



# Improvement in home-staging three-dimensional virtual surgical planning via webinar during the COVID-19 pandemic

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Dear Editor,

The COVID-19 pandemic has resulted in the cancellation of the vast majority of non-emergency surgical procedures as a part of international postgraduate courses. With lockdowns being enforced in many countries and the enactment of social distancing requirements, alternative educational surgical training platforms, such as “Webinars”, have flourished in recent months on the internet [1]. This phenomenon was reinforced by the introduction of reliable free cloud meeting applications (Zoom<sup>®</sup> and Webmex<sup>®</sup>) and free social media services (Facebook live<sup>®</sup>, Instagram<sup>®</sup>, and YouTube<sup>®</sup>). These entities are a fast and effective response to the current surgical education need worldwide. The incorporation of webinars in our weekly training routine represents an innovative and indispensable educational tool during the COVID-19 pandemic, allowing trainees to interact and ask questions in order to facilitate deep and meaningful learning.

The senior author developed a home-staging three-dimensional (3D) surgical modeling protocol for reconstructive surgery using an open-source software program (Osirix<sup>®</sup>, Meshlab<sup>®</sup>, Netfabb<sup>®</sup>, and Blender<sup>®</sup>) [2, 3]. Surgeons can now design precise surgical models and guides by themselves at an extremely low cost for use in the operating theater. Since open-source software programs are neutral and free, they can be used by all surgeons with any surgical specialty and from any country. Furthermore, 3D training

with surgical modeling can be done from anywhere with computer access.

However, one drawback of this technology has been its transmissibility, as it was described through author’s in-person seminars study [4]. Therefore, solutions to improve the transmissibility of this technology have been discussed, including ways to enhance the interface of the 3D modeling software program (Blender<sup>®</sup>) and make it more user friendly, create automatic functions, introduce the capability to draw or sculpt a surgical guide, and create tutorial videos for surgeons on a website.

With the onset of the COVID-19 pandemic, elements necessary to improve the transmissibility at last became available. A better ergonomics of Blender<sup>®</sup> software is accessible in version 2.80 and more. Add-ons (such as Orto Blender<sup>®</sup>) can create automatic designs of surgical cutting planes, guides and splints through simple drawing or sculpting modes. Tutorials are available on YouTube<sup>®</sup> (<https://www.youtube.com/watch?v=FBqY-HvMqrw>), and perhaps most importantly, time to train at home is now available for everyone.

Therefore, the first webinar on open-source 3D surgical modeling software protocol was presented via Webmex<sup>®</sup> and Facebook live<sup>®</sup> on April 18, 2020, on the Facebook group “International Microsurgery Club,” a platform of Microvascular Surgical Education (+ 13,600 surgeons worldwide). A link to our YouTube<sup>®</sup> channel was given during the presentation for surgeons who wished to conduct further self-guided training.

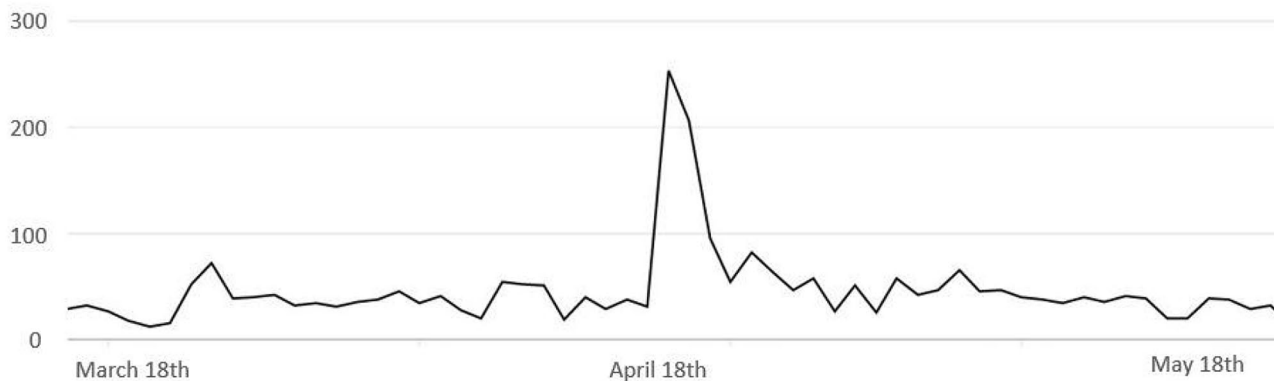
According to the YouTube channel analytics data, a spike of + 516% in views on our tutorial videos occurred in the 4 days following the webinar compared to the mean number of views between March 18 and May 18, with a total of + 576 views in April compared to March and May (Fig. 1). Viewing these videos may be correlated with active training by surgeons following the webinar, which garnered more than 1000 views in the 5 days after it was posted on social media.

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**Fig. 1** A 516% increase in YouTube® channel tutorial video views during the 4 days following the Webinar on 3D surgical Modeling with Blender® software

Innovation flourishes during times of crisis. The education of surgeons worldwide is of paramount importance and should be maintained at all cost. While operative skills are difficult to develop in such situations, educating a large number of surgeons at once on specific topics, such as accessible 3D surgical modeling, can still be achieved. The development of this very affordable technology can improve surgical care for everyone, facilitate training among surgical residents by allowing virtual study, and expand access to underdeveloped countries that cannot otherwise take advantage of professional 3D surgical modeling.

### Compliance with ethical standards

**Conflict of interest** Laurent Ganry, MD, and other co-authors have no conflicts of interest.

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