Microsurgery

General term for surgery requiring an operating microscope.

Microsurgical technique and anatomical knowledge require extensive laboratory training. Human cadaver models are especially valuable as they supply a good microsurgical training environment simultaneously providing authentic brain anatomy.

Training

Microsurgical laboratory training seems to be essential in order to acquire the dexterity, ease and experience necessary for performing microsurgical procedures in human [1].

The increase in restrictions to animal use and the financial constraints of training in recent years have led to the development and spread of many non-living animal models for microsurgery simulation. Such models are numerous and include a huge spectrum such as rat cadavers, cryo-preseved rat aortas, chicken and turkey wings, leaves and grape skin, human cadaver vessels, and different styles of plastic simulation materials.

Most of these non-living models are sufficient in enabling students to acquire the basic set of microsurgery skills, especially in the early stages of training. At this beginner stage, the set of skills required includes a basic working knowledge of the surgical microscope, handling the microsurgery instruments and small sutures, and basic suturing and anastomosis techniques. Using non-living models for this purpose decreases the number of live animals used for training purposes, and gives students confidence when working with living tissues.

However, the live rat animal model remains an indispensable model for many training microsurgical courses around the world. The use of this model in microsurgery training stretches back to the early 1960's, when pioneers such as Lee [2] identified the need for low cost surgical models that could meet the clinical needs of the day. He and subsequent researchers went on to develop organ transplant models in the rat to help address the current immunological issues at that time. It became evident that there was a need to transfer these skills to the clinical sector, as these new microsurgical techniques opened up new surgical possibilities. This, in return, led to the establishment of microsurgical training courses utilizing the rat model across both shores of the Atlantic and the expansion of training.

Fifty years after Sun Lee's manual describing microsurgery techniques in the rat to address the needs of reconstructive surgeons of that time, the clinical world is again in need of further microsurgical training interventions with the advent of new horizons in microsurgery, namely, the advent of perforator flaps and lymphatic anastomosis. These new emerging techniques utilise vessels of below 1 mm. This has been termed 'supra-microsurgery' [3]

It has been established that microsurgery training courses using rat models offer many advantages. They greatly enhance students' surgical skills and provide the highest fidelity simulator for clinical microsurgery. The use of rat models in advanced courses under a supervised training programme provides an excellent simulation model for complex microsurgical reconstruction procedures. As such, the rat model remains the best preparation for achieving high standards of competency in microsurgery. Advances in microsurgical reconstruction demand new educational interventions. The live rat is one of the most versatile models in microsurgery training courses worldwide, and 50 years

after microsurgery was first pioneered, the rat model is still irreplaceable for advanced microsurgery skill acquisition. Its prospects include future educational roles in perforator flap techniques and robot-assisted microsurgery. [4)]

Standard microsurgical laboratories frequently have difficulties to work with decapitated human cadaver heads but could have human brains readily available. Using the infusion model and inserting it in a human skull makes the environment much more realistic. Its simplicity and inexpensiveness make it a good alternative for developing microsurgical techniques [5)].

1)
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