

# Tele-colleaguography - Adjunct to Intraoperative Time Out for Safe Laparoscopic Cholecystectomy

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## INTRODUCTION

Laparoscopic cholecystectomy (LC) is a widely performed surgical procedure, but it carries the risk of biliovascular injury, which can be associated with significant morbidity and can be life-threatening. While the global adoption of LC has expanded rapidly, the rate of biliary injuries has not seen a corresponding decrease, often attributed to misidentification of critical anatomical structures. The notion of the critical view of safety (CVS) has been established as a crucial framework to enhance surgical safety in LC.<sup>1</sup> However, unexpected injuries still occur due to human factors and the surgeon's assumptions.<sup>2</sup> A high level of experience alone may not be sufficient for a successful LC.<sup>3</sup> Visual misinterpretation of biliary architecture during

## ABSTRACT

Laparoscopic cholecystectomy is a common surgical procedure, and strategies for preventing biliovascular injury include intraoperative time-out and intraoperative cholangiography. However, the feasibility of intraoperative cholangiography is limited in certain regions due to cost and training constraints. This article introduces the concept of "Tele-colleaguography" as an adjunct to intraoperative time-out during laparoscopic cholecystectomy, particularly in low-resource settings. Tele-colleaguography, a term coined to signify remote consultation with senior surgeons using video applications like WhatsApp and Viber, presents a potential solution to prevent bile duct injuries. The viewpoint discusses the potential benefits of Tele-colleaguography, and the role of modern technology such as 5G, and references key studies that support this approach.

## KEY WORDS

*Intraoperative time-outs, Laparoscopic cholecystectomy, Tele-colleaguography*

surgery accounts for about 97% of iatrogenic biliary ductal injury (BDI).<sup>2</sup> Misidentification due to visual interpretation rather than an error of skill, knowledge, or judgment leads to most cases of BDI.<sup>2</sup>

The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) has recommended strategies for minimizing bile duct injuries for safe cholecystectomy including intraoperative time-outs, intraoperative cholangiography, and involvement of detached observers.<sup>1</sup> While these strategies may be effective, they are not universally feasible, particularly in low-resource settings where cost and training barriers exist.

Intraoperative time-outs involve pausing the surgery to verify critical information and ensure a collective understanding among the surgical team. SAGES emphasizes the importance of taking this moment to cross-verify patient identification, procedure details, and potential risks.<sup>1</sup> However, the operating surgeon may still suffer from visual perception error leading to injury. In such cases, a detached observer may prove useful to prevent such errors of misinterpretation and misperception.

Intraoperative cholangiography (IOC), the imaging of the biliary tract during surgery, is recommended to confirm the anatomy and prevent inadvertent damage.<sup>2</sup> However, despite their benefits, the implementation of these strategies can be challenging, particularly in low-resource settings. While IOC has proven effective in preventing biliovascular injuries, especially in cases with uncertain anatomy, its widespread adoption faces obstacles. Low-resource settings often struggle with limited access to advanced medical equipment, including imaging technology, and training opportunities for surgical teams.<sup>4</sup> These challenges hinder consistently applying these preventive measures, potentially putting patients at risk.

Kapoor described the concept of “in vicinity colleagueography” as an alternative to traditional intraoperative cholangiography.<sup>5</sup> This practice involves involving another surgical colleague as an unbiased observer and leveraging their opinion to make informed decisions during surgery and avoid the visual perception error of the primary surgeon.<sup>5</sup>

However, in the context of low and middle-income countries, especially in remote areas, due to lower surgical coverage, bystander surgeons may not be available. Lancet Commission on Global Surgery (LCoGS) has recommended the density of 20 specialist Surgeon/Anaesthesiologist/Obstetrician (SAO) per 100,000 as the target indicator for universal access to surgical and anesthesia care. In a study conducted by Ross et al., the density of specialist Surgeon/Anaesthesiologist/Obstetrician (SAO) in 25 remote areas of Nepal was only 0.4/100,000 population implying low surgical coverage.<sup>6</sup> Thus in areas where the operating surgeon is the sole surgeon in the facility, a bystander observer may not be available increasing the risk of BDI, especially in cases of difficult anatomy.

In recent years, telemedicine has revolutionized healthcare by enabling remote consultations and collaborations among medical professionals. Such obstacles can be tackled with the help of the implementation of telemedicine in surgery. Tele-colleagueography, a term introduced (or coined) to signify remote consultation with experienced surgeons through video communication platforms, emerges as an innovative approach to address the challenges posed by biliovascular injuries during laparoscopic cholecystectomy. The concept centers around seeking expert opinions

from senior surgeons, often in different geographical locations, to enhance surgical decision-making and reduce complications.

The global COVID-19 pandemic shed light on the potential of telemedicine and remote consultations in surgery. Laudari et al. reported successful cases of remote consultation through platforms such as Facebook, where senior surgeons provided guidance during challenging surgeries and helped prevent bile duct injuries.<sup>7</sup> These instances suggest the adaptability of tele-colleagueography in demanding circumstances.

One of the driving factors that could aid in the feasibility of tele-colleagueography is the advancement of communication technology. The transition to 5G technology has transformed internet connectivity, enabling faster data transfer rates and low latency. This technological leap enhances the quality of remote video consultations, allowing for real-time communication and seamless exchange of visual information. Surgeons can now share live visuals, discuss surgical steps, and seek immediate feedback from colleagues, mimicking the in-person collaboration that is often lacking in resource-limited environments.

As Sawyer observed, the utilization of telementoring through real-time audio and video communication during surgery has demonstrated its safety and efficacy as a teaching tool.<sup>4</sup> Similarly integrating tele-colleagueography into surgical practices can offer fresh insights, additional guidance, and an extra layer of reassurance to both experienced and less-experienced surgeons alike. This collaborative approach, facilitated by modern communication technology and the spirit of shared expertise, holds the potential to significantly reduce the occurrence of bile duct injuries and elevate patient outcomes in laparoscopic cholecystectomy.

Tele-colleagueography offers several notable advantages. Firstly, it bridges the knowledge gap by connecting surgeons with diverse experiences, ensuring well-informed decisions are made even in complex cases. Secondly, it serves as an educational tool, enabling less-experienced surgeons to learn from their more experienced counterparts.<sup>8</sup> Thirdly, tele-colleagueography enhances patient safety by preventing potential complications, ultimately leading to better patient outcomes.

The integration of tele-colleagueography into surgical practice requires a concerted effort. Surgeons must adapt to these new modes of communication, and healthcare institutions should establish guidelines for ethical and secure remote consultations. Additionally, ongoing research is needed to quantify the impact of tele-colleagueography on surgical outcomes and patient safety. Furthermore, we could argue if we can harness the power of artificial intelligence (AI) to enhance the critical view of safety in laparoscopic cholecystectomy, further advancing the innovative concept

of tele-colleaguography.<sup>9</sup> By leveraging AI-driven image analysis and real-time feedback, surgeons could receive immediate insights into biliary ductal anatomy, minimizing the risk of errors and complications while reinforcing the collaborative spirit of surgical decision-making.

## CONCLUSION

Tele-colleaguography stands as a promising solution to enhance the safety of surgery, particularly in settings where traditional preventive measures face challenges. By leveraging modern communication technology and seeking expert opinions remotely, surgeons can make informed decisions and reduce the risk of complications. The integration of 5G technology further enhances the

potential of tele-colleaguography, offering a path toward more efficient and effective surgical consultations. As healthcare continues to evolve, tele-colleaguography could emerge as a cornerstone strategy for preventing complications and elevating patient outcomes in the realm of surgery.

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