Basic Knee Simulator Model Proves to Successfully Transfer Abilities Learned to Real-Patient Scenarios

Sebastián Irarrázaval, MD; Pablo Besa, MD; Gerardo Ledermann, MD; Luis A. Irribarra, MD; Rafael Vega, MD; Mario Orrego, MD

Orthopaedics Department
Pontifical Catholic University of Chile

medicina.uc.cl
Disclosure Statement

Sebastián Irarrázaval, MD
Pablo Besa, MD
Gerardo Ledermann, MD
Luis A. Irribarra, MD
No financial conflicts to disclose

Rafael Vega, MD: Biomet® consultant

Mario Orrego, MD: Arthrex® consultant
Introduction

- Arthroscopic training programs based on simulation have proven capable of developing surgical skills
- Most of these skills are measured on the same simulator used for training
- The ultimate goal for any surgical simulator is to prove capable of transferring the skills learned to real patients
Introduction

- We designed an arthroscopic partial meniscectomy training module and sought to determine its ability to transfer to real patients.
Methods

- Institutional review board acceptance was obtained
- All patients included gave signed written consent before inclusion
- 11 junior orthopedic residents (1st and 2nd year of training) and 3 expert knee surgeons were included
- A knee arthroscopic simulator was used for all simulated stages

Simulation laboratory. The program was based on a moderate-fidelity simulation system based on a dry Sawbones® model. External light source, camera and computer were used as shown.
Methods

- Trainees had two base line evaluations (one on a real patient and one on the simulator) completing partial mid-body medial meniscectomies
- Measured using the previously validated Arthroscopic Surgical Skill Evaluation Tool (ASSET)

Superior view of synthetic meniscus showing meniscus model without (left) and with (right) radial tear in the union of body and posterior horn of medial meniscus
Methods

• After baseline, the trainees completed a 10-session training program and had a final evaluation of proficiency on the simulator.

• Finally, trainees were measured using the ASSET on a real patient partial mid-body medial meniscectomy.

• Experts were measured once on the simulator and once on real patients.
Methods

- Statistical analysis was done assuming non-parametric behavior of variables, with Wilcoxon and U Mann Whitney tests.
- Significance was set at 5%
Results

All trainees improved significantly on the simulator (10 to 39 points) (p<0.01)

Trainees’ Median ASSET score (range)
Results

All trainees improved significantly on real patients
(14 to 36 points) (p<0.01)
Results

- Final trainee simulator score did not differ from experts on the simulator (p<0.01)
- Final trainee score on real patients was lower than final simulator score (36 vs 39 points respectively, p=0.01)

92% transfer ratio
Conclusions

- Simulated training of **partial mid-body medial meniscectomy** in orthopedic residents, using a low-fidelity knee model, proved to not only improve simulated **proficiency**, but also successfully transfer to a real clinical scenario with a **high model transfer ratio**.