

ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

Section Editor: John Baillie, MB ChB, FRCP

The Use of Telemedicine for Performing ERCP



Hans-Ivar Pålsson, MD, PhD
Karolinska Institute
CLINTEC
Stockholm, Sweden
Consultant Surgeon
Visby Hospital
Visby, Sweden

G&H What is telemedicine?

H-IP Telemedicine is the use of telecommunication technologies such as two-way video, e-mail, smartphones, and other wireless tools to exchange medical information from one site to another to provide and improve clinical healthcare. Telemedicine allows access to medical services that would otherwise not be available and improves the quality of procedures performed in low-volume centers by enabling an experienced team to guide an inexperienced physician step-by-step through a procedure without physically being in the same room.

G&H How important is operator experience for performing high-quality endoscopic retrograde cholangiopancreatography?

H-IP Operator experience is the most important determinant of high-quality endoscopic retrograde cholangiopancreatography (ERCP). However, this does not necessarily mean just the experience of the individual holding the endoscope; it includes the experience of the entire team, such as the instructing physician during a procedure performed with telemedicine.

G&H What equipment is needed to establish a connection between 2 hospitals for telemedicine?

H-IP In my experience with telemedicine, video endoscopes are used in conjunction with a fluoroscopy system

and a mobile teleconference system, which includes a large liquid-crystal display screen, a high-definition video camera, stereo speakers, and microphones. These tools allow endoscopists in 2 different hospitals to see and hear each other in real time. The instructing endoscopist can observe the procedure via 2 of 3 views: a radiographic, endoscopic, or video camera view of the entire operation theater where the procedure is being performed. This video feed, as well as all communication, is connected to a protected network that is separate from the Internet and open only to accredited users; therefore, it is not possible for unauthorized users to watch the procedure. Establishing this connection is usually quite easy and fast; technicians are usually not needed, as they were in the past.

G&H How good is the sound and image quality?

H-IP With recent advances in technology, the sound and image quality has improved and is quite good. In addition, nowadays, the instructing physician has the same endoscopic and radiologic image quality as the physician performing the procedure.

G&H Are there often technical difficulties using telemedicine?

H-IP Technical problems are sometimes an issue. It may occasionally be difficult to establish a connection between the 2 hospitals. My colleagues and I conducted a study of 26 ERCPs that were performed with telemedicine, the results of which were recently published in *Endoscopy*.

There were technical problems in 5 cases (which were excluded from the study): the temporary gatekeeper registration expired, the dedicated Internet Protocol number of one of the operating rooms was changed by the information technology department, and a button on a screen was accidentally pushed, causing a disconnection. However, this study was conducted at the beginning of our experience with telemedicine; since then, we have performed an additional 28 procedures and have learned how to handle these issues. It should also be noted that, unlike previous telemedicine studies, there were no communication failures in our study once the connection had been established.

G&H How exactly does telemedicine help improve the success of ERCP?

H-IP With telemedicine, an experienced endoscopist can watch an ERCP performed by a physician who has not had much experience with the procedure and can give advice, such as tips on how to overcome problems or what not to do throughout the course of the procedure. In the study that my colleagues and I conducted of 26 ERCPs, teleguided support was scored as crucial to the success of the ERCP in 8 cases, an important factor in 8 cases, and of less importance in 10 cases. In the cases in which teleguided support was considered to be crucial, 6 subsequent percutaneous transhepatic cholangiographies and 2 repeat ERCPs were avoided. The common bile duct was successfully cannulated in all of the procedures during the study period.

More interestingly, the overall cannulation rate at the low-volume center improved from 85% the 2 years prior to the introduction of telemedicine compared with 99% the 2 following years (although not all of these procedures were teleguided). Various studies have shown that higher cannulation success rates are associated with high-volume centers and experienced endoscopists; thus, this rate change implies that the competence of the entire team and their capability of successful interaction are more important than the location of the endoscopy suite.

In fact, for my colleagues and I, no other single improvement has helped ERCP outcomes as much as telemedicine, and we feel that it can be very useful for other hospitals as well because, as discussed, the experience of the entire team is what determines the success of the procedure, even more than advances in cameras or endoscopes, in our opinion. An experienced physician can perform a successful ERCP even with an old instrument, and an inexperienced physician may have trouble even with a new instrument; it is experience that makes the difference. If support from a high-volume center can allow a low-volume center to offer treatments

that are similar in quality, both patients and healthcare providers will benefit. The outcomes of our study show that telemedicine is ready for more widespread use for performing ERCP.

G&H Are there any medicolegal issues involving the use of telemedicine for performing ERCP?

H-IP Prior to the procedure, the patient is told that a colleague from another hospital will be observing and guiding the procedure. In my experience of using telemedicine, I have never had a patient object to this disclosure. In Sweden, the physician actually performing the ERCP is the one legally responsible for the procedure and should do only what he or she thinks is helpful for the patient and what he or she is able to do safely. However, the instructing physician who is guiding the procedure is responsible for giving advice that is not harmful to the patient and that can be realistically followed by the less-experienced physician.

G&H What are the drawbacks of telemedicine?

H-IP It may be difficult to arrange a time when both the instructing endoscopist and the physician performing the procedure are available, particularly because the procedure might be urgent. Having a large pool of endoscopists at the high-volume center who can observe and guide the procedure may help ensure that one is always available.

In addition, cost can be a drawback. The required equipment has a high initial cost, although the procedure obviously becomes more cost-effective each time the equipment is used. In terms of other costs, there are currently no rules for reimbursement of the instructing endoscopist in Sweden, whereas telemedicine coverage for private insurance and Medicaid in the United States depends on the state.

G&H Are there any guidelines or regulations regarding the use of telemedicine?

H-IP There are no official guidelines in Sweden because our hospital was the first to use this method; however, in my opinion, the instructing physician should have performed the teleguided procedure at least 1000 times. In the United States, general telemedicine guidelines have been released from societies such as the American Telemedicine Association and the Society of American Gastrointestinal and Endoscopic Surgeons, although there is currently not much research data on the use of telemedicine for endoscopic procedures.

G&H Is there a role for the use of telemedicine for general training as well as for physicians at low-volume centers?

H-IP Yes. Telemedicine is most commonly used to help physicians at low-volume centers to perform fairly standard procedures, but it is also currently being used by highly trained physicians at specialist centers for advanced or rare procedures, live demonstrations at national and international meetings and other events, and even standard postgraduate teaching in university hospitals. This method can be used for any endoscopic procedure; for example, my colleagues and I have also used telemedicine for esophageal and duodenal stenting and have, thus, been able to avoid operations.

G&H What are the next steps in research in this field?

H-IP It is important to understand what factors make a good instructing physician for telemedicine. Experience is clearly important, but other factors are needed. The instructing endoscopist also must be a good teacher,

be able to instill confidence in the learning endoscopist, understand the resources of a low-volume center, and possibly have a working relationship with and mutual respect for the learning endoscopist prior to a telemedicine relationship. Many other skills may be needed as well, and it would be helpful to know exactly what these skills are and which are most important to make procedures performed with telemedicine successful. Not all endoscopists who have performed 1000 ERCPs are necessarily fit to be instructing endoscopists.

Suggested Reading

Pahlsson HI, Groth K, Permert J, et al. Telemedicine: an important aid to perform high-quality endoscopic retrograde cholangiopancreatography in low-volume centers. *Endoscopy*. 2013;45(5):357-361.

Lee SP, Lee HL, Hahm JS, Choi HS, Joe I, Shimizu S. International live endoscopic multichannel demonstration using superfast broadband internet connections. *Clin Endosc*. 2012;45(1):73-77.

Shimizu S, Itaba S, Yada S, et al. Significance of telemedicine for video image transmission of endoscopic retrograde cholangiopancreatography and endoscopic ultrasonography procedures. *J Hepatobiliary Pancreat Sci*. 2011;18(3):366-374.

Kaltenbach T, Muto M, Soetikno R, et al. Teleteaching endoscopy: the feasibility of real-time, uncompressed video transmission by using advanced-network technologies. *Gastrointest Endosc*. 2009;70(5):1013-1017.