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Research review

Animal models in plastic and reconstructive surgery simulation—a review

Charles Yuen Yung Loh, MBBS, MSc, MS, MRCS,[a,b,1]
Aline Yen Ling Wang, BS, MS, PhD,[a,1]
Vincent Tze Yang Tiong, MBChB, MRCS, FRCR,[c,1]
Thanassi Athanassopoulos, MBBS, DPhil, FRCS(Plast),[d]
Meiling Loh, MBBS, MRCS,[e] *Philip Lim, MBBS, FRCS(Plast),*[f]
and Huang-Kai Kao, MD, FACS[a,g,*]

[a] *Department of Plastic Surgery, Center for Vascularized Composite Allotransplantation, Chang Gung Memorial Hospital, Taoyuan, Taiwan*
[b] *Graduate Institute of Clinical Medical Sciences, Chang Gung University, Taoyuan, Taiwan*
[c] *Department of Radiology, Tan Tock Seng Hospital, Singapore*
[d] *Department of Plastic Surgery, Aberdeen Royal Infirmary, Aberdeen, United Kingdom*
[e] *Department of Plastic Surgery, Tan Tock Seng Hospital, Singapore*
[f] *Department of Plastic Surgery, Hull York Medical School (HYMS), York Teaching Hospital, York, United Kingdom*
[g] *College of Medicine, Chang Gung University, Taoyuan, Taiwan*

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ABSTRACT

Background: The use of live and cadaveric animal models in surgical training is well established as a means of teaching and improving surgical skill in a controlled setting. We aim to review, evaluate, and summarize the models published in the literature that are applicable to Plastic Surgery training.

Materials and methods: A PubMed search for keywords relating to animal models in Plastic Surgery and the associated procedures was conducted. Animal models that had cross over between specialties such as microsurgery with Neurosurgery and pinnaplasty with ear, nose, and throat surgery were included as they were deemed to be relevant to our training curriculum. A level of evidence and recommendation assessment was then given to each surgical model.

Results: Our review found animal models applicable to plastic surgery training in four major categories namely—microsurgery training, flap raising, facial surgery, and hand surgery. Twenty-four separate articles described various methods of practicing microsurgical techniques on different types of animals. Fourteen different articles each described various methods of conducting flap-based procedures which consisted of either local or perforator flap dissection. Eight articles described different models for practicing hand surgery techniques. Finally, eight articles described animal models that were used for head and neck procedures.

* *Corresponding author*. Department of Plastic and Reconstructive Surgery, Chang Gung Memorial Hospital & Chang Gung University College of Medicine, 5, Fu-Hsing St., Kuei-Shan, Tao-Yuan, Taiwan. Tel.: +886 3 3281200x3355; fax: +886 3 2868789.
E-mail address: kai3488@gmail.com (H.-K. Kao).
[1] Drs Loh, Wang and Tiong have equal contribution.
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Head and neck

Conclusions: A comprehensive summary of animal models related to plastic surgery training has been compiled. Cadaveric animal models provide a readily available introduction to many procedures and ought to be used instead of live models when feasible.

Introduction

The Oxford English Dictionary definition of the word 'simulate' is "to imitate the appearance or character of". Training in many areas of work involves the use of simulation, with the airline industry perhaps the best known example. The use of simulation in medical training is becoming increasingly common. Skills and techniques can be honed in a realistic setting under supervision, before performing it on the live patient. It allows for a controlled environment in which mistakes can be made and lessons learned without major repercussions.

In the United Kingdom, with the advent of the European Working Time Directive, and the resulting cap on doctor's hours, surgical training has had to evolve to include a greater use of simulation and goal-directed teaching, to deliver safe and effective training. Animal models thus play an important role in surgical simulation. Not only do they allow the build-up of technical skills but also allow trainees to develop the decision-making steps which are often lacking in traditional textbook learning. These 'soft factors' are often crucial in the success of a surgery and can only be learned through the simulation of surgical procedures and performing it themselves. Animal models allow for a safe environment with less pressure compared with the actual scenario. Trainees can then build-up their confidence before commencing on patients.

There are multiple animal models for various aspects of Plastic Surgery training which have been published over the years. However, there lacks an overall view and summary of the feasibility of such models in the literature. This review aims to highlight animal training models described in the literature for plastic surgery in particular and provide a grading or level of evidence and recommendation which may serve as a guide for future trainees wishing to learn more about a particular surgical procedure. This guide will also steer future research into other different plastic surgery simulation models.

Materials and methods

Search methods

A list of MeSH terms were made to search PubMed, Embase, and Medline sources. Keywords such as animal model, training, plastic surgery, microsurgery, and simulation were used. Our search period spanned a period of 2 weeks from first November 2013 to 14th November 2013 and was performed by two reviewers who performed the task independent of each other. Articles deemed relevant were then analyzed by our reviewers and categorized into types of training procedure, animal models used, and the features of each model. Other training models that involved other forms of simulation other

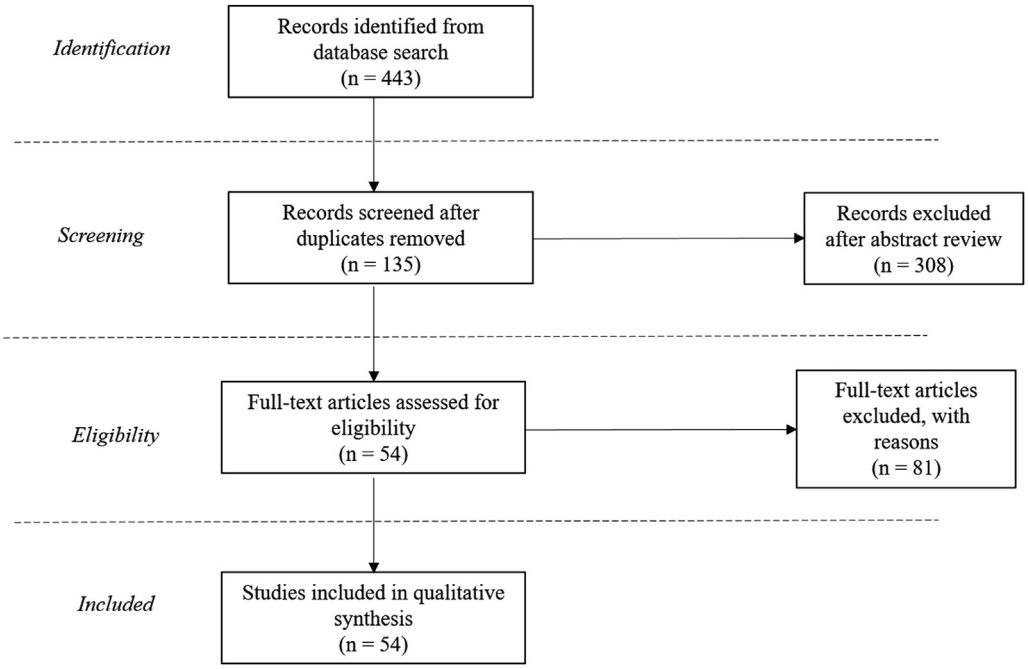

Figure – Study selection process flowchart—according to the preferred reporting items for systematic reviews and metaanalysis (PRISMA) statement.