

## MICROSURGICAL EDUCATION IN GREECE: PAST, PRESENT, AND FUTURE

K. Gasteratos<sup>1</sup>, G.-A. Spyropoulou<sup>1</sup>, J. Georgoulis<sup>2</sup>,  
A. Karonidis<sup>3</sup>, D. Tentis, D. Michelakis<sup>4</sup>

<sup>1</sup> Papageorgiou General Hospital of Thessaloniki, Greece

<sup>2</sup> National and Kapodistrian University of Athens, School of Medicine, Athens,  
30, Panepistimiou Str., 10679, Athens, Greece

<sup>3</sup> General Hospital of Athens "G. Gennimatas", Athens, Greece

<sup>4</sup> Athens Veterans' Hospital, Athens, Greece

<sup>5</sup> Euroclinic Hospital Group, Athens, Greece

The aim of this paper is to provide a brief overview of the history of microsurgery in Greece and how it evolved throughout the years. It is based on published literature as well as anecdotal evidence. It is by no means an exhaustive list of available resources and contributions. Microsurgery in Greece begins with Prof Soucacos who acquired his microsurgical skills in the USA (1970–1974), where he worked as a clinical and research fellow. After gaining invaluable experience, he returned to his home country, Greece, to establish a microsurgery replantation team in 1975. His team gained national recognition soon thereafter thanks to the many successes and innovations they achieved. The tradition is continued with contemporary microsurgical courses in Greece from expert faculty and a busy microsurgical practice in several centers across the country. The experimental educational program in microsurgery includes a blend of synthetic and live animal models, such as rats and rabbits. They include a complete exposure to basic and advanced practical exercises through several days. The simulation training models slowly but surely steadily advance to meet the training standards.

**Keywords:** *Microsurgery, training, history, Greece, simulation, anastomosis, expert instruction.*

**Conflict of interest:** the authors declare the absence of obvious and potential conflicts of interest related to the publication of this paper.

**Financial disclosure:** no author has a financial or property interest in any material or method mentioned.

**For citation:** Gasteratos K., Spyropoulou G.-A., Georgoulis J., Karonidis A., Tentis D., Michelakis D. Microsurgical education in Greece: past, present, and future. *Issues of Reconstructive and Plastic Surgery*. 2021;24(1):109–116. doi: 10.52581/1814-1471/76/14

## МИКРОХИРУРГИЧЕСКОЕ ОБРАЗОВАНИЕ В ГРЕЦИИ: ПРОШЛОЕ, НАСТОЯЩЕЕ, БУДУЩЕЕ

К. Гастератос<sup>1</sup>, Г.-А. Спиропулу<sup>1</sup>, Дж. Георгулис<sup>2</sup>, А. Каронидис<sup>3</sup>,  
Д. Тентис, Д. Мичелакис<sup>4</sup>

<sup>1</sup> Главный госпиталь Папагеоргиу, г. Салоники, Греция

<sup>2</sup> Афинский национальный университет,  
Греция 10679, г. Афины, ул. Panepistimiou, 30

<sup>3</sup> Главный госпиталь Афин «Г. Генниматас», г. Афины, Греция

<sup>4</sup> Афинская больница для ветеранов, г. Афины, Греция

<sup>5</sup> Euroclinic Hospital Group, г. Афины, Греция

Цель статьи – дать краткий обзор истории микрохирургии в Греции и ее развития на протяжении многих лет. Обзор основан на опубликованной литературе, а также на свидетельствах. Приведен ни в коем случае не исчерпывающий список доступных ресурсов. Становление микрохирургии в Греции началось с профессора Сукакоса, который приобрел свои навыки в области микрохирургии в США (1970–1974), работая клиническим и научным сотрудником. Получив бесценный опыт, он вернулся в Грецию, чтобы в 1975 г. создать команду по микрохирургической реплантации. Вскоре его команда получила признание благодаря многочисленным достигнутым успехам и инновациям. Традиция продолжается современными курсами по микрохирургии в Греции под руководством опытных преподавателей, а также интенсивной микрохирургической практикой в нескольких центрах, расположенных по всей стране. Экспериментальная образовательная программа по микрохирургии включает в себя сочетание синтетических и живых моделей животных (крысы и кролики), а также полное ознакомление с базовыми и передовыми практическими упражнениями в течение нескольких дней. Модели имитационного обучения медленно, но неуклонно развиваются, чтобы соответствовать мировым стандартам обучения.

<b>Ключевые слова:</b>	микрохирургия, обучение, история, Греция, моделирование, анастомоз, инструктаж специалиста.
<b>Конфликт интересов:</b>	авторы подтверждают отсутствие конфликта интересов, о котором необходимо сообщить.
<b>Прозрачность финансовой деятельности:</b>	никто из авторов не имеет финансовой заинтересованности в представленных материалах или методах.
<b>Для цитирования:</b>	Гастератос К., Спиropулу Г.-А., Георгулис Дж., Каронидис А., Тентис Д., Миче-лакис Д. Микрохирургическое образование в Греции: прошлое, настоящее, будущее. <i>Вопросы реконструктивной и пластической хирургии</i> . 2021;24(1):109–116. doi: 10.52581/1814-1471/76/14

## OVERVIEW OF HISTORY OF MICROSURGERY IN GREECE

The history of microsurgery in Greece began with Professor Panayiotis N Soucacos who established microsurgical training in Greece. He acquired his microsurgical skills at the Duke University Medical Center in Durham, North Carolina (1970–1974) where he worked as a clinical and research fellow under his mentor, Dr. James Urbaniak. After gaining invaluable experience, he returned to his home country, Greece, to establish a microsurgery replantation team in 1975. Until then, several failed replantation attempts had been performed in Greece by various centers (Hippocraton Hospital, Diamandis Cassioumis; Laiko Hospital, Panayotis Balas and Anastasios Giannikas; “KAT” Hospital, Athanasios Trabaklos). These failures were attributed to the fact that there was not a dedicated expert microsurgical team to perform these challenging cases [1].

In 1967, Prof Panayiotis Balas, a vascular surgeon, and Anastasios Giannikas, an orthopaedic surgeon, performed the first successful replantation of a total arm amputation at Laiko Hospital, Athens, Greece [2, 3]. Nowadays, Prof Balas is considered the father of vascular surgery in Greece. In 1976, he successfully replanted an incomplete non-viable amputation of the distal third of the forearm.

In 1979, Prof Soucacos with the assistance of his resident Stathis Anastasiou, performed the first

successful multi-digit replantation in Greece by. In 1984, he established the first microsurgical workshop for orthopaedic and plastic surgeons joined by an internationally renowned faculty, Dr. Julia Terzis (President of the International Microsurgery Society at that time) and his mentor, Dr. Urbaniak from Duke University [1].

In 1989, Prof Soucacos and his team performed the first vascularized free fibula flap in a case of a patient with a type IIIb open tibial fracture. In 1990, the Hellenic Society of Reconstructive Microsurgery was founded. In 1994, the first successful thumb replantation was performed in Greece by Prof Soucacos and his team, including Prof Beris, a resident at the time.

Through members' contributions and international collaborations, they managed to expand their clinical work and educational activities, including seminars, workshops, symposia, and meetings [1, 4–14]. Dr. Julia Terzis is a renowned worldwide Greek Plastic Surgeon specializing in facial paralysis, and she has trained many Greek surgeons in this niche field.

In 1986, the Hand Surgery, Upper extremity and Microsurgery Unit of the “KAT” Hospital in Athens, Greece, was established with Dr. Nikolaos Daoutis as Director and Dr. Nikolaos Gerostathopoulos as Attending surgeon, joined thereafter by many other important microsurgeons. “KAT” hospital remains today a busy trauma center, and major microsurgical and hand trauma cases are being managed. It has a long tradition of teaching micro-

surgery courses for almost thirty years and spread the significance of microsurgery in various surgical specialties.

At the General State Hospital of Athens "G. Genimatas", Prof. Ioannovits established the Department of Microsurgery under the direction of Dr. Stamatopoulos. One of the first clinical cases of the Department was the successful toe-to-hand transfer in 1990 (Dr. K. Stamatopoulos and A. Kepenekidis). This was a benchmark in the evolution of microsurgery with significant contributions in the introduction of the working microscope and flaps for the reconstruction of severe and complex trauma cases. As a result, the field of microsurgery was expanded further across many surgical subspecialties.

The oncological hospital "Agios Savvas" and the Military Hospital of Athens significantly contributed to the development of microsurgery even more. As such Plastic Surgery in Greece was established as the main specialty that applied microsurgery for the management of complex reconstructive cases in relation to other specialties (e.g., ENT, Neurosurgery, Maxillofacial surgery).

Other centers include the "Thriasio General Hospital of Elefsina", St Andreas Hospital of Patra, and University Hospital of Larisa with invaluable contribution in this field. In 1998, with the election of Prof. Malizos as Head of the University Orthopaedic Clinic at the University of Larissa, another center for Microsurgery was established (co-workers Drs Z. Dailiana and S. Varytimidis). Prof. Malizos coming from Prof. Soucacos' "school", having also been trained in the USA close to Prof. Urbaniak has placed his own contribution in the evolution of microsurgery in Greece with clinical, editorial and educational work. In Patra Prof. Elias Lampiris established a Department for surgery of the hand and microsurgery with Drs. M. Tyllianaki and D. Giannika.

The first microsurgery cases in the armed forces were performed at the Athens Veterans' Hospital (417 NIMTS) since 2000 (Dr. P. Spyriounis, Dr. D. Tentis; resident) and later at 401 General Army Hospital in 2010. Dr Tentis, after returning from his microsurgery fellowship in Canada, and with all the other colleagues' contribution and collaboration, a clinical microsurgery practice to be proud of was established.

Ever since, there has been an exponential growth of the field of microsurgery in Greece with novel techniques being introduced in the current clinical practice, such as replantations, revascularization, free tissue transfer, toe-to-hand transfers, nerve grafts, and so forth. Numerous international peer-reviewed papers have been published in reputable Journals [15–17].

## CURRENT STATUS OF MICROSURGICAL TRAINING IN GREECE

Nowadays, thanks to Prof Soucacos initial efforts to establish standardized training microsurgical centers around Greece, there is a variety of educational courses and opportunities. The nationally recognized state-of-the-art Experimental Research and Training Center at "ELPEN", Athens, Greece is a pioneering Institute. The first basic and advanced microsurgical course for plastic surgeons took place at the "ELPEN" training center organized by the Hellenic Society of Plastic, Reconstructive and Aesthetic Surgeons (HESPRAS) in 2002 and 2003, respectively. Until now, 17 basic and 10 advanced courses have been organized by scientific faculty, namely, Dr. Achilleas Kepenekidis, Dr. Dimitrios Michelakis, and more recently by Dr. Christos Assimomitis (in advancing chronological order).

At the ELPEN center, several hands-on microsurgical – both basic and advanced – workshops occur annually until recent unprecedented restrictions due to COVID-19 pandemic. Through expert faculty one-on-one instruction on practical exercises and lectures, participants complete a series of microsurgical exercises with an increasing difficulty. The basic and advanced experimental model is the live wistar rat and rabbit, respectively, which both offer an unparalleled experience for trainees. A veterinary anesthesiologist with his designated crew of assistants provides sedation and analgesia for the animals. The participants of the course practice their skills through a series of practical exercises with increasing difficulty after having been introduced to fundamental concepts through video-based lectures. Step-by-step techniques are being taught, such as end-to-end, end-to-side anastomoses of femoral vessels, neurorrhaphy, interposition vein graft, bypass graft, free groin flap, aorta dissection, and auricular replantation [18] (Fig. 1–3).

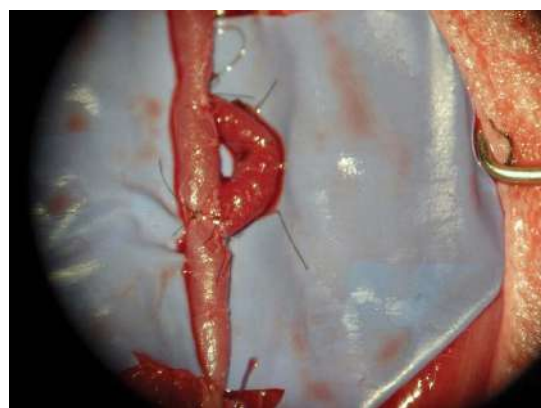


Fig. 1. Bypass graft in rabbit model

Рис. 1. Обходной трансплантат на модели кролика



Fig. 2. Auricular replantation in rabbit model

Рис. 2. Реплантация ушной раковины на модели кролика

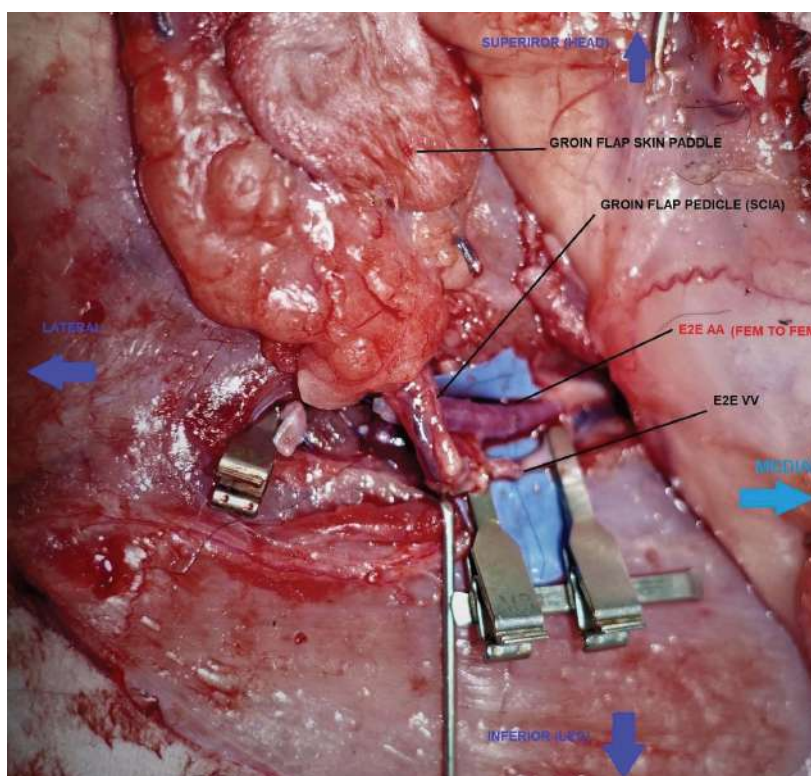


Fig. 3. Free groin flap elevated and inset ready for microvascular anastomoses with femoral vessels in rabbit model. (E2E, end to end; AA, artery to artery; fem, femoral; SCIA, superficial circumflex iliac artery)

Рис. 3. Свободный паховый лоскут приподнят и вставлен для микрососудистого анастомоза с бедренными сосудами на модели кролика (E2E, конец в конец; AA, от артерии к артерии; бедренная, бедренная; SCIA, поверхностная огибающая подвздошная артерия)

In 1988 Dr. Aikaterini (Catherine) Vlastou, a plastic and reconstructive surgeon, returned to Greece from the USA after having trained and worked for 16 years in Cleveland, Ohio, with vast experience in microsurgery. Evers since, she is one of the leading microsurgeons in Greece with crucial clinical, educational and scientific contributions to the field, and one of the constitutional members of the Hellenic Society for Reconstructive Microsurgery, established in early 1990s.

Several research projects and courses in microsurgery are conducted in many Institutions, including the Department of Clinical Sciences, Faculty of Veterinary Medicine, Aristotle University of Thes-

saloniki, Thessaloniki, Greece. Last but certainly not least, the department of Plastic and Reconstructive Surgery at "Papageorgiou" General Hospital in Thessaloniki, Greece is a leading academic institute in laboratory research and clinical micro- and super-microsurgical innovative reconstructive techniques with a vast diversity of patient caseload. Other courses are listed below:

- Annual International Flap Course on living tissues at the "Center for Orthopaedic Research and Education" (O.R.E.C) established by Prof. Soucacos and ran at Attiko University Hospital, Athens
- Course on hand surgery with practical exercise and live surgery demonstration organized since



2007 by the "Iatriko Athinon" Hospital (organizing faculty Drs. D. Misitzis, P. Giannakopoulos, S. Anagnostou, N. Skouras)

Course on problems of the hand organized in Thessaloniki since 2008 (Prof. Ch. Dimitriou).

- Joint annual symposium co-organized by the Hellenic Society for Reconstructive Microsurgery and the Hellenic Society for Surgery of the Hand, held in Thessaloniki. There are training sessions incorporated in the symposium program with lectures on surgical anatomy, flap anatomy and dissection techniques.

Yearly course in microsurgery organized by the Orthopaedic Clinic of University of Ioannina since 1984.

- 3-month practical training in microsurgery organized at the research center "Th. Garofalidis" at KAT hospital since 1989 with co-direction by the Hand and Microsurgery Clinic, the Research Center and the University Orthopaedic Clinic of KAT.

- Microsurgery week organized by the University Orthopaedic Clinic of Ioannina University since 1989 (Professors Beris, Korompilias and Vekris).

- Course for flap dissection on living tissues (rabbits-pigs): organized by the Dept. of Plastic Reconstructive and Aesthetic Surgery of "YGEIA" Hospital (chief scientific organizing faculty member Dr. Aikaterini Vlastou) and the Dept. of Plastic Surgery and Burns Center of Ioannina University (Dept. Head and co-organizing faculty member Prof. Efstathios Lycoudis).

- Microsurgery training organized by the Plastic Surgery Clinic of Evangelismos Hospital (scientific organising faculty member Dr. George Charikiolakis).

Until today, orthopaedic and plastic surgery residents rotate through several major teaching public hospitals across the country to further gain exposure to hand trauma and microsurgical training alongside experienced faculty. Notably, microsurgery is also being performed in private sector hospitals in major cities in Greece.

## OBJECTIVE ASSESSMENT TOOLS FOR MICROSURGICAL TRAINING

Different objective assessments tools and scoring systems to determine the quality of the training provided to trainees. International consensus on minimum standards for microsurgical courses [19, 20], minimum microsurgery case requirements [21] and several validated training models with objective structured assessment of technical skills (OSATS) have been devised to evaluate the trainers' performance in microsurgery [22–25].

The development of assessment tools for Robot-Assisted Microsurgery (RAMS) skills is still in progress [26–29]. All of these innovative grading

tools are comprehensive and reliable for assessing the students' progress throughout a microsurgical course [30, 31]. However, they focus solely on the technical aspects [32], such as manual dexterity, hand-eye coordination, meticulous suture placement [33, 34], speed, operative flow, motion 35, and patency of the anastomosis based on task-specific checklists [36–40]. On the other hand, non-technical skills (NTS) are equally important. Non-technical skills include five broad categories: leadership, situation awareness, decision-making, communication, and teamwork. The integration of these skills in the microsurgical curricula is a work in progress [41]. Last but not least, studies show that expert instruction is pivotal in achieving timely and significant progress in microsurgical courses compared to courses which do not have a designated instructor [42].

The educational ethic of spreading the knowledge for the development of new microsurgeons is reflected today in current microsurgical training; innovative methods are being employed by faculty for residents to be able to expand their technical skills with the elevation of anterolateral thigh flaps under Attending supervision [43]. Contemporary experimental microsurgical research is being conducted in several fields, such as nerve regeneration with an epineurial flap can be used to bridge a nerve defect [44].

Some drawbacks in the microsurgical training are the short residency period of four years and the lack of a robust official rotational training in head and neck, craniofacial, breast, upper and lower limb subspecialties during residency.

## FUTURE PERSPECTIVES

Due to COVID-19, the face and shape of the microsurgical training has shifted towards virtual training worldwide. In order to abide by the new regulations, researchers and policy creators have begun to recognize and started to turn to alternative educational modalities, such as nonliving models, virtual/augmented reality (VR/AR) and three-dimensional tools for microvascular anastomosis training [45]. A myriad of novel synthetic [46] (e.g., silicone) and biological training models have been devised over the years. As a result, select microsurgery courses at the University of Ioannina School of Medicine, Greece, have proposed modernized curricula consisting of a blend of both live and virtual learning experiences, and advocated the evaluation of the trainee should be added in the training programs [47].

In conclusion, the history of microsurgery in Greece reflects the long tradition in this field with ongoing contribution from contemporary passionate researchers and physicians.

Note: This concise article is not meant to offer an exhaustive list of "pioneers" in microsurgery in Greece but rather a brief overview based on bibliographical published literature as well as anecdotal evidence.

Since no official consensus currently exists in Greece, the authors attempted to highlight the most important facts on the evolution of microsurgical in Greece throughout the years.

## REFERENCES

1. Soucacos P.N. 20 years of microsurgery in Greece. *Acta Orthop Scand Suppl.* 1995;264:3-6.
2. Christeas N., Balas P., Giannikas A. Replantation of amputated extremities. Report of two successful cases. *Am J Surg.* 1969;118(1):68-74.
3. Balas P. Replantation of amputated extremities. The necessity for re-evaluation. *Vasc Surg.* 1973;7(1):1-2.
4. Soucacos P.N., Beris A.E., Touliatos A.S., Anastasiou E.D. Evolution and present status of orthopedic microsurgery in Greece. *Clin Orthop Relat Res.* 1989;(246):65-69.
5. Soucacos P.N. Orthoplasty in trauma & reconstructive microsurgery: World Society for Reconstructive Microsurgery IV WSRM Congress, Athens, Greece. *Injury.* 2008;39 Suppl 3:S1-S4.
6. Beris A.E., Soucacos P.N., Malizos K.N. Microsurgery in children. *Clin Orthop Relat Res.* 1995;(314):112-121.
7. Beris A., Kostas-Agnantis I., Gkiatas I., Gatsios D., Fotiadis D., Korompilias A. Microsurgery training: A combined educational program. *Injury.* 2020;51 Suppl 4:S131-S134.
8. Soucacos P.N., Mavrogenis A.F. Reconstructive microsurgery. *Eur J Orthop Surg Traumatol.* 2019;29(2):245-246.
9. Beris A.E., Lykissas M.G., Korompilias A.V., Mitsionis G.I., Vekris M.D., Kostas-Agnantis I.P. Digit and hand replantation. *Arch Orthop Trauma Surg.* 2010;130(9):1141-1147.
10. Georgescu A., Bumbasirevic M., Soucacos P.N. Current trends in microsurgery: From basic and clinical sciences to medical education. *Injury.* 2020;51 Suppl 4:S1-S3.
11. Georgescu A.V., Battiston B., Soucacos P.N. European Federation of Societies for Microsurgery (EFSM): Our ongoing commitment to education and advancement of the field. *Injury.* 2019;50 Suppl 5:S1-S2.
12. Georgescu A.V., Battiston B., Matei I.R., et al. Emergency toe-to-hand transfer for post-traumatic finger reconstruction: A multicenter case series. *Injury.* 2019;50 Suppl 5:S88-S94.
13. Bumbaširević M., Palibrk T., Georgescu A.V., et al. "Close-open-close free-flap technique" for the cover of severely injured limbs. *Injury.* 2019;50 Suppl 5:S29-S31.
14. Malizos K.N., Zalavras C.G., Soucacos P.N., Beris A.E., Urbaniak J.R. Free vascularized fibular grafts for reconstruction of skeletal defects. *J Am Acad Orthop Surg.* 2004;12(5):360-369.
15. Soucacos P.N., Beris A.E., Malizos K.N., Touliatos A.S. Bilateral thumb amputation. *Microsurgery.* 1994;15(7):454-458.
16. Soucacos P.N., Anastasiou E.D. The first finger. *Acta Orthop Hellenica.* 1994;45:21-28.
17. Beris A.E., Soucacos P.N., Touliatos A.S. Experimental evaluation of the length of microvenous grafts under normal tension. *Microsurgery.* 1992;13(4):195-199.
18. Seminars. <https://elpenresearchcenter.com/research-training/seminars-2/>. Published October 6, 2017. Accessed February 20, 2021.
19. Ghanem A., Kearns M., Ballestín A., et al. International microsurgery simulation society (IMSS) consensus statement on the minimum standards for a basic microsurgery course, requirements for a microsurgical anastomosis global rating scale and minimum thresholds for training. *Injury.* 2020;51 Suppl 4:S126-S130.
20. Tolba R.H., Czigány Z., Osorio Lujan S., et al. Defining Standards in Experimental Microsurgical Training: Recommendations of the European Society for Surgical Research (ESSR) and the International Society for Experimental Microsurgery (ISEM). *Eur Surg Res.* 2017;58(5-6):246-262.
21. Kania K., Chang D.K., Abu-Ghname A., et al. Microsurgery Training in Plastic Surgery. *Plast Reconstr Surg Glob Open.* 2020;8(7):e2898.
22. Dumestre D., Yeung J.K., Temple-Oberle C. Evidence-Based Microsurgical Skill-Acquisition Series Part 1: Validated Microsurgical Models – A Systematic Review. *J Surg Educ.* 2014;71(3):329-338.
23. Almeland S.K., Lindford A., Sundhagen H.P., et al. The effect of microsurgical training on novice medical students' basic surgical skills – a randomized controlled trial. *Eur J Plast Surg.* 2020;43(4):459-466.
24. Evgeniou E., Walker H., Gujral S. The Role of Simulation in Microsurgical Training. *J Surg Educ.* 2018;75(1):171-181.
25. Satterwhite T., Son J., Carey J, et al. The Stanford Microsurgery and Resident Training (SMaRT) Scale: validation of an on-line global rating scale for technical assessment. *Ann Plast Surg.* 2014;72 Suppl 1:S84-S88.
26. Zhang D., Wu Z., Chen J., et al. Automatic Microsurgical Skill Assessment Based on Cross-Domain Transfer Learning. *IEEE Robotics and Automation Letters.* 2020;5(3):4148-4155.
27. Clarke N.S., Price J., Boyd T., et al. Robotic-assisted microvascular surgery: skill acquisition in a rat model. *J Robot Surg.* 2018;12(2):331-336.

28. van Mulken T.J.M., Boymans C.A.E.M., Schols R.M, et al. Preclinical Experience Using a New Robotic System Created for Microsurgery. *Plast Reconstr Surg*. 2018;142(5):1367-1376.
29. Lee J.-Y., Mattar T., Parisi T.J., Carlsen B.T., Bishop A.T., Shin A.Y. Learning curve of robotic-assisted microvascular anastomosis in the rat. *J Reconstr Microsurg*. 2012;28(7):451-456.
30. Nugent E., Joyce C., Perez-Abadia G., et al. Factors influencing microsurgical skill acquisition during a dedicated training course. *Microsurgery*. 2012;32(8):649-656.
31. Ribeiro de Oliveira M.M., Ramos T.M., Ferrarez C.E., et al. Development and validation of the Skills Assessment in Microsurgery for Brain Aneurysms (SAMBA) instrument for predicting proficiency in aneurysm surgery. *J Neurosurg*. June 2019:1-7.
32. Qassem Q., Boulart L. A 4-task skills examination for residents for the assessment of technical ability in hand trauma surgery. *J Surg Educ*. 2015;72(2):179-183.
33. Zheng Y.D., Nicolas C.F., Corvi J.J., et al. Large and Uneven Bites in End-to-End Anastomosis of the Rat Femoral Artery. *J Reconstr Microsurg*. 2020;36(7):486-493.
34. Kim E., Norman I.C.F., Myers S., Singh M., Ghanem A. The end game – A quantitative assessment tool for anastomosis in simulated microsurgery. *J Plast Reconstr Aesthet Surg*. 2020;73(6):1116-1121.
35. Schaverien M.V., Liu J., Butler C.E., Selber J.C. Factors Correlating With Microsurgical Performance: A Clinical and Experimental Study. *J Surg Educ*. 2018;75(4):1045-1051.
36. Chan W., Niranjana N., Ramakrishnan V. Structured assessment of microsurgery skills in the clinical setting. *J Plast Reconstr Aesthet Surg*. 2010;63(8):1329-1334.
37. Balasundaram I., Aggarwal R., Darzi L.A. Development of a training curriculum for microsurgery. *Br J Oral Maxillofac Surg*. 2010;48(8):598-606.
38. Atkins J.L., Kalu P.U., Lannon D.A., Green C.J., Butler P.E.M. Training in microsurgical skills: Assessing microsurgery training. *Microsurgery*. 2005;25(6):481-485. doi:10.1002/micr.20150
39. Dumestre D., Yeung J.K., Temple-Oberle C. Evidence-based microsurgical skills acquisition series part 2: validated assessment instruments – a systematic review. *J Surg Educ*. 2015;72(1):80-89.
40. Campos M.E.C., de Oliveira M.M.R., Reis A.B., de Assis L.B., Iremashvili V. Development and validation a task-specific checklist for a microsurgical varicocele simulation model. *Int Braz J Urol*. 2020;46(5):796-802.
41. Gasteratos K., Paladino J.R., Akelina Y., Mayer H.F. Superiority of living animal models in microsurgical training: beyond technical expertise. *Eur J Plast Surg*. February 2021:1-10.
42. Paladino J., Gasteratos K., Akelina Y., Marshall B., Papazoglou L.G., Strauch R.J. The Benefits of Expert Instruction in Microsurgery Courses. *J Reconstr Microsurg*. September 2020. doi:10.1055/s-0040-1715910
43. Deskoulidi P.I., Benetatos K.M., Maltzaris N.A., et al. The Anterolateral Thigh Perforator Flap in an Innovative Microsurgery Training Method. *Plast Reconstr Surg Glob Open*. 2018;6(11):e1974.
44. Ignatiadis I.A., Tsiampa V.A., Yiannakopoulos C.K., et al. A new technique of autogenous conduits for bridging short nerve defects. An experimental study in the rabbit. In: *How to Improve the Results of Peripheral Nerve Surgery*. Springer Vienna; 2007:73-76.
45. Alshome F., Alhazmi B., Alowais F., Aldekhayel S. A Low-Cost 3D-Printed Tool with Multiaxial/Angular Vessel Orientation for Microvascular Anastomosis Training. *Plast Reconstr Surg Glob Open*. 2020;8(2):e2567.
46. Willis R.E., Wiersch J., Adams A.J., Al Fayyadh M.J., Weber R.A., Wang H.T. Development and Evaluation of a Simulation Model for Microvascular Anastomosis Training. *J Reconstr Microsurg*. 2017;33(7):493-501.
47. Beris A., Kostas-Agnantis I., Gkiatas I., Gatsios D., Fotiadis D., Korompilias A. Microsurgery training: A combined educational program. *Injury*. March 2020. doi:10.1016/j.injury.2020.03.016

Поступила в редакцию 16.12.2020, утверждена к печати 18.02.2021

Received 16.12.2020, accepted for publication 18.02.2021

#### Information about authors:

**Konstantinos Gasteratos\***, MD, MSc, the Department of Plastic and Reconstructive Surgery, Papageorgiou General Hospital of Thessaloniki, Greece.

ORCID: 0000-0001-5305-668X

**Georgia-Alexandra Spyropoulou**, MD, PhD, the Department of Plastic and Reconstructive Surgery, Papageorgiou General Hospital of Thessaloniki, Greece.

**Jim Georgoulis**, MD, First Department of Orthopaedics, National and Kapodistrian University of Athens, School of Medicine, Athens, Greece.

**Athanasios Karonidis**, MD, MBA, PhD, MRCS, FEBOPRAS, the Department of Plastic and Reconstructive Surgery, General Hospital of Athens "G. Gennimatas", Athens, Greece.

**Dimitrios Tentis**, MD, the Department of Plastic and Reconstructive Surgery for adults & children, Euroclinic Hospital Group, Athens, Greece.

**Dimitrios Michelakis**, MD, Consultant Plastic & Reconstructive Surgeon, Microsurgeon, Plastic Surgery Department, 417 NIMTS Athens Veterans' Hospital Athens, Greece.

**Сведения об авторах:**

**Константинос Гастератос\***, MD, MSc, отделение пластической и реконструктивной хирургии, Главный госпиталь Папагеоргиу (г. Салоники, Греция).  
ORCID: 0000-0001-5305-668X

**Джорджия-Александра Спиропулу**, MD, PhD, отделение пластической и реконструктивной хирургии Главный госпиталь Папагеоргиу (г. Салоники, Греция).

**Джим Георгулис**, MD, Первое отделение ортопедии, Афинский национальный университет, медицинский факультет (г. Афины, Греция).

**Афанасиос Каронидис**, MD, MBA, PhD, MRCS, FEBOPRAS, отделение пластической и реконструктивной хирургии, Центральный госпиталь Афин «Г. Генниматас» (г. Афины, Греция).

**Димитриос Тентис**, MD, отделение пластической и реконструктивной хирургии для взрослых и детей, Euroclinic Hospital Group (г. Афины, Греция).

**Димитриос Мичелакис**, MD, пластический и реконструктивный хирург-консультант, микрохирург, отделение пластической хирургии, 417 NIMTS, Афинский госпиталь для ветеранов (г. Афины, Греция).