UMBILICAL CORD AND FOETAL PLACENTA VESSELS AS BIOLOGICAL MATERIAL IN MICROSURGICAL TECHNIQUES TRAINING – OWN EXPERIMENTS

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For dozens of years microsurgical techniques have been successfully applied in various procedural areas mainly in ophthalmology, laryngology, female infertility treatment, urology, plastic surgery and reconstruction as well as hand surgery. Courses enabling acquisition of basic qualifications within the microsurgical techniques area are the starting point for such activity, there is however an urgent need for further training as it goes without saying that without adequate training one may quickly forget all the experience gained during such trainings. Our department have been using foetal placenta obtained from maternity ward (following a written consent from a parturient) to carry out microsurgical trainings for 13 months now.

Key words: microsurgical anastomosis, experimental animals, human placenta

Microsurgery is widely applied in all operational fields (1). Those specializing in microsurgery have an opportunity to acquire basic microsurgical skills during microsurgical techniques courses (2, 3, 4). Such courses were pioneered by the Clinic of Traumatology and Hand Surgery, Silesian Piasts University of Medicine in Wrocław as early as in 1977, and since that time it has organized the courses every six months, with approximately 40 surgeons graduating each year (5).

As opposed to the 80s, the problem nowadays is not the very finding medical equipment of good quality but maintaining the high level skills of microsurgeons, who having achieved these skills are highly motivated to further develop in this area. In departments with microsurgical activity there exists a need for a non-stop access to “training material”. Only in emergency situations can animals become such material (e.g. research program strictly specified and approved by bioethical committee) (6). Apart from a number of limitations regarding animal exploitation for educational purposes, there also start logistic problems (including availability of experimental animal centres). What also needs to be taken into account is the act defining regulations applying to experiments on animals, which allows for such experiments only when they are indispensable to:
1) prepare, produce, supervise quality, ensure effectiveness and safety of medicaments, groceries and other substances and goods used for the following purposes:
   a) prophylaxis, diagnostics, medical treatment or health improvement, to counteract their influence on people, animals and plants,
b) estimation, detection, control or change of physiological states in animal and plant organisms,
2) health protection of people and animals from diseases,
3) environment protection with the purpose of human health protection or animals’ well-being,
4) basic scientific studies,
5) didactics in higher education institutions - if these goals cannot be achieved in a different way due to lack of proper alternative methods.

Experts though have different opinions as to value of animal specimens (8). In this case a widely accepted solution is to make use of various types of phantoms, most frequently in the form of tubes of different thickness (9). Obvious is the advantage of biological material of human tissues over the above-mentioned. Such material can be obtained, following the patient’s consent, fragments of removed tissues like: thyroid vessels, greater omentum, stomach, etc. (10). Following the example of Romero and Ayoubi, our department have for 13 months been using foetal placenta for microsurgical trainings (11, 12, 13).

Placenta – is an ellipsoidal formation of 16x20 cm in size, 2-3 cm in thickness and about 500-600 g of weight (14). Umbilical cord consists of a vein and two arteries. Foetal part is made from foetal stroma covered with a densely vascularized amniotic membrane that resembles cerebral choroidal membrane. The size of vessels in this area oscillates from 1-6 mm (12) (fig. 1, 2, 3).

We obtain placentas from maternity ward following the written consent from parturients.

Microsurgical trainings are run in a separate room of the surgical ward with the use of instruments specially allocated for this purpose (micro-tourniquets, scissors, “micro” scalpels, dissectors, etc.) as well as optical devices (lenses of 4-6x magnification). Placenta, after preliminary preparation (i.e. bathing with isotonic salt solution) is then placed on the operating table. Separation of vascular elements from placental stroma is the first stage of training. The most important part of the training is carrying out arterial and venous anastomosis in various configurations (end-to-end anastomosis, end-to-side anastomosis, etc.). The quality of the performed anastomosis is next confirmed by a flow test of liquid pressed up by gravitational force through a
narrow (pink) port and/or its instrumental examination.

Drawing on the more than annual period of experiments we have noticed the following advantages of placenta as biological material in microsurgical techniques trainings:

- easiness of acquisition - maternity wards are in most hospital complexes; such wards witness a few parturitions a day while a refusal to have the placenta used for scientific purposes is less than rare;
- free acquisition;
- similarity of vascular structures to those present in tissues which are subject to microsurgical reconstruction in all possible configurations;
- a wide spectrum of cross section diameter of vessels;
- possibility to store the material in fridge in isotonic salt solution up to 48 hours upon acquiring (the storage time may be longer, but lengthening the 48-hour-period diminishes value of the material, i.e. tissues lose turgor);

Human foetal placenta seems therefore to meet all the biological requirements of material meant for improvement of microsurgical techniques.

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