PROCEDURE SPECIFIC ARTHROSCOPIC SIMULATION

USING 3D PRINTING

Michail Spyridon,Papakostopoulou Aikaterini,Mitsikostas Pnteleimon,Zisis Ioannis-Nektarios,Zacharakis Nikolaos,2nd Department of Orthopaedics,General Hospital of Athens'G.Gennimatas'

PURPOSE

We present a knee arthroscopy training box that can be 3D printed and simulates the knee anatomy and structures during real time arthroscopy.

MATERIA LAND METHODS

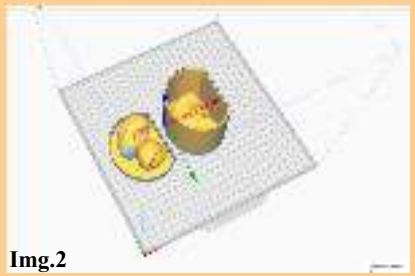
For the design, a healthy female knee high resolution CT scan was used , that was converted to STL, the patella and fibula were removed and the femur and tibia were cut perpendicular to the Z axis.

Two STLs were created, one for the tibia and one for the femur.

To achieve realistic positioning of the structures ,the two femoral condyles were split and placed as follows:the lateral in 90 degrees and the medial in 30 degrees respectively to the tibial plateau. The structures were fused and placed in the box to be 3d printed **(img. 1)**

- The box was designed so the height would be adjusted corresponding to the actual Tibiofemoral distance **(img. 2)**.
- The portals were measured from the patella on the CT to correspond to the typical arthroscopy portals **(img. 3)**.
- In the final design the plugs were adjusted to fit 20mm waterproof plugs or grommets which can be replaced.
- Additional plugs were placed in the design to be able to practice inside out and inside in techniques on a silicone meniscus.

img.1



Img.2

img.3

RESULT:

During the use of the 3d printed arthroscopic box,an ease of use in training basic arthroscopic techniques is encountered,using cheap printable materials and without any damage to the arthroscopic instruments.

CONCLUSION :

In the rapidly developping world of orthopaedic material technology and everyday evolving techniques,3D printing offers the novice trainee an easy to use ,affordable way to train as well as easy to access from everywhere ,given that a basic 3d printing station is available.

img.4

img.5

SOURCES

Stirling ER, Lewis TL, Ferran NA. Surgical skills simulation in trauma and orthopaedic training. J Orthop Surg Res. 2014 Dec 19;9:126. doi: 10.1186/s13018-014-0126-z. PMID: 25523023; PMCID: PMC4299292.