

# Sleeve gastrectomy telementoring: a SAGES multi-institutional quality improvement initiative

Ninh T. Nguyen<sup>1,7</sup> · Allan Okrainec<sup>2</sup> · Mehran Anvari<sup>3</sup> · Brian Smith<sup>1</sup> · Oz Meireles<sup>4</sup> · Denise Gee<sup>4</sup> · Erin Moran-Atkin<sup>6</sup> · Evelyn Baram-Clothier<sup>5</sup> · Diego R. Camacho<sup>6</sup>

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## Abstract

**Background** Sleeve gastrectomy is a relatively new procedure that developed as a result of rapid innovation in the field of bariatric surgery. As with any newly developed operation, there is a learning curve that potentially can be associated with higher morbidity. Real-time surgical mentoring reduces the learning curve effect but can be time intensive for the mentor. The aim of this initiative was to evaluate the feasibility, effectiveness, and satisfaction of surgical telementoring for laparoscopic sleeve gastrectomy. This is the first national specialty society effort to determine if the “remote presence” of an expert surgeon (mentor) can help practicing surgeons improve skills.

**Methods** The experience of 15 surgical trainees (mentees) who performed laparoscopic sleeve gastrectomy under real-time telementoring by 7 mentors was reviewed.

Telementoring was implemented using the Visitor1<sup>®</sup> remote presence system with two-way live audio and video communication. The receiving platform utilized a conventional laptop, iPad, or iPhone. The mentee followed a structured telementoring program including didactic learning, live case teleobservation, and telementoring of 2–3 cases. A survey on the quality of the telecommunication and effectiveness of the mentoring was performed by the mentor and mentee on a scale of “exceeded,” “met,” “almost met,” or “failed to meet” expectations. The overall telementoring experience was rated on a scale of 1 for “poor” to 5 for “excellent.”

**Results** Based on the mentees’ survey, the overall telementoring experience was rated as 4.8. Despite the mentees having experience with laparoscopic sleeve gastrectomy, most commented that the telementoring experience was an excellent educational tool and they learned some new techniques they plan to apply it in their practice. Based on the mentors’ survey, the overall telementoring experience was rated as 4.7. All mentors stated that they were satisfied with the telementoring sessions and there were no unexpected intraoperative occurrences. There were some logistical limitations including difficulties in scheduling of cases or the delay of cases.

**Conclusions** Surgical instruction by telementoring was shown to be feasible, practical, and successful, and was highly rated in this study by both the mentors and mentees. The currently utilized telementoring platform is thus an effective educational tool that can facilitate acquisition of surgical skills and assist with the conventional on-site surgical mentoring model.

**Keywords** Telementoring · Sleeve gastrectomy · Remote presence

✉ Ninh T. Nguyen  
ninhn@uci.edu

<sup>1</sup> Department of Surgery, University of California Irvine Medical Center, Orange, CA, USA

<sup>2</sup> Department of Surgery, University of Toronto, Toronto, ON, Canada

<sup>3</sup> Department of Surgery, McMaster University, Hamilton, ON, Canada

<sup>4</sup> Department of Surgery, Massachusetts General Hospital, Boston, MA, USA

<sup>5</sup> American Medical Foundation for Peer Review and Education, Philadelphia, PA, USA

<sup>6</sup> Department of Surgery, Albert Einstein College of Medicine, New York, NY, USA

<sup>7</sup> Department of Surgery, University of California Irvine Medical Center, 333 City Bldg. West, Suite 1600, Orange, CA 92868, USA

The fields of metabolic and bariatric surgery are dynamic and require the practicing surgeon to continually learn new surgical techniques to keep up with rapid advancements in the field. The traditional approach to learning new innovative bariatric surgical procedures includes attendance at national conferences such as those provided by the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) and the American Society for Metabolic and Bariatric Surgery (ASMBS). At these conferences, there are didactics, hands-on laboratory and simulation training sessions that expose surgeons to new innovative procedures. Following these initial learning experiences, many surgeons return to their institutions and proceed to perform the new procedures often on their own, without the assistance of an expert surgeon. This gap in the learning process between attendance at educational conferences and the first attempt at the performance of a new procedure is not optimal as it may lead to an unnecessary higher risk for patient complications [1, 2].

The Foundation for Advanced Medical Education (FAME), a division of the American Medical Foundation for Peer Review and Education, is a leader in the field of patient safety and surgical mentoring [3]. In 2001, FAME presented a large grant to six specialty surgical societies to determine the optimal process in balancing the need for surgeons to learn new procedures and patient safety [3, 4]. The results from that project showed that a three-step process (didactic learning, simulation training, and on-site mentoring) was highly effective in teaching new procedures and improving skills for practicing clinicians [3, 4]. However, the process of on-site surgical mentoring involves an expert surgeon (mentor) taking time away from clinical practice, to travel and assist a trainee surgeon (mentee) to perform the initial new operative procedures. This third step of the training process is very important, however, in our experience there were many logistical problems that often led to cancelation of this important learning experience. Some common issues were schedule conflicts, travel delays, patient cancellation, high travel-related costs, loss of work productivity, and the intensive time demands for the mentor [1, 3, 4].

In an effort to improve the limitations of on-site surgical mentoring, remote surgical mentoring has been implemented as an important educational tool in transitioning from the classroom didactics and hands-on laboratory to actual operative performance. Recent improvement in telementoring technology has resulted in a seamless telementoring process using a conventional Wi-Fi connection, making it a reasonable alternative to conventional on-site surgical mentoring [5–10]. In an effort to simplify and streamline the three steps of the educational process for learning a new surgical procedure, FAME provided a grant to SAGES to implement a project to improve bariatric surgical skills utilizing the laparoscopic sleeve gastrectomy

as a template procedure. The purpose of the grant was to determine whether telementoring could successfully complement on-site mentoring, the important last of three steps in the educational process. Therefore, the aim of this quality improvement initiative was to determine the feasibility and participant satisfaction in the use of telementoring to assist on-site mentoring for continued training in laparoscopic sleeve gastrectomy.

## Methods

### SAGES sleeve gastrectomy telementoring project

This SAGES quality improvement project was performed in collaboration with the ASMBS. Because laparoscopic sleeve gastrectomy is a relatively new bariatric operation, it was selected as a timely and appropriate procedure for training. Scholarships for mentoring were initiated and offered to members of SAGES and ASMBS. The scholarship enables the surgeons to participate in this telementoring program without a charge. The participants did not receive any financial compensation. Since this was a feasibility project to evaluate the telementoring technology and the logistics of setting up a telementoring episode, the mentees included only practicing bariatric surgeons or minimally invasive surgery fellows who are currently performing and have privilege within their institution to perform laparoscopic sleeve gastrectomy. All mentees have either moderate to extensive experience in the procedure (Table 1). A surgical mentor was defined as a surgeon with prior experience in performing at least 75 laparoscopic sleeve gastrectomy cases, currently teaching laparoscopic sleeve gastrectomy within a training program, and participation within the Metabolic Bariatric Surgery and Quality Improvement Program (MBSAQIP). Mentors for this project included surgeons from Montefiore, University of California Irvine Medical Center, University of Toronto, and Massachusetts General Hospital. This quality improvement project was performed over a 4-year period.

Following the similar three-step educational process previously developed by FAME, the current sleeve

**Table 1** Institutions and number of mentees who participated in the laparoscopic sleeve gastrectomy telementoring program

University of California Irvine medical Center	(4)
Montefiore	(3)
Massachusetts General Hospital	(2)
McMaster University	(3)
Loma Linda Medical Center	(1)
Private practice surgeon in Guatemala	(1)
Private practice surgeon in Argentina	(1)

gastrectomy telementoring project consisted of a modified three-step approach. The first step consisted of the mentee reviewing the online learning didactics for the technique of laparoscopic sleeve gastrectomy. The didactic materials included the SAGES handbook of Bariatric Surgery and the ASMBS Textbook of Bariatric Surgery. The second step consisted of teleobservation in which the mentee remotely observed the mentor performing a minimum of two laparoscopic sleeve gastrectomy cases (Fig. 1). Instead of an on-site surgical mentoring, the third step involved the mentor remotely proctoring the mentee for a minimum of two laparoscopic sleeve gastrectomy cases (Fig. 2A and B).

### Logistics of telementoring

In this telementoring program, a relationship between the mentor and mentee for training in laparoscopic sleeve gastrectomy was established. Due to the constraints of individual state medical licensure requirements, the mentors and mentees were paired to be from the same states. There were two state exceptions (Delaware and West Virginia) that permit telementoring across state lines by a medical provider if invited by a physician from these two states [10]. In this initiative, telementoring was also performed internationally, specifically to Guatemala and



**Fig. 1** Teleobservation: a surgeon in Guatemala is observing on an iPad a laparoscopic sleeve gastrectomy case being performed in California



**Fig. 2** Real-time telementoring: the mentor connects into the mentee's operating room (A) using a laptop control station (B)

Argentina. The requirement for obtaining hospital's privileging for the mentor to participate in the telementoring episodes was based on mentee's institution. None of the institutions in this quality improvement initiative required special privileging for the mentor. With regard to malpractice coverage issue, all mentors were asked to contact their individual malpractice carrier to let them know about the specific telementoring episodes to ensure that there is a standard coverage for their telementoring activity. Additional malpractice insurance coverage was not obtained. The mentor and mentee communicated for all logistics including the scheduling of cases, shipment and set-up of the telementoring equipment, and the entire telecommunication process via email or telephone. Patient consent for the telementoring episodes was obtained by the operative surgeon. A week prior to the mentoring episode, the mentor and the mentee communicated to reconfirm the date and time of the telementoring case and also discuss specifics of the operative case and mutual guideline for mentoring.

### Telementoring platform and the mentoring episode

In this project, the Karl Storz VISITOR1<sup>®</sup> remote presence platform was utilized for telementoring. The VISITOR1<sup>®</sup>

is a mobile internet-based cart that provides live communication connection between the mentor and mentee, and vice versa. Connection to the mobile VISITOR1<sup>®</sup> cart can be achieved through conventional Wi-Fi using a special telementoring application (app) that is placed on a laptop, iPhone, or iPad. The connection provides the mentor and mentee with two-way, real-time audio and visual communication. Using the telementoring system, the mentor can toggle between the operative theater image and the laparoscopic image through an S-video signal. There are other important educational features in this telementoring app including video recording, laser pointing to important anatomic structures, capturing a still image, and the ability to telestrate. The telementoring episode began with the surgical incisions including site for port placement and end with wound closure. There was no standardized language used during the telementoring episode. Due to the relatively high level of experience of the mentee in sleeve gastrectomy, mentoring occurred episodically during the case at points as specified by the mentor or the mentee. Although there is the capability for telestration, this feature was utilized in the minority of cases.

### Evaluations of the telementoring program

Upon completion of the telementoring program, both the mentees and mentors evaluated the telementoring process for the quality of telecommunication, latency of telecommunication, visual clarity, sound clarity, and effectiveness of the sleeve gastrectomy mentoring. Success of the interactions were based on a scale of “exceeded,” “met,” “almost met,” or “failed to meet” expectations. The overall telementoring program was rated on a scale of 1 for “poor” and 5 for “excellent.”

### Results

Fifteen mentees completed the entire three-step telementoring process. The telementoring was provided by seven mentors (Table 1). Four additional mentees only completed step 1 and 2 without completion of the final step 3 (telementoring). Teleobservation and telementoring were accomplished in a single instance or on multiple occasions. There were some observed limitations of the telementoring program. These included logistical limitations including schedule conflicts between the mentor and the mentee, and patient case delay. Technology limitations included equipment malfunctions such as poor or lack of audio and video signals (S-video image), issues with institutional firewalls, and issues with telementoring equipment not being readily available. Transmission interruption, either

video or audio, occurred in 3 cases. Legal and regulatory limitations included difficulty in obtaining liability indemnification by the mentee’s hospital. There were no reported intraoperative or postoperative complications in any of the telementoring cases.

The mentees’ overall evaluation of their telementoring experiences showed 93% exceeded expectation and 7% met expectations for the teleobservation sessions and 93% exceeded expectation and 7% met expectation for the telementoring sessions. Specifically, 93% exceeded expectation and 7% met expectation for the quality of telecommunication; 87% exceeded expectation and 13% met expectation for the latency of telecommunication, 67% exceeded expectation and 33% met expectation for visual clarity; and 67% exceeded expectation and 33% met expectation for sound clarity. There were no unexpected occurrences. The overall impression of the mentees’ telementoring experience was rated 4.8. Many mentees commented that the telementoring experience increased the quality of surgery they performed and also increased their confidence in performing laparoscopic sleeve gastrectomy (Table 2).

The mentors’ overall evaluation of their telementoring experiences showed 54% exceeded expectation and 46% met expectation for the quality of telecommunication; 54% exceeded expectation and 46% met expectation for the latency of telecommunication, 41% exceeded expectation and 59% met expectation for visual clarity; 41% exceeded expectation and 59% met expectation for sound clarity. There were no unexpected occurrences. All mentors stated that they were satisfied with their ability to perform mentoring. The overall impression of the mentors’ telementoring experience was rated as 4.7.

### Discussion

Bariatric surgery is a dynamic field with frequent development of novel surgical techniques and new surgical or endoscopic devices for the treatment of obesity. An example of a new bariatric surgical operation includes the single anastomosis duodenoileostomy (SADI) procedure and the endoscopic sleeve procedure. These new operations have inherent learning curves that can be associated with higher patient morbidity [2]. Didactic education with on-site surgical mentoring potentially can reduce the learning curve of a new surgical procedure and its potential associated complications [2–6]. In this quality improvement initiative, we examined the feasibility and participant satisfaction of telementoring of laparoscopic sleeve gastrectomy and found that surgical telementoring is feasible, effective, and overall highly rated by the mentees and mentors. With availability of an affordable platform,

**Table 2** Mentee comments on the laparoscopic sleeve gastrectomy telementoring program

“Great technology”
“Very usable platform”
“Excellent learning tool”
“Great relationship with the proctor”
“The experience gave me more confidence”
“Learned new surgical technique that I plan to incorporate in my procedure”

telementoring potentially can assist conventional on-site mentoring as an educational tool.

Surgical mentoring is an important component in the spectrum of learning a new operative procedure. However, in-person mentoring requires the mentor to travel to the mentee’s operative theater in an effort to assist the mentee performing his or her initial surgical cases. On the part of the mentor, this process can be time intensive and costly with regard to time taken off from practice [3, 4]. Telementoring is a viable alternative that allows the mentor to perform mentoring remotely without the need for travel and time off from work or high associated travel cost [5–8]. In this quality improvement initiative, we found that telementoring is feasible, seamless, and can be repeated on multiple occasions. Because on-site surgical mentoring is time intensive on the part of the mentor, it is often performed in a single session. Since telementoring connection is relatively seamless, it can be done repeatedly until the mentee is comfortable in performing the new surgical procedure. Utilizing a laptop or conventional iPhone or iPad with a specialized app, telementoring was able to be initiated by the mentor essentially anywhere as long as there was a good Wi-Fi connection.

Similar to on-site surgical mentoring, this initiative identified many barriers and limitations with the telementoring process that can be improved. With regard to the regulation of individual state medical licensing boards, currently telementoring can only be performed between a mentor and mentee who have medical licenses in that particular state. There are only two states (Delaware and West Virginia) that recognize licensed medical practitioners from outside of their own states and allow telementoring across state lines [10]. This regulatory limitation poses an issue whenever the only available mentor is licensed in a different state than the mentee’s location where the telementoring is to be performed. To further telementoring, it is imperative to develop legislation to allow medical practitioners to practice telementoring across state lines. Medical liability coverage for the mentor is another important barrier that should be addressed. Currently, liability coverage is being gratuitously instituted by the mentor’s institution; however, a process should be developed to institutionalize liability coverage provided by the mentee’s institution to enable easy access to remote

continued education. Additionally, there are also logistical issues that need to be addressed including the optimal method for communication between the mentor and mentee on the day of telementoring to ensure timely remote attendance of the mentor. Due to variable operative start times, it is important for the mentee to frequently update the mentor regarding the timing for remote presence. Prior to the procedure, there should be a discussion on an agreed communicative channel between the mentor and mentee during the operation and the possible encounter of intraoperative complication. The discussion should point out the basic foundation including items such as the mentee being the operative surgeon who will need to proceed with his or her own course of management in case of an intraoperative complication, and that the mentee is ultimately the surgeon of record for the patient and must be responsible for making final decisions for the intraoperative care of the patient. There should also be a discussion regarding the optimal method for educational communication during the operation. Lastly, there is sometimes a barrier with regard to the availability of low-cost telementoring equipment. In order to have telementoring widely available, there is a need for a variety of systems including a compact, low-cost, portable telementoring system.

This quality improvement initiative had several limitations. Many of the mentees had significant experience with laparoscopic sleeve gastrectomy; therefore, we were not able to determine the effectiveness of telementoring in enabling surgeons to acquire new surgical skills starting from a novice level. However, despite being experienced with laparoscopic sleeve gastrectomy, most mentees commented that their telementoring sessions were worthwhile and educational, and some learned alternative surgical techniques that they plan to incorporate into their clinical practice. Additionally, this quality improvement project did not analyze patient outcome to determine if telementoring had an impact on perioperative outcomes such as reducing length of hospital stay. Additionally, there was no standardized communication protocol developed for the mentoring session. The mentee and mentor communicated freely throughout the case regarding important technical aspects of the procedure. Despite these limitations, this study substantiates the feasibility and positive participant satisfaction with telementoring as a convenient educational

tool for the improvement of surgical skills and may assist with the acquisition of a new surgical skill.

## Conclusions

Surgical telementoring is feasible and was overall highly rated by the mentees and mentors. Despite having variable experience with laparoscopic sleeve gastrectomy, mentees commented that their telementoring sessions were worthwhile and some learned alternative surgical techniques that they plan to incorporate in their practice. Telementoring is an effective educational tool that can assist with the conventional on-site surgical mentoring model.

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## Compliance with ethical standards

**Disclosures** Ninh T. Nguyen, Allan Okrainec, Mehran Anvari, Brian Smith, Oz Meireles, Denise Gee, Erin Moran-Atkin, Evelyn Baram-Clothier, and Diego R. Camacho have no conflicts of interest or financial ties to disclose.

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