

# ***Fundamentals of Arthroscopic Surgery Training (FAST) Program Testing Benchmarks***

Gregg Nicandri MD

Professor of Orthopedic Surgery

Director of Kenneth Dehaven Motor Skills Laboratory

Chief Medical Information Officer

University of Rochester Medical Center

ePoster #44

# Disclosure

- I and my co-authors have no financial conflicts of interest related to this work
- I served on and led the AANA FAST committee that worked on the development of the FAST curriculum and workstation.
- I have received funding from the ABOS/OREF and AANA to perform research related to the FAST Program.

The logo for FAST (Fundamentals of Arthroscopic Surgery Training) features the word "FAST" in a large, bold, black serif font. To the left of the "F", there are four horizontal black lines of varying lengths, stacked vertically, that extend to the left edge of the "F".

# FAST

FUNDAMENTALS OF ARTHROSCOPIC SURGERY TRAINING

A collaborative project of the  
Arthroscopy Association of North America (AANA)  
American Academy of Orthopaedic Surgeons (AAOS)  
American Board of Orthopaedic Surgery (ABOS)

# Curriculum

## Authors:

- Robert Pedowitz MD PhD – UCLA Health
- Keith Nord MD – Jackson TN
- Gregg Nicandri MD – University of Rochester
- Mark Hutchinson MD – University of Illinois
- Robert Hunter MD – HRRMC: Salida Colorado
- Howard Sweeney MD – Northwestern Illinois

*Reviewed and adopted by the Surgical Skills Task Force of the American Board of Orthopaedic Surgery (ABOS) in collaboration with the American Academy of Orthopaedic Surgeons (AAOS), and the American Orthopaedic Association (AOA)/Council of Orthopaedic Residency Directors (CORD)*

## Published:

<https://www.abos.org/wp-content/uploads/2019/07/Module-14-Basic-Arthroscopy-Skills-edit.pdf>



## Module 1: Basic Principles of Arthroscopy

*Keith Nord, MD*

### Problem Identification and Needs Assessment

#### Identification of targeted learners

Targeted learners will include PGY 1 Orthopaedic Surgery residents with potential inclusion of PGY 2 residents.

#### Identification of need or problem for targeted learners

Arthroscopy is one of the most common orthopaedic procedures. In order to perform arthroscopy safely and efficiently, surgeons must become familiar with basic arthroscopy tools and equipment. Learners must also understand relevant periarticular anatomy and the associated portals for safe access to joints.

#### Current educational approach to address need or problem

Our current approach is to bring the resident into the operating room environment, demonstrate the use of the arthroscope, and then allow the trainee to utilize the instruments in a patient. A cadaveric lab may have been performed beforehand, but typically residents have very limited training about the surgical equipment to be used. Risk of patient injury is higher and risk of equipment damage is higher with this see one, do one, teach one approach. Relevant neurovascular and portal anatomy is generally taught with lectures and cadaver dissections, followed by making portals on patients. A stepwise progressive approach is likely to be both safer and more efficient.

#### Ideal educational approach to address need or problem

The ideal educational approach would be structured and progressive, allowing the resident

to acquire basic cognitive information, followed by training and practice setting up arthroscopy equipment, leading to practice with a model or arthroscopy simulator (to an acceptable level of proficiency), before implementation of these skills on patients.

### Goals and Objectives

#### Specific educational goals

- The learner will become familiar with the basic set up and function of the arthroscopy "tower", including the angled arthroscope (30 and 70 degree lens), light source, shaver and pump, tissue ablation / coagulation tools (radiofrequency devices), foot pedals, and control boxes.
- The learner will become familiar with basic hand tools that are used during arthroscopy, including probes, graspers, baskets, scissors, and motorized shavers.
- The learner will become familiar with operating room set-up and draping techniques for the most common arthroscopic procedures.
- The learner will understand the relationships between surface anatomy, superficial and deep neurovascular anatomy, and basic arthroscopy portals.

#### Specific cognitive, affective, psychomotor task objectives

- The learner will demonstrate ability to set up and connect the various elements of the arthroscopy tower.
- The learner will demonstrate familiarity and application of various hand instruments used during basic arthroscopic procedures.



# Workstation



# Testing Modules



# Purpose

- Establish benchmarks for each of the five testing modules for the FAST program to enable proficiency based progression through the FAST curriculum
- Benchmark defined as mean performance of experienced surgeon cohort<sup>1</sup>

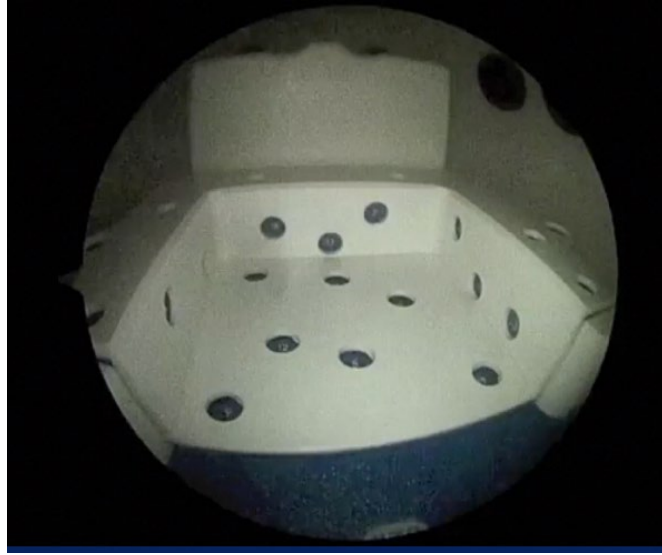
1. Gallagher, AG., O'Sullivan GC. Fundamentals of Surgical Simulation: Principals and Practice. Springer 2012.

# Methods

- Data was collected from two separate cohorts (n=40) of faculty at the AANA Fundamentals of Arthroscopic Surgery Residents Course at the Orthopaedic Learning Center in Chicago Illinois.
- For each module the subject was given a list of written instructions and allowed to practice for a period of 2 minutes. Then, each subject performed the task 3 times with their dominant hand and 3 times with their non-dominant hand.
- The time it took each subject to complete the module as well as the number of errors committed was recorded.
- Cohort 1 performed Probing, Ring Transfer, and Maze Navigation. Cohort 2 performed Partial Meniscectomy and Suture Passage.



# #1 Probing Testing Module



## **Instructions:**

Using your LEFT hand, place the camera in the central left portal. Place the probe in the center portal. Probe and punch the 10 numbers listed on the random number sequence. Repeat the task with the camera in your RIGHT hand.

## **Fundamental Skills Assessed**

- Horizon Control, Telescoping, Periscoping, Triangulation, Probing

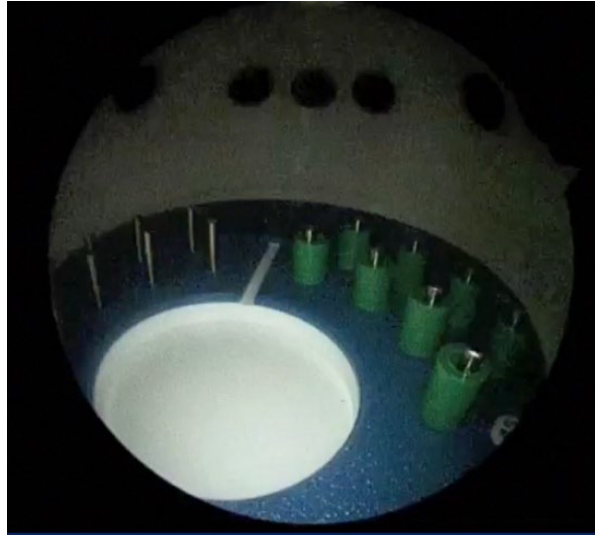
## **Surgical Correlate:**

- Diagnostic Arthroscopy

## **Rationale:**

- Diagnostic arthroscopy is a key fundamental skill that should be mastered prior to progressing to surgical intervention and manipulation. The fundamental haptic skills required for this procedure can be developed outside of the OR. This will improve patient safety and drive increased educational value from resident surgical time.

# #2 Ring Transfer Testing Module



## Instructions:

Place the rings on the module as pictured above. Using your RIGHT hand, place the camera in the right portal. Place the grasper in the left portal. Use the grasper to transfer all of the rings from the posts on the right to the left. Do not stop to pick up any rings that drop.

## Fundamental Skills Assessed

- Horizon Control, Telescoping, Periscoping, Triangulation, Probing
- Grasping

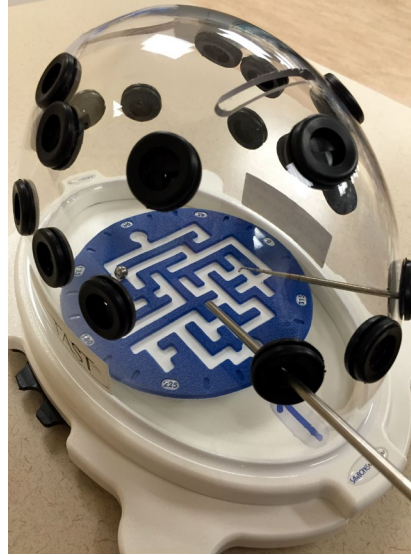
## Surgical Correlate:

- Loose Body Removal

## Rationale:

- Loose body removal is one of the early procedural skills historically taught in the OR and grasping and manipulating tissue or implants is common to many procedures. Improving these skills will result in improved safety and efficiency

# #3 Maze Testing Module



## Instructions:

During the maze task, the subject is asked to use an arthroscopic probe to push a 3mm ball bearing through the maze. If the ball skips the track but stays on the platform, the subject may continue. If the ball jumps off the platform completely, this results in failure of the module.

## Fundamental Skills Assessed

- Horizon Control, Telescoping, Periscoping, Triangulation, Probing

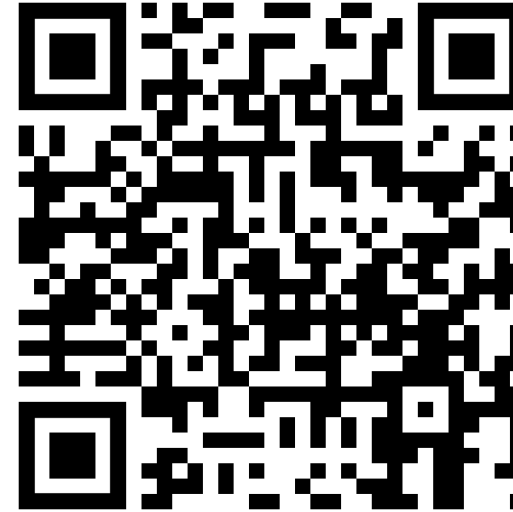
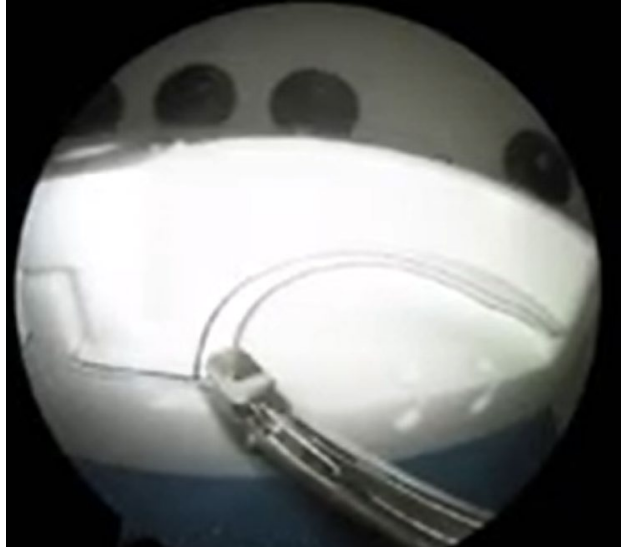
## Surgical Correlate:

- Object tracking and probing during diagnostic arthroscopy

## Rationale:

- Being able to track and probe from different arthroscope and instrument orientations and combinations is required during arthroscopy. Improving these skills will result in improved safety and efficiency. This skill is necessary before interventional arthroscopy can be performed.

# #4 Biting Testing Module



## **Instructions:**

Using your LEFT hand, place the camera in the central portal and the biter the right portal. Use the biter to remove the inner black line in its entirety AND without cutting into the peripheral black line. Repeat the task with the camera in your RIGHT hand.

## **Fundamental Skills Assessed**

- Horizon Control, Telescoping, Periscoping, Triangulation
- Biting

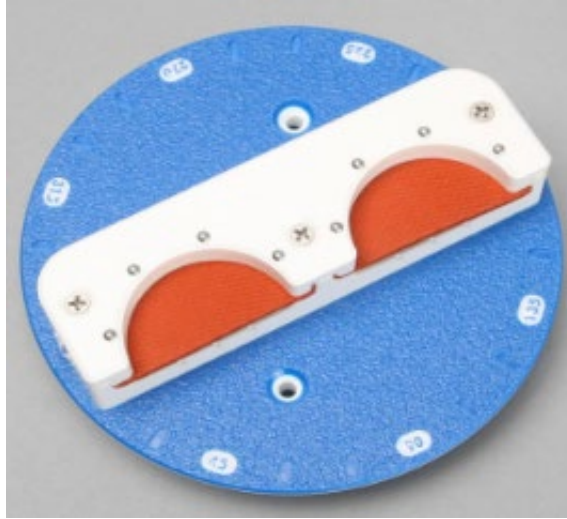
## **Surgical Correlate:**

- Arthroscopic Partial Meniscectomy

## **Rationale:**

- Partial Meniscectomy is one of the early procedural skills historically taught in the OR. Improving these skills will result in improved safety and efficiency

# #5 Suture Passing Module



## Instructions:

Visualizing through a posterior portal and working through a lateral portal, pass three sutures through the target zones in the simulated cuff material. Grasp the sutures with a ring grasper, gator, or kingfisher and save all three sutures out an anterior portal. Practice with different suture passers (Scorpion, Bird Beak, Lassos). Use both right and left hands.

## Fundamental Skills Assessed

- Horizon Control, Telescoping, Periscoping, Triangulation
- Suture Passing (antegrade (Scorpion), instrument to instrument (Bird Beak + Grasper), shuttling (Lasso or suture shuttle))

## Surgical Correlate:

- Arthroscopic Rotator Cuff Repair or Bankart

## Rationale:

- Arthroscopic Rotator Cuff Repair is one of the more complex arthroscopic procedures and requires a coordination of the skills taught in previous modules.

# Results

- The mean age of the subjects was 43.9(SD +/- 8.96).
- They had an average of 10.5 (SD +/- 8.28) years in practice and performed approximately 277 (SD +/-125.45) arthroscopic cases per year.
- All were sports medicine fellowship trained and were male.
- 7.5% were left handed.

# Result: Benchmarks Established

Module	Benchmark Time	Benchmark Errors
Probing Module	<96 seconds	No Errors
Ring Transfer Module	<140 seconds	<2 dropped rings
Maze Module	<103 seconds	No balls off platform
Resection Module	<68 seconds	<2 areas of over or under-resection
Suture Passing Module	<195 seconds	<1 mm of distance from the target area (per target) and no suture anchor unloads

# Discussion/Conclusions

- Benchmarks for 5 FAST testing modules were established in this study
- This will facilitate proficiency based progression through the FAST curriculum
- Future work is necessary to determine the number of repetitions necessary or the practice time required to meet proficiency benchmarks
- Future work is necessary to assess whether those who reach proficiency perform better on other simulated surgical procedures or in the operating room.



# Thank You

- **Rob Pedowitz**
- Keith Nord
- Mark Hutchinson
- Rob Hunter
- Howard Sweeney
- Richard Angelo
- Tony Gallagher
- Joe Tauro
- Jacqueline Brady
- John Marzo
- Mary Mulcahey
- Lisa Friedman
- Grant Garrigues
- Brian Grawe
- Robin Gehrman
- Countless Resident Participants and Program Faculty
- ABOS, AANA, AAOS

Email: [Gregg\\_Nicandri@URMC.Rochester.edu](mailto:Gregg_Nicandri@URMC.Rochester.edu)