TRAINING PROGRAM IN MICROSURGERY AT THE VICTOR BABES UNIVERSITY OF MEDICINE AND PHARMACY, TIMISOARA

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INTRODUCTION

Since their development, microsurgical techniques have dramatically changed the concepts of wound treatment from general basics to advanced tissue reconstruction. Moreover, during the last three decades there is an increasing demand for application of microsurgery in many other specialties such as orthopedics, cardiovascular surgery, ENT surgery and also in fundamental sciences, where such techniques are used to perform small animal experimental models as tools for research.

Microsurgery entered Romania at the beginning of 1980 and began to be slowly but steadily implemented in nearly all university centers around the country. Still, the opportunity to learn microsurgery remained limited since only a few centers possessed the necessary equipment to perform such procedures. After the founding of the Romanian Society for Reconstructive Microsurgery, the idea of a microsurgery teaching program of high quality standards was fostered. It would address not only plastic surgeons but also allied specialties and basic scientists as well. The first seminars for microsurgery of vessels and nerves were started in 1992 at the Iuliu Hatieganu University of Medicine in Cluj-Napoca under the coordination of Prof. Dr. Constantin Ciuce. Six years later, a seminar curriculum, with a slightly different infrastructure, but having the same purpose, was developed in Timisoara at the Victor Babes University of Medicine.
and Pharmacy. Since then, these seminars became a tradition and are today part of the national Romanian training program in microsurgery. The main goal of such seminars is to offer a gradual introduction to microsurgical techniques by offering the participants the chance to learn and develop their skills under the direct supervision of experienced instructors.

Starting 1998, in Timisoara are organized two-three times per year 4-days training seminars in microsurgery of vessels and nerves for both clinicians and researchers. The main objective is to provide familiarization with optical equipments, microsurgical tools and then to gradually introduce participants in the details of live tissue preparation, microvascular and nervous suturing techniques.

After graduating the microcourses, as a link between the experimental laboratory and clinical microsurgery, the learning infrastructure has expanded with flap dissection courses in living tissues to further enhance the knowledge in such techniques and their clinical applications.

In the following paper the overall organization, the program and the microsurgical models used in this teaching program are presented. Furthermore, the evaluation of the participants as well as their professional background is discussed.

The Facility

The Pius Branzeu Center for Laparoscopic Surgery and Microsurgery is a two-level building entirely air-conditioned and structured as follows: on the first floor a multimedia conference room with a capacity of 70 participants and which may be adapted to host a maximum of 20 working places during the microsurgical seminars; on the second floor a microsurgical laboratory and an operating theatre equipped with 5 independent surgery stations including 5 basic sets of instruments for minimal invasive surgery and also special tools adapted for endoscopic free-flap harvesting and inhalatory anesthesia machines. (Figs. 1, 2) Finally, in the basement, a modern animal facility for small and large laboratory animals (e.g. mice, rats, pigs) was developed.

For training purposes, the center offers 10 table-top operatory microscopes (Model MD-651, Leica®, Sulzfeld, Germany) (Fig. 3) and one standing operating room microscope (Model MD 650L, Leica®, Sulzfeld, Germany) equipped with interchangeable CCD videocamera (JVC®) and digital imaging tools (Canon® digital camera, Sony® videoprinter) (Fig. 4) which enables both video and photo imaging during demonstrative procedures and documentation of different research activities. Basic microsurgical kits (Aesculap®, Tutlingen, Germany) and standard microsutures are also provided for participants.

Figure 1. Conference room at the Pius Branzeu Center for Laparoscopic Surgery and Microsurgery. In the actual picture it has been modified to host one microseminar.

Figure 2. Laparoscopic surgery operating room at the Pius Branzeu Center for Laparoscopic Surgery and Microsurgery.

Figure 3. One of our participants operating at the table-top operating microscope LEICA MD-651. The microscope used by trainees during the microseminars.
The training program is offered for residents of all surgical specialties and also for basic scientists willing to learn microsurgery. There is a modern online registration system through which all interested can ask for details about the program, course fees and accommodation and complete registration forms (www.umft.ro/pius_branzeu_center). Before being scheduled for a course each application is analyzed by at least two members of our staff and thereafter all other details are discussed independently with each applicant. Until the present time, more than 300 residents from different surgical specialties have been trained in our center. (Table 1)

Faculty
Besides the local organizing committee, to further increase the learning quality of our seminars internationally renowned faculty is constantly invited. Thus, during the last years, we had the privilege to have among us, as invited professors, Prof. Alexandros Beris (Ioannina, Greece), Prof. Mihaly Boros (Szeged, Hungary), Prof. Vaughan Bowen (Calgary, Canada), Dr. Max Geishauser (Munich, Germany), Prof. William Lineaweaver (Jackson, Mississippi, USA), Prof. Hanno Millesi (Vienna, Austria), and Prof. Amado Ruiz Razura (Houston, Texas, USA).

Accreditation
The microsurgery teaching program at the Victor Babes University of Medicine and Pharmacy Timisoara is part of the Romanian National Training Program in Microsurgery being officially recognized by several official authorities as Romanian Society for Reconstructive Microsurgery (RSRM), Romanian Society for Surgery of the Hand (RSSM) and Hellenic Society for Reconstructive Microsurgery (HSRM). Official accreditation is also given by European Board of Plastic, Reconstructive and Aesthetic Surgery (E.B.O.P.R.A.S). The seminars are credited on a regular basis by the Romanian College of Physicians with CME (continuing medical education) credits.

Certification
After successful evaluation, each participant receives a “University diploma in Microsurgery”, awarded by Victor Babes University of Medicine and Pharmacy. Before finishing, each trainee is completing an anonymous auto evaluation form containing questions about:
- Information source for the seminar;
- Rating of the theoretical sessions (rating score);
- Rating of the practical sessions (rating score);
- Rating of the overall organization of the course.

The forms also contain a request list about other techniques they would like to perform during seminars or about different topics they would like to hear during theoretical presentations.

After a continuous upgrade of our organizational infrastructure and after receiving the feedback from our trainees, we started to develop a much diversified array of seminars focused on specific specialties like neurosurgery and ophthalmology and also on individual training.

![Figure 4. Operating room standing microscope LEICA MD-651 equipped with JVC CCD videocamera and Canon digital imaging system. The microscope udes by instructors during the microseminars](image-url)

*Table 1. The overall participation ratio between different surgical specialties in a period from 1999 to 2005 is presented.*
SEMINAR FORMATS

1. Seminars for basic microsurgical skills

Under this format we organize a 4 days seminar with a maximum number of 20 participants. It mainly includes hands-on practical training (a total of 36 hours) and at least 1 theoretical session each day, in which different topics covering both experimental and clinical microsurgery are presented in 10 to 15 minutes of PowerPoint lectures. Each participant has his own workstation during the entire training and is closely followed and advised, throughout the practical sessions, by one experienced instructor. We found this combination to be the ideal teaching format through which, a real benefic interaction exists between the participant and his instructor. Thus, many questions can be answered “on the spot” and frustrating events such as bleeding during vessel dissection or wrong suture positioning can be avoided. As a rule, the first practical session is precluded by an introductory lecture in which the basics of microsurgery are explained together with a short description of the delicate micro-instrumentation.

The trainee starts with learning of different knot-tying and suture techniques on latex. During this session, since this year, we also use a latex-flap model. After the feedback from our participants we found this exercise to be extremely helpful in acquiring the maneuvers necessary for later handling of live structures.

As a second step, the participants get the chance to perform different anastomosis models in swine coronary arteries. (Fig. 5)

Starting with the second day until day 4, the live rat models are introduced in a increasing difficulty fashion, from the end-to-end anasmosis on the aorta to the end-to-end anasmosis of the femoral vein, interpositional vein grafts on aorta and finally end-to-side anastomosis in an arteriovenous fistula model. The last day is dedicated to microsurgical nerve coaptation on an ex-vivo chicken leg model (Fig. 6) Since it has proeminent femoral vessels, the participants are given the chance to repeat previously performed vascular exercises at the end of the nerve session.

2. Advanced microsurgical skills seminars

Advanced practical seminars, were developed on the same organizational infrastructure as the basic skill seminars and are organized for trainees with previous experience in microvascular surgery. These are 4 days-long seminars and consist of mainly practical hands-on laboratory on laboratory rats, precluded by short theoretical presentations of the exercises to be performed.

Here, the participants are expected to have extensive knowledge about fundamentals of microvascular techniques which they will further
“sharpen” by being introduced to different models of tissue and organ transplantation. The exercises presented are chosen to have an increasing difficulty level from the first day until the end of the seminar. Practical sessions start with easier models such as dissection and free transfer of different flaps (groin fasciocutaneous flap, semitendinosus-semimembranosus muscle flap), then move further with heterotopic kidney transplantation, heterotopic heart transplantation, hind-limb replantation and during the last day the techniques of orthotopic liver transplantation is demonstrated.

During practical sessions, each participant is closely observed by an experienced instructor. As found in our basic skills seminars, where this type of organisation was first introduced, such “one-to-one” contact, proves very effective in both avoiding uncomfortable accidents (e.g. haemorrhage during dissection) during experiments and accelerating the learning curve of the trainees.6-8

3. Individual training seminars in microsurgery
These seminars are offered on request and can also be organized for one person alone. Each seminar lasts 6 to 7 days and contains exclusively practical sessions the entire period. Participants are offered individual working places in our microsurgical laboratory, suited with Leica microscopes, specific instrumentation, sutures and animals. One of the senior staff is supervising and evaluating the trainees the entire period of the seminar. The program of the practical sessions is previously tailored according to the specific learning interests of each participant. Thus, one can be basic microsurgery practice (vessel and/or nerve anastomosis) or advanced experimental models from arterio-venous fistulae to free flap or organ transplantation.

Such seminar formats offer on one hand the unique possibility to intensively learn and master different microsurgical techniques in a relatively short time and on the other hand a flexible training program that can be specifically adjusted to reach the expectations of each participant.

Future plans
During the last 5 years the overall demand for such seminars has grown allowing us to continuously develop our training program. Trainees from many specialties including basic scientists approached us to develop other seminar formats more focused on certain fields (e.g. ophthalmology, neurosurgery, ENT surgery). Thus, one of our future aims will be to develop a new microsurgery training curriculum which will offer more comprehensive and diversified seminar formats that will encompass all learning levels from basic to advanced, being specifically adapted to the needs of each participant.

Another main area of development will be the completion of the Practical Manual for Experimental Microsurgery, developed as a complete reference for laboratory microvascular techniques in collaboration with prestigious specialists in the field. Here all microvascular and nervous procedures from fundamentals to video-assisted microsurgery or organ transplantation are presented in separate chapters. This idea was fostered and promoted by us after positive feedbacks received from trainees that took part in the micro-seminars.

CONCLUSIONS
The microsurgical training program at the Victor Babes University of Medicine and Pharmacy represents a valuable resource for both medical doctors and researchers, offering ideal learning conditions in a state-of-the-art facility equipped with modern technical infrastructure and highly qualified instructors. Also, by offering multiple training formats with national and international certification, it can adequately suit the specific needs of each target group being able to comprise a large array of participants with backgrounds from basic science to different surgical specialties.

By further developing the actual format of the training program in microvascular surgery in our university we hope to shorten and refine the learning curve of all participants willing to practice clinical microsurgery in the future, since “Ideally, training should begin in the laboratory. Only after expertise has been acquired should skills be transferred in the operating room. Later, problems encountered clinically can be taken back to the laboratory for solution. Thus, the experimental laboratory becomes an essential component of the resident training program.”

REFERENCES

