International Journal of Surgery 72 (2019) 154–155

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.elsevier.com/locate/ijsu

Invited Commentary

A commentary on "The current state of animal models in research: A review" (Int J Surg 2019; Epub ahead of Print)

ARTICLE INFO

Keywords:
Animal model
Surgical research

Without animal research, polio would still be claiming thousands of lives each year.

Albert Bruce Sabin (1906–1993)

In a recent article, Robinson et al. reviewed the current state of animal models in biomedical research with special emphasis on surgery and research on surgical diseases [1]. We appreciate the authors and the editorial team for publishing this review. The use of animal models in surgical research is of potential clinical significance. It is essential that surgical innovations be applied in human only after there are precise safety measures and standardizations. New techniques of minimally invasive surgery, including laparoscopic, robotic and endovascular surgeries, have been used clinically and they are now the treatments of choice in many surgical diseases [2]. Thus, rapid utilization of advanced technologies requires preclinical experiments in non-human models. One of the potential sources of non-human experiments is animal models. Live animals with similar anatomy and physiological environment enable surgical researchers to examine safety and effectiveness of novel technologies, and to remedy any deficiencies prior to their use in human. However, commitment to ethical standards in animal research is essential and the use of animal models should be limited to conditions when other alternative models are not able to provide the required valid information.

Another advantage of using animal models in surgical research is the possibility of using blind randomization. The control group can receive a sham operation to strengthen the randomization and allow the researchers to compare the primary outcome. Such a kind of procedure is a matter of debate and controversy in human subjects [3]. Even in animal models, it should be done under strict ethical considerations. As animal subjects are exposed to harmful and painful procedures with no benefit [1], the benefits of using sham operations should be carefully considered in the study design before initiation of the research.

There is a potential difference between medical and surgical researches. In surgery, testing innovative ideas can be a concern because of ethical considerations [4]. Animal models are potential ways to test innovative ideas and safety of new surgical techniques. However, test should be limited to essential, useful and clinically relevant innovations. In addition, animal models should only be used when other alternatives are not available.

Another important application of animal models in surgery is education. Training medical students and general surgery residents on surgical procedures require environments that are similar to the real situations. Animal models are potential sources to provide these environments, especially for procedures such as microsurgery [5]. However, other models such as cadavers and simulators are acceptable alternatives to animal models. These substitutes have less ethical concerns and can fulfill educational purposes in most circumstances.

In conclusion, animal models play an important role in surgical research and education. However, their use should be limited to conditions when other alternatives fail to provide appropriate and precise information. In addition, ethical measures should always be applied in designing research studies and educational plans.

Provenance and peer review

Invited Commentary, internally reviewed.

Data statement

This manuscript does not contain data.

Ethical approval

N/A.

Sources of funding

None.

Author contribution

The commentary has been written by Dr. Sina Zarrintan and Dr.

DOI of original article: https://doi.org/10.1016/j.ijsu.2019.10.015

https://doi.org/10.1016/j.ijsu.2019.10.052
Received 27 October 2019; Accepted 31 October 2019
Available online 08 November 2019

Annis Shahnaee.

Trial registry number

N/A.

Guarantor

Sina Zarrintan.

Declaration of competing interest

None.

References

[1] N.B. Robinson, K. Krieger, F. Khan, W. Huffman, M. Chang, A. Naik, R. Yongle, I. Hameed, K. Krieger, L.N. Girardi, M. Gaudino, The current state of animal models in research: a review, Int. J. Surg. (2019 Oct 15), https://doi.org/10.1016/j.ijsu.2019.10.015.

[2] C.L. Mueller, G.M. Fried, Emerging technology in surgery: informatics, robotics, electronics, in: C.M. Twonsend, R.D. Beauchamp, B.M. Evers, K.L. Mattox (Eds.), Sabiston Textbook of Surgery: the Biological Basis of Modern Surgical Practice, Elsevier, Philadelphia, PA, 2017, pp. 396–404.

[3] R.L. Brim, F.G. Miller, The potential benefit of the placebo effect in sham-controlled trials: implications for risk-benefit assessments and informed consent, J. Med. Ethics 39 (11) (2013 Nov) 703–707, https://doi.org/10.1136/medethics-2012-101045.

[4] C.E. Margo, When is surgery research? Towards an operational definition of human research, J. Med. Ethics 27 (1) (2001 Feb) 40–43.

[5] E. Aboud, C.E. Suarez, O. Al-Mefty, M.G. Yasargil, New alternative to animal models for surgical training, Altern Lab Anim 32 (Suppl 1B) (2004 Jun) 501–507.

Sina Zarrintan*
Division of Vascular & Endovascular Surgery, Department of General & Vascular Surgery, Shohada-Tajrish Medical Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
E-mail address: s.zarrintan@yahoo.com.

Annis Shahnaee
School of Pharmacy, Tabriz University of Medical Sciences, Tabriz, Iran

* Corresponding author. Shohada-Tajrish Medical Center, Tajrish Square, Shahrdari St, Tehran, 1989934148, Iran.