Neurosurgical Training Laboratory

- High Conductivity Saline Nanodroplets-Enhanced Thermoacoustic Imaging for Brain Tumor Detection
- Neuroradiological Evaluation of Anatomo-Morphometric Arcuate Fascicle Modifications According to Different Brain Tumor Histotypes: An Italian Multicentric Study
- Video gaming facilitates adaptation to surgical exoscopes - a laboratory experiment
- Additive Manufacturing, Thermoplastics, CAD Technology, and Reverse Engineering in Orthopedics and Neurosurgery-Applications to Preventions and Treatment of Infections
- NeuroLens: organ localization using natural language commands for anatomical recognition in surgical training
- Sleep deficiency exacerbates periodontal inflammation via trigeminal TRPV1 neurons
- Optimizing pregnancy management of chronic hypertension: A case report of cerebrovascular accident in a pregnant woman and literature review
- Rapid diagnosis of adult-type diffuse glioma using a layered scheme

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In low- and middle-income countries (LMICs), approximately 5 million essential neurosurgical operations per year remain unaddressed. When compared with high-income countries, one of the reasons for this disparity is the lack of microsurgery training laboratories and neurosurgeons trained in microsurgical techniques. In 2020, we founded the Madison Microneurosurgery Initiative to provide no-cost, accessible, and sustainable microsurgery training opportunities to health care professionals from LMICs in their respective countries.

Methods: We initially focused on enhancing our expertise in microsurgery laboratory training requirements. Subsequently, we procured a wide range of stereo microscopes, light sources, and surgical instrument sets, aiming to develop affordable, high-quality, and long-lasting microsurgery training kits. We then donated those kits to neurosurgeons across LMICs. After successfully delivering the kits to designated locations in LMICs, we have planned to initiate microsurgery laboratory training in these centers by providing a combination of live-streamed, offline, and in-person training assistance in their institutions.

Results: We established basic microsurgery laboratory training centers in 28 institutions across 18 LMICs. This was made possible through donations of 57 microsurgery training kits, including 57 stereo microscopes, 2 surgical microscopes, and several advanced surgical instrument sets. Thereafter, we organized 10 live-streamed microanastomosis training sessions in 4 countries: Lebanon, Paraguay, Türkiye, and Bangladesh. Along with distributing the recordings from our live-streamed training sessions with these centers, we also granted them access to our microsurgery training resource library. We thus equipped these institutions with the necessary resources to enable continued learning and hands-on training. Moreover, we organized 7 in-person no-cost hands-on microanastomosis courses in different institutions across Türkiye, Georgia, Azerbaijan, and Paraguay. A total of 113 surgical specialists successfully completed these courses.

Conclusion: Our novel approach of providing microsurgery training kits in combination with live-streamed, offline, and in-person training assistance enables sustainable microsurgery laboratory training in LMICs [1)]

Laboratory training is a very important step on the development of the skills necessary for a neurosurgeon. This can be achieved using animal models and surgical microscopes or stereomicroscopes. Methods, like the use of fluorescein, increase the lifelike situation and allows anyone to assess the patency of an anastomosis and improve the quality of this training.

Lovato et al., reported the use of a stereomicroscope with white light and a fluorescence mode used to perform dissection of small arteries and anastomosis using a chicken wing model. Using an affordable device they could perform fluorescein videoangiography to asses the patency of those anastomosis and improve the quality of the training skills in microsurgery.

The stereomicroscope is a useful tool for laboratory training and can be used as a substitute of a surgical microscope for microsurgery training. The fluorescence mode allowed us to perform fluorescein videoangiography with very a good quality of image.

Microsurgery training is important part in the life of any neurosurgeon. Using a stereomicroscope with a fluorescence mode is an affordable method that can be reproduced in any laboratory in the world [2].

Cadaver laboratory

Neurosurgical Cadaver Laboratory.

Microsurgical training laboratory

Microsurgical training laboratory.

Neurosurgical laboratory training model

see Neurosurgical laboratory training model.

[1]
Keles A, Cancela AA, Moussalem CK, Kessely YC, Malazonia Z, Shah JM, Gurbuz MS, Gasimov T, Adekanmbi A, Bari MS, Dumot C, Oriola GG, Golidtum JPU, Bin Mohd Nor MA, Omar AH, Ozaydin B, Patel NJ, Dempsey RJ, Baskaya MK. A Novel Approach for Free, Affordable, and Sustainable Microsurgery Laboratory Training for Low- and Middle-Income Countries: University of Wisconsin-Madison Microneurosurgery Laboratory Experience. Neurosurgery. 2024 Jan 30. doi: 10.1227/neu.0000000000002814. Epub ahead of print. PMID: 38289067.

[2]
Lovato RM, Campos Paiva AL, Pesente FS, Gonçalves de Oliveira J, Ferrarez CE, Vitorino Araújo JL, Esteves Veiga JC. An affordable stereomicroscope for microsurgery training with fluorescence mode. World Neurosurg. 2019 Jul 3. pii: S1878-8750(19)31856-X. doi: 10.1016/j.wneu.2019.06.199. [Epub ahead of print] PubMed PMID: 31279115.