

Live Surgery in Orthopedics: Balancing Educational Benefits and Ethical Challenges in the Modern Surgical Practice

Sachin Kale^{1,2}, Arvind Vatkar^{3,4}, Ronak Mishra², Shikhar Singh², Ayush Saheta², Ashok Shyam⁵

Learning Point of the Article:

Live orthopaedic surgery provides considerable educational benefits, such as real-time insights into surgical procedures and decision-making. However, it poses several obstacles, including ethical considerations, patient safety, and increasing burden on surgeons. Pre-recorded movies, surgical simulations, and virtual reality can help avoid these concerns while providing valuable teaching content.

Introduction

There is a saying that “a picture speaks more than a thousand words.” Similarly, an ongoing video streaming of live surgery can teach you much more than what books can teach.

Live surgery in orthopedics offers a unique and dynamic educational experience, providing real-time insights into surgical techniques and decision-making processes. This method has been praised for its potential to enhance learning among residents and practicing surgeons by offering an unfiltered view of operative procedures. However, the integration of live surgery into educational frameworks is not without its challenges. Ethical concerns, patient safety, and the potential for increased stress on the performing surgeon are significant considerations that must be balanced against the educational benefits. Ethical challenges in orthopedic surgery often revolve around the introduction of new technology and maintaining patient safety and confidentiality during live broadcasts [1].

Furthermore, the effectiveness of live surgery as an educational tool must be carefully weighed against these ethical dilemmas and the associated risks [2].

As live surgical broadcasts become more prevalent, it is crucial to establish standardized guidelines to ensure patient safety and

uphold ethical standards [3]. This editorial aims to explore the delicate balance between the educational benefits and the ethical challenges inherent in the practice of live surgery within the field of orthopedics.

Advantages of live surgery

Live surgeries have many advantages, due to which it became popular in conferences and webinars.

Real-time feedback during live surgery

Live surgery provides an invaluable opportunity for real-time feedback from the operating surgeon, significantly enhancing the understanding of decision-making processes during complex procedures. This immediate interaction allows learners to observe the rationale behind surgical choices and adjustments, which are often based on real-time anatomical and pathological findings. The dynamic environment of live surgery fosters a deeper comprehension of the thought processes and clinical judgments that experienced surgeons make. This is particularly beneficial in complex cases where decision-making is multifaceted and context dependent [4]. Moreover, the opportunity to ask questions and receive instant feedback helps

Author's Photo Gallery



Dr. Sachin Kale



Dr. Arvind Vatkar



Dr. Ronak Mishra



Dr. Shikhar Singh



Dr. Ayush Saheta



Dr. Ashok Shyam

Access this article online

Website:
www.jocr.co.in

DOI:
<https://doi.org/10.13107/jocr.2024.v14.i10.4790>

¹Consultant Orthopaedic Surgeon, Apollo Hospital, Belapur, Navi Mumbai, Maharashtra, India,

²Department of Orthopaedics, Dr D Y Patil School of Medicine, Nerul, Navi Mumbai, India.

³Consultant Orthopaedic Spine Surgeon, Fortis Hiranandani Hospital, Vashi, Apollo Hospital, Belapur,

⁴Assistant Professor at MGM Medical College, Navi Mumbai, Maharashtra, India.

⁵Department of Orthopaedics, Sancheti Institute for Orthopaedics and Rehabilitation, Pune, Maharashtra, India.

Address of Correspondence:

Dr. Sachin Kale,

Consultant Orthopaedic Surgeon, Apollo Hospital, Belapur, Navi Mumbai, Maharashtra, India. Professor Orthopaedics, Dr D Y Patil School of Medicine, Nerul, Navi Mumbai, India.

E-mail: sachinkale@gmail.com

Submitted: 23/07/2024; Review: 14/08/2024; Accepted: September 2024; Published: October 2024

DOI: <https://doi.org/10.13107/jocr.2024.v14.i10.4790>

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License <https://creativecommons.org/licenses/by-nc-sa/4.0/>, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms



to clarify uncertainties and reinforces learning. Such direct engagement with the surgical team promotes a more interactive and practical educational experience, making it an essential tool for the professional development of aspiring surgeons [5]. This approach has been shown to contribute significantly to the improvement of surgical skills and patient outcomes.

Tips and tricks during live surgery

Live surgery sessions offer a unique platform for surgeons to impart invaluable personal insights that go beyond textbook knowledge. These tips and tricks are honed through years of experience and are often not formally documented. During live surgeries, experienced orthopedic surgeons can demonstrate nuanced techniques, optimal instrument handling, and decision-making nuances that contribute to successful outcomes. These insights are crucial for trainees and practicing surgeons alike, providing practical knowledge that enhances surgical skills and efficiency.

For instance, techniques for precise bone cuts in joint replacements or strategies for managing unexpected intraoperative challenges can significantly impact surgical proficiency [6]. By sharing these personal strategies during live surgeries, surgeons foster a culture of continuous learning and professional development within the orthopedic community.

Unfiltered access of live surgery – patient positioning, demeanor of surgeon, and staff handling

Live surgery offers unparalleled access that enhances understanding of critical aspects in orthopedic procedures. First, it provides unfiltered insights into patient positioning techniques essential for optimal surgical access and patient safety [7]. Observing these maneuvers in real-time aids in learning the intricacies of maintaining patient comfort and preventing complications like pressure ulcers [8].

In addition, live surgery allows observers to study the demeanor of experienced surgeons under various conditions, from calm precision to managing unexpected challenges. This firsthand experience fosters insights into effective communication and decision-making in the operating room [9].

Moreover, the role of assistant surgeons is elucidated, showcasing their coordination and support in optimizing procedural efficiency and patient outcomes. Such immersive learning experiences during live surgeries significantly contribute to the educational journey of orthopedic surgeons.

Learning novel techniques and motivation for learners

Live surgical broadcasts serve as an invaluable medium for showcasing cutting-edge surgical techniques. By broadcasting procedures in real-time, these sessions facilitate the rapid dissemination and adoption of advanced methods within orthopedic surgery [10]. This direct exposure enhances the skill set of surgeons, ensuring they remain adept with the latest innovations in clinical practice.

Furthermore, the dynamic nature of live surgery enhances learner engagement and motivation. Unlike static educational methods, observing surgeries in real time offers a compelling and immersive experience [11]. This firsthand view sparks active participation and curiosity among trainees, fostering a deeper understanding and appreciation of the complexities involved in new surgical techniques.

Disadvantages of live surgery

Live surgeries in orthopedics can also have disadvantages which need to be understood. Let's delve into them.

Increased distraction for surgeons

Live surgery broadcasts, while valuable for education, pose challenges such as increased distraction for operating surgeons. The presence of cameras, audience interaction, and the pressure to perform flawlessly under scrutiny can divert the surgeon's attention from the task at hand. Distractions during surgery have been shown to contribute to medical errors and reduced procedural efficiency [12]. Studies indicate that distractions lead to lapses in concentration, potentially compromising patient outcomes [5]. Surgeons may experience heightened stress levels, impacting their decision-making and procedural skills [5]. Addressing these distractions requires careful management of the surgical environment and training to maintain focus and ensure patient safety.

Increased stress for surgeons while doing live surgery

Live surgery broadcasts can intensify stress levels for surgeons, particularly impacting those who are introverted or prone to performance anxiety. The presence of an audience, whether in person or virtual, can amplify feelings of stage fright and the pressure to perform flawlessly [13]. Surgeons may experience heightened levels of cortisol, affecting their concentration and decision-making abilities [14]. In addition, the fear of making a mistake under scrutiny can further exacerbate stress [15]. Addressing these stressors requires strategies such as mindfulness techniques and supportive environments to mitigate the negative impact on surgical performance and patient outcomes.

Patient safety concerns

Live surgeries pose inherent risks to patient safety due to the prioritization of educational objectives over patient care sometimes. During live broadcasts, there is a notable risk that the attention of surgeons and the operating team may be divided between teaching and ensuring optimal patient outcomes. This division of focus can lead to lapses in critical decision-making, communication errors, and procedural mistakes [16]. Distractions in the operating room have been linked to compromised patient safety checks and an increase in intraoperative errors [17]. While live surgeries offer valuable educational benefits, such as real-time learning opportunities, these must be carefully balanced with stringent protocols to safeguard patient well-being [18].

Privacy and confidentiality risks

Live surgery broadcasts introduce significant risks to patient privacy and confidentiality. These broadcasts, while intended for educational purposes, can inadvertently expose identifiable patient information and sensitive medical details to a wide audience [19]. The visual nature of surgeries, combined with verbal discussions among the surgical team, may reveal patient identities or specific medical conditions without proper consent or anonymization procedures in place.

Such breaches not only violate patient trust but also potentially infringe on data protection regulations such as general data protection regulation and health insurance portability and accountability act, which mandate stringent safeguards for personal health information [20]. Addressing these risks requires meticulous planning, including obtaining explicit patient consent for broadcasting, implementing robust anonymization techniques, and ensuring secure transmission channels for live feeds [21]. These measures are essential to balance educational benefits with ethical responsibilities toward patient privacy.

Limited control over operating environment and logistical challenges

External influences might have a big impact on live surgery broadcasts. Technical difficulties with live broadcasting technology, such as a loss of video feed or audio glitches, might disrupt operations and disorient the surgical team. Unanticipated events in the operating room, such as equipment failure or patient difficulties, might exacerbate the situation. These disruptions not only jeopardize patient safety but they also weaken the broadcast's instructional usefulness by diverting focus away from surgical skill and onto technical difficulties [22].

Live surgical events include extensive logistical efforts, such as putting up technology, arranging staff, and adhering to regulatory criteria for sterility, implant quality, equipment standards, and quality control. Furthermore, some surgeons are accustomed with their own setup, equipment, and crew, and may feel awkward and uncomfortable in other operating settings. These duties can be resource-intensive, diverting time and effort away from therapeutic and educational goals. The requirement for constant monitoring and management during broadcasts increases the strain for healthcare personnel, possibly affecting performance, and patient care [22].

Regulatory challenges while inviting overseas surgeons

The process of bringing abroad surgeons to India for live surgeries offers considerable regulatory obstacles, such as securing clearance from the Medical Council of India or state medical councils. This bureaucratic process necessitates extensive credential verification and, in certain cases, temporary or special registration. These barriers might delay or prohibit international professionals from attending live surgical events, restricting knowledge sharing and cooperation. Addressing these issues necessitates efficient processes and clear rules to guarantee patient safety and compliance with local standards [23].

Alternatives to live surgery

There are a few options which can help to negate the disadvantages of live surgery, in addition to helping in real-time decision making.

Pre-recorded surgery videos, narrated and explained by surgeon live

Pre-recorded surgery videos, narrated and explained by surgeons live – these offer many benefits for medical education and conference presentations. These films may be carefully produced to highlight crucial stages and vital moments of surgery, ensuring that the safety of patients is not jeopardized, as can happen during a live surgery. These presentations provide a smooth educational experience by minimizing the possibility of technical difficulties that might occur during the live transmission.

This strategy also relieves the surgeon of the immediate stress of performing in front of a live audience. This independence enables the surgeon to concentrate more on teaching and debriefing difficult surgical procedures and aspects, hence increasing the instructional value. Furthermore, pausing the lecture at key moments promotes collaborative debates.

Surgeons can invite delegates and other faculty members to participate in discussions, making the session more lively and interactive. This approach creates a holistic learning environment by combining the accuracy of pre-recorded information with the interactivity of live narration [5, 24].

Surgical simulations

Surgical simulations using high-fidelity simulators provide a safe learning environment, allowing for interactive and practical training. These simulators assist trainees in fully comprehending the phases of surgical procedures. Performing the processes helps to instill techniques more effectively than simply seeing them. Simulations can also be modified to include surgical challenges, such as neuromonitoring alerts in scoliosis surgery, and direct the trainee on managing these concerns in a step-by-step way.

Furthermore, surgical simulations give teachers insights into the trainee's performance, baseline knowledge, and pain points. Completing sufficient surgical simulations can provide a firm basis for trainees, equipping them to help in real-life procedures. This method guarantees they build confidence and competence before working with live patients, improving overall surgical training and safeguarding patients [25].

Virtual reality (VR) demonstrations

VR may offer immersive experiences by allowing participants to virtually "participate" in operations and learn about spatial relationships and processes. These meetings may be held from the comfort of the delegate's own home, making them a wonderful tool for global education, particularly during pandemics like COVID-19 [26, 27]. VR sessions also allow for the use of novel devices and procedures without engaging actual patients, which ensures safety and practicality. Furthermore, VR enables the world's greatest surgeons to reach out to aspiring surgical trainees in emerging and disadvantaged countries, effectively sharing their experiences and expertise. This democratizes access to top-notch surgical education and assists in filling the gap in medical training across different areas of the world, creating a worldwide community of well-trained surgeons [28].

Conclusion

Live orthopedic surgery provides substantial educational benefits by offering real-time observations of surgical methods, decision-making processes, and operative procedures. Live surgery's interactive aspect facilitates a more profound comprehension of intricate procedures, improves surgical abilities, and inspires learners through instant feedback and the exhibition of professional techniques and strategies. Nevertheless, the practice is not without its obstacles. It is imperative to effectively address ethical issues related to patient safety and confidentiality, while also managing the heightened stress and possible diversions experienced by surgeons. The demand to excel while being closely observed and the practical challenges of broadcasting surgery in real-time provide substantial obstacles.

To tackle these problems, various instructional approaches such as pre-recorded surgery films, surgical simulators, and VR demos can provide helpful answers. Pre-recorded movies, augmented with live narration and interactive conversations, offer a regulated setting for learning while ensuring patient safety is not compromised. Surgical simulators provide trainees with the opportunity to practise operations in a safe environment, helping them develop confidence and expertise. VR provides immersive experiences, allowing learners to virtually engage in surgeries and receive high-quality education from any location worldwide, which is especially advantageous during pandemics such as COVID-19.

Although live surgery is still a great instructional tool, it is important to carefully analyze ethical concerns and explore new options to progress surgical education in the field of orthopedics.

Clinical Message

Live orthopaedic surgery provides tremendous educational benefits by presenting real-time information about surgical decision-making and procedures. However, ethical problems, patient safety hazards, and the burden imposed on surgeons must all be carefully considered. Alternatives like as pre-recorded operations, surgical simulations, and virtual reality can provide useful training without these downsides, maintaining patient safety and surgeon well-being while improving trainee learning.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None



References

1. Capozzi JD, Rhodes R. Ethical challenges in orthopedic surgery. *Curr Rev Musculoskelet Med* 2015;8:139-44.
2. Rocco B, Grasso AA, De Lorenzis E, Davis JW, Abbou C, Breda A, et al. Live surgery: Highly educational or harmful? *World J Urol* 2018;36:171-5.
3. Philip-Watson J, Khan SA, Hadjipavlou M, Rane A, Knoll T. Live surgery at conferences - Clinical benefits and ethical dilemmas. *Arab J Urol* 2014;12:183-6.
4. Van Bonn SM, Grajek JS, Schneider A, Oberhoffner T, Mlynski R, Weiss NM. Interactive live-stream surgery contributes to surgical education in the context of contact restrictions. *Eur Arch Otorhinolaryngol* 2022;279:2865-71.
5. Awad M, Chowdhary M, Hermena S, Falaha SE, Slim N, Francis NK. Safety and effectiveness of live broadcast of surgical procedures: Systematic review. *Surg Endosc* 2022;36:5571-94.
6. Ackermann J, Wedel T, Holthaus B, Bojahr B, Hackethal A, Brucker S, et al. Didactic benefits of surgery on body donors during live surgery events in minimally invasive surgery. *J Clin Med Res* 2020;9:2912.
7. Rozet I, Vavilala MS. Risks and benefits of patient positioning during neurosurgical care. *Anesthesiol Clin* 2007;25:631-53, x.
8. Getinge AB. Operating Tables/Surgical Tables: Patient Positioning in the Operating Room. Getinge AB; 2021. Available from: <https://www.getinge.com/me/insights/articles/operating-room/patient-positioning-in-the-or> [Last accessed on 2024 Jun 25].
9. Role of Surgeon in ot. SlideShare. Available from: <https://www.slideshare.net/slideshow/role-of-surgeon-in-ot/250239672> [Last accessed on 2024 Jun 25].
10. Ibrahim AM, Varban OA, Dimick JB. Novel uses of video to accelerate the surgical learning curve. *J Laparoendosc Adv Surg Tech A* 2016;26:240-2.
11. Faiz T, Marar O, Kamel MK, Vance S. Teaching operative surgery to medical students using live streaming during COVID-19 pandemic. *Surg Innov* 2021;28:253-4.
12. Mentis HM, Chellali A, Manser K, Cao CG, Schwaitzberg SD. A systematic review of the effect of distraction on surgeon performance: Directions for operating room policy and surgical training. *Surg Endosc* 2016;30:1713-24.
13. Budden AK, Song S, Henry A, Wakefield CE, Abbott JA. Surgeon reported measures of stress and anxiety prior to and after elective gynecological surgery. *Acta Obstet Gynecol Scand* 2024;103:360-7.
14. Tjønnås MS, Guzmán-García C, Sánchez-González P, Gómez EJ, Oropesa I, Våpenstad C. Stress in surgical educational environments: A systematic review. *BMC Med Educ* 2022;22:791.
15. Wetzel CM, Black SA, Hanna GB, Athanasiou T, Kneebone RL, Nestel D, et al. The effects of stress and coping on surgical performance during simulations. *Ann Surg* 2010;251:171-6.
16. Legemate JD, Zanetti SP, Freund JE, Baard J, de la Rosette JJ. Surgical teaching in urology: Patient safety and educational value of "LIVE" and "SEMI-LIVE" surgical demonstrations. *World J Urol* 2018;36:1673-9.
17. Sevdalis N, Undre S, McDermott J, Giddie J, Diner L, Smith G. Impact of intraoperative distractions on patient safety: A prospective descriptive study using validated instruments. *World J Surg* 2014;38:751-8.
18. Carbonara U, Crocerossa F, Novara G, Ditunno P, Pansadoro V, Breda A, et al. Risks and benefits of live surgical broadcast: A systematic review. *Eur Urol Focus* 2022;8:870-81.
19. Allen A. Privacy and Medicine; 2009. Available from: <https://plato.stanford.edu/entries/privacy-medicine> [Last accessed on 2024 Jun 25].
20. Verma A. Confidentiality and Privacy in Healthcare. *i P l e a d e r s ; 2 0 2 0*. Available from: <https://blog.ipleaders.in/confidentiality-privacy-healthcare> [Last accessed on 2024 Jun 25].
21. Keshta I, Odeh A. Security and privacy of electronic health records: Concerns and challenges. *Egypt Inform J* 2021;22:177-83.
22. Niculescu M, Honțaru OS, Popescu G, Sterian AG, Dobra M. Challenges of integrating new technologies for orthopedic doctors to face up to difficulties during the pandemic era. *Healthcare (Basel)* 2023;11:1524.
23. Min SK. Ethics of live surgery demonstration or broadcast: Is it beneficial to the patients? *Vasc Specialist Int* 2020;36:4-6.
24. Bhattacharya K, Bhattacharya N, Abraham SJ, Neogi P, Kumar S. Live surgical workshops-the good, the bad, and the ugly. *Indian J Surg* 2024;86:1-4.
25. Wang Z, Shen J. Simulation training in spine surgery. *J Am Acad Orthop Surg* 2022;30:400-8.
26. Rasic G, Parikh PP, Wang ML, Keric N, Jung HS, Ferguson BD, et al. The silver lining of the pandemic in surgical education: Virtual surgical education and recommendations



for best practices. *Global Surg Educ* 2023;2:59.

27. Sadek O, Baldwin F, Gray R, Khayyat N, Fotis T. Impact of virtual and augmented reality on quality of medical education during the COVID-19 pandemic: A systematic review. *J Grad*

Med Educ 2023;15:328-38.

28. Ota D, Loftin B, Saito T, Lea R, Keller J. Virtual reality in surgical education. *Comput Biol Med* 1995;25:127-37.

Conflict of Interest: Nil
Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

How to Cite this Article

Kale S, Vatkar A, Mishra R, Singh S, Saheta A, Shyam A. Live Surgery in Orthopedics: Balancing Educational Benefits and Ethics Challenges in the Modern Surgical Practice. *Journal of Orthopaedic Case Reports* 2024 October;14(10):04-09.