheral

- Healthy left hip joint
- Guided inspection of the peripheral compartment of the hip joint

---



## Triangulation I central

- Locate virtual spheres in the central compartment
- Select the appropriate instrument portal to access the spheres
- Touch all the spheres with the probe for two seconds

---

## Triangulation I peripheral

- Locate virtual spheres in the peripheral compartment
- Select the appropriate instrument portal to access the spheres
- Touch all the spheres with the probe for two seconds

---

## Triangulation II central

- Locate virtual rings in the central compartment
- Select the appropriate instrument portal to access the rings
- Hook the rings with the probe and hold still for two seconds

---

## Triangulation II peripheral

- Locate virtual rings in the peripheral compartment
- Select the appropriate instrument portal to access the rings
- Hook the rings with the probe and hold still for two seconds

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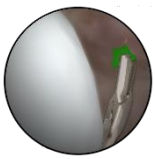

## Catch the stars central

- Locate the virtual stars in the central compartment
- Select the appropriate instrument portal to access the stars
- Use the grasper to remove the stars from the hip joint

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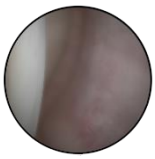
## Catch the stars peripheral

- Locate the virtual stars in the peripheral compartment
- Select the appropriate instrument portal to access the stars
- Use the grasper to remove the stars from the hip joint

# Diagnostic cases



## Diagnostic I

- Healthy left hip joint

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## Diagnostic II

- Labrum rupture

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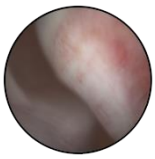

## Diagnostic III

- Cam deformity of femoral neck

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## Diagnostic IV

- Cartilage flap on the acetabulum caused by cam impingement

# Therapeutic cases

## Loose body removal

- Locate the loose bodies in the hip joint
- Select appropriate portals for the grasper to access the loose bodies
- Use the grasper to remove the loose bodies

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## Cam decompression

- Locate the cam deformity on the femoral neck
- Use the burr to resect bone from the femoral neck until impingement is removed
- Bring the hip into flexion to check for successful decompression

# ArthroS™ Ankle

Basic skills, diagnostic, and therapeutic cases for ankle arthroscopy

## Module description

The ArthroS™ Ankle features supine and prone patient positioning as well as joint distraction capabilities. The module contains six basic guided skills-training cases fully integrated into realistic simulation. By mastering these tasks, trainees are more equipped to perform a complete ankle arthroscopy. There are five different patients with varying levels of difficulty, which offer the trainee the chance to perform complete diagnostic arthroscopic interventions. Patient cases include lesions in the cartilage as well as an impingement. Therapeutic cases include interventional ankle arthroscopies including loose body removal and anterior decompression.

## Learning objectives

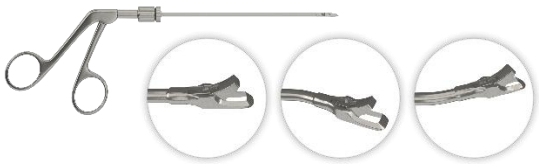
- To navigate the camera and the instruments in the anterior and posterior aspects of the ankle joint
- To visualize the most important anatomical structures and to identify pathological conditions
- To get used to triangulation either in prone or supine position
- To control two instruments at the same time and to triangulate whilst avoiding unnecessary tool movements and unwanted contact with the cartilage surfaces in the ankle joint

## Instruments

Arthroscope



Probe/Electrocautery Device



Grasper/Punch

Shaver/Hooded Burr

# Contributors

We would like to acknowledge the following experts who greatly contributed and helped to create the ArthroS™ Ankle module:

Dr. John G. Kennedy (Hospital for Special Surgery, New York), Dr. Christoph Lampert (Orthopädie Rosenberg, St. Gallen), PD Dr. Dr. Andre Leumann (OrthoPraxis Leumann, Basel)

# Courses

The ArthroS™ Ankle comes with several pre-defined courses. Each course contains a selection of cases organized in a hierarchy designed to guide users to the course objective.

**Ankle Basic Skills Course**

This basic course covers the training of arthroscopy basic skills. An exploratory arthroscopy is performed, identifying the key anatomical landmarks in the ankle joint. In addition, the trainee learns triangulation and how to orient arthroscopic instruments such as the probe and grasper.

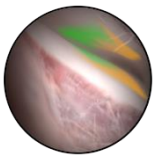
**Ankle Course in Diagnostics**

This course trains participants in camera orientation and triangulation for diagnostics in ankle arthroscopy. Participants should learn how to inspect the ankle joint, triangulate the camera with the instrument, and identify various pathologies.

**Ankle Advanced Course**

This course trains the participant in basic interventional ankle arthroscopy. The participant should learn how to inspect the ankle joint, triangulate the camera and the instruments, identify pathologies and perform an anterior decompression.

# Basic skills cases



## Guided diagnostics anterior

- Healthy left ankle joint
- Guided inspection of the anterior aspect of the ankle joint

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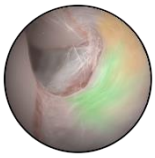

## Guided diagnostics posterior

- Healthy left ankle joint
- Guided inspection of the posterior aspect of the ankle joint

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## Guided diagnostics and palpation

- Healthy left ankle
- Step by step guided inspection of the entire ankle
- Learn to bring the probe to all relevant anatomical structures

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## Triangulation I

- Locate virtual spheres in the anterior aspect of the ankle joint
- Select the appropriate instrument portal to access the spheres
- Touch all the spheres with the probe for two seconds

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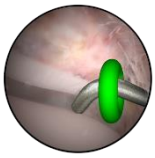

## Triangulation II

- Locate virtual rings in the anterior aspect of the ankle joint
- Select the appropriate instrument portal to access the rings
- Hook the rings with the probe and hold still for two seconds

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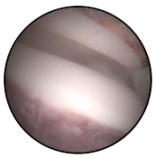
## Catch the stars

- Locate the virtual stars in the anterior aspect of the ankle
- Select the appropriate instrument portal to access the stars
- Use the grasper to remove the stars from the ankle joint

# Diagnostic cases



## Diagnostic I

- Healthy left ankle

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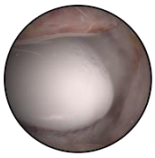

## Diagnostic II

- Osteochondritis on talus

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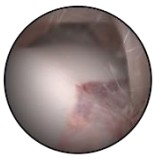

## Diagnostic III

- Bony impingement anterior

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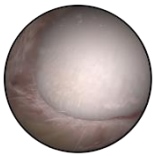

## Diagnostic IV

- Posterior impingement

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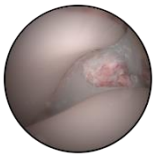

## Diagnostic V

- Anterior soft tissue impingement

# Therapeutic cases

## Loose body removal

- Locate the loose bodies in the ankle joint
- Select the appropriate portals for the grasper to access the loose bodies
- Use the grasper to remove the loose bodies

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## Anterior decompression

- Locate the deformity of the tibia on the anterior rim
- Use the burr to resect bone from the femoral neck until the impingement is removed.