Smartphone-Based Microsurgical Simulation and Training Model Using Pig and Chicken Feet in Novice Residents and Surgeons

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Abstract:

Microsurgical education typically does not begin until surgical residency, and requires significant investment of time and practice. (1) Simulation is integral to the development and maintenance of micro- surgical skills. Several simulation models have been described ranging from bench- top to live animal models.

Methods: Descriptive study showing a smartphone-based microsurgical simulation and training model using pig and chicken feet in novice residents and surgeons according the supervision and experience of a senior microsurgical plastic and reconstructive surgeon with a huge experience in reconstructive and microsurgical cases in the Medical Research Center La Trinidad in Caracas, Venezuela.

Discussion And Conclusion: The challenge of increasing microsurgery exposure during residency training is complicated by the need for specialized equipment and lab, supervision and guidance of attendings, and single use item costs. Thus, much effort has been invested to determine an approach to efficiently develop surgeons with microsurgical skills. A fact that highlights the opportunity to develop a simple and traditional systems of training using portable advices like smartphones, tablets, chiken and pig feets and diminute instruments and sutures.

keywords: microsurgery; simulation; training; resident

Introduction

Microsurgical education typically does not begin until surgical residency, and requires significant investment of time and practice. [1] Simulation is integral to the development and maintenance of micro- surgical skills. Several simulation models have been described ranging from bench- top to live animal models. [2] Flap dissection, microsurgery, and free tissue transfer are challenging procedures within plastic and reconstructive surgery, for which the learning curve is long, and students often face difficulties in mastering these techniques during the 3-year plastic surgery residency program. [3]

Methods

Descriptive study showing a smartphone-based microsurgical simulation and training model using pig and chicken feet in novice residents and surgeons according the supervision and experience of a senior microsurgical plastic and reconstructive surgeon with a huge experience in reconstructive and microsurgical cases. Using a pig and chicken feets as a biological model of soft tissues, the residents of different surgical areas (plastic and reconstructive surgery, head and neck surgery and general surgery) of the Medical Research Center La Trinidad in Caracas, start with the dissection of the vascular pedicles between the biological model, and after that, using a magnification high resolution image system of the tablets and smartphones, it can develop a microsurgical anastomoses using 8-0 a 9-0 sutures with a delicate surgical instruments. However, also can practice the different models of regional flaps according his geometry and transfer type like rotation, advancement and interpolation flaps.

Discussion And Conclusion

Microsurgical techniques have a steep learning curve. Worldwide along these years different surgical institutes adapted validated surgical approaches to develop a novel, competency-based microsurgical simulation curriculum called Fundamentals of Microsurgery (FMS). Some of these learnings are rubber band transfer, glove laceration repair, synthetic vessel anastomosis, and vessel anastomosis in a deep cavity. [4] With surgical education moving from a time-based to a competency-based model, developing high-fidelity simulation models has become a priority. [5] The acquisition of advanced microsurgical skills is obtained through a long training that is traditionally performed on ex-vivo models with the aid of the operating microscope. The chicken model is one of the most widespread options in microsurgical training, as it allows trainees to safely reproduce the surgical gesture on arteries and veins whose caliber are comparable to that of head and neck vessels. [6] There are currently many ways to maintain skill and training in performing sutures with microinstruments. Microsurgeons are experimentally trained to ensure that anastomoses are as safe as possible for the patient at all times. Animal models are used, and even smartphones are used to practice and train continuously in the comfort of one's home. [7] A fact that has relation with this study according the methodology and instruments used by the residents in the microsurgical training with the senior microsurgical professor. In the reports of Andrades P, Erazo C, Loo M et al [8] three microsurgeons in training evaluated the following models in their laboratory: latex rubber, a #14 feeding tube, a chicken leg, a chicken wing, a turkey wing, a pig leg, a beef heart, a human placenta, and a human anterior abdominal wall obtained from abdominoplasty. The challenge of increasing microsurgery exposure during residency training is complicated by the need for specialized equipment and lab, supervision and guidance of attendings, and single use item costs. Thus, much effort has been invested to determine an approach to efficiently develop surgeons with microsurgical skills. A fact that highlights the opportunity to develop a simple and traditional systems of training using portable advices like smartphones, tablets, chiken and pig feets and diminute instruments and sutures. Finally, advances in surgical instruments, magnification technology, perforator dissection techniques, and vascular imaging over the past decades have facilitated exponential growth in the field of microsurgery. With wide application potential including but not limited to limb salvage, breast reconstruction, lymphedema treatment, and sex affirmation surgery, microsurgery represents a critical skill set that powerfully augments the reconstructive armamentarium of plastic surgeons. [9]

Figures 1-2: Medical Research Center "La Trinidad" Caracas. Venezuela

Figure 3: Senior microsurgeon performing a vascular microanastomoses.

Acknowledgments

Conflicts Of Interest

The author declares no conflicts of interest.

Ethical Approval

This research complies with the World Medical Association Declaration of Helsinki on medical protocols and ethics.

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