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RESEARCH ARTICLE

VIDEO-LEARNING IN SURGICAL TRAINING: IS IT A METHOD TO IMPROVE PREPARATION OF SURGICAL RESIDENTS?

*¹Danilo Coco and ²Silvana Leanza

¹Department of General Surgery, Ospedali Riuniti Marche Nord, Pesaro (PU), Italy

²Department of General Surgery, Carlo Urbani Hospital, Jesi (AN), Italy

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ABSTRACT

Teaching of surgery has changed during last 30 years due to technological advances from laparoscopy and robotic surgery but also for the use of new technical and learning devices such as Internet Access and Video Recording. Videos should be used in addition to standard techniques in the surgical education and seem to reduce learning curve for complex procedures, seem to have the potential to identify variations in operative technique as well as their impact on patient outcomes. In this way, surgical training is evolving and Surgical Video Learning (SVL) is became an emerging concept in surgery .SVL has advantages on the teaching but has many disadvantages because for the use of low quality, video learning become a foe not a friend in learning point. We reviewed the current evidence for the video-based surgical education methods, discussing the advantages and disadvantages on the teaching of technical and nontechnical surgical skills.

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INTRODUCTION

Video-based education has potential for use in surgical education as trainees face to facilitate *teaching of surgery and reduce* significant barriers during the residents' practice. According to the recent literature, this method seems to be effective.(1) Nowadays, Videos should be used in addition to standard techniques in the surgical education and seem to reduce learning curves for complex procedures, seem to have the potential to identify variations in operative technique as well as their impact on patient outcomes. *Surgical training is evolving* and Surgical Video Learning (SVL) and video-recording are became an emerging concept in surgery (2).Video-based surgical education methods has advantages on the teaching of technical and nontechnical surgical skills helping intraoperative decision-making. The Pittsburgh group has developed a step by step virtual curriculum to improve skills in minimally invasive HPB surgery to diminish the time and the rate of operations in learning curve. The same method was demonstrated by Michigan Bariatric Surgery Collaborative (MBSC).We reviewed the current evidence for the video-based surgical education methods, discussing the advantages and disadvantages on the teaching of technical and nontechnical surgical skills.(3)

MATERIALS AND METHODS

An electronic literature search was conducted through PubMed, Medline, Embase, Cochrane and Google Scholar databases to identify articles reporting on importance of video-based learning in surgical training using the following key words: "Video-Based Learning, Improvement, Skills, Techniques, Video, Medical Knowledge". Of the 80 studies found by using the above-mentioned search terms and object of each study, only 14 were included, the remaining 66 were excluded due to non-relevance to the topics. Both authors (DC and SL) have independently selected the studies.

Inclusion and exclusion criteria: The Medical Subject Headings (MeSH) terms and keywords used were "video," "education," and "general, laparoscopic, robotic surgery.". We excluded all manuscripts talk about video learning about other field not comprehensive of general surgery. We found 80 manuscripts. We analyzed all full-texts, randomised and nonrandomised clinical trials and observational studies including video-based education methods about General Surgery. We exclude all manuscript who including video-based education methods on any surgery. A total of 14 articles met inclusion criteria were included.

*Corresponding author: Danilo Coco,
Department of General Surgery, Ospedali Riuniti marche Nord,
Pesaro (PU), Italy.

Outcomes: In a randomized controlled trial conducted at a single teaching hospital, comparing a group supported by video-learning and a group non supported, after Surgical

Video Coaching (SVC) , it was demonstrated that Surgical Video Coaching (SVC) group significantly increased skills score when compared to the control group, concluding Video Learning is an effective and efficient teaching method to improve surgical residents' technical skills.(1). In a Survey, distributed at Department of Surgery at the University of Iowa Hospitals and Clinic, 90% of respondents reported using videos for surgical preparation. Residents seem to use web pages as YouTube: 95%, Surgical Council on Resident Education (SCORE): 25%, society web pages 67%, commercial videos 27%. The survey stated that Video Learning is an efficient way to prepare for surgery and that YouTube was the preferred source cause the major free open video access.(2). A questionnaire distributed at Surgical Sciences Research Domain, Life and Health Sciences Research Institute in Portugal, demonstrated that 98.6% of the respondents have already used videos to prepare for surgery. The study agrees that video-learning seem to be a hallmark of surgical preparation.(3) These studies doesn't referred to a specific type of surgery. We found many articles which talk about laparoscopic cholecystectomy video-learning.

duration for considering a video of good quality was 7:42 minute according of a sensitivity of 67.9%, a specificity of 60.5%, and an odds ratio of 3.23 (95% CI: 1.19-8.79; p = 0.022). (5). A study conducted reinforced the thesis that favorable characteristics, such as number of views or likes, do not translate to higher quality. In 139 YouTube videos with higher views, likes or subscribers, using critical view of safety cut-off as goal, one video (0.06%) achieved a passing CVS score of 5; 23%, 4; 44%, 3; 79%, 2; and 100% 1.The study confirmed higher views, likes or subscribers did not correlate with better quality.(7). In 160 surgical videos of laparoscopic cholecystectomy from public domain websites, some authors found that the percentage of satisfactory CVS 5 was only 12.5%. (8) From University of Michigan, authors stated participants were more willing to divide critical structures when videos showed an adequate CVS dissection (CVS score 4) than an inadequate dissection (CVS score 3) (60.4% vs. 16.3%, p=0.043). They concluded that, when building a culture of safety for laparoscopic cholecystectomy, education may play a more important role than experience.(9) Studies show that video-learning improve practice.

Table 1. Goals

Manuscript	Year	Goal
Soucisse M. <i>et al</i>	2017	Efficient teaching method
Rapp AK. <i>et al</i>	2016	Efficient way to prepare for surgery
Mota P. <i>et al</i>	2017	SVL is a hallmark of surgical preparation
Lee JS. <i>et al</i>	2015	Only videos uploaded by tertiary centers showed the highest educational value
Frongia G. <i>et al</i>	2016	YouTube as a Potential Training Resource
Rodriguez HA. <i>et al</i>	2017	Surgical Videos Learning is a friend or foe in surgical education
Deal SB. <i>et al</i>	2017	Higher views, likes or subscribers did not correlate with better quality
Deal SB,Stefanidis D, Telem D. <i>et al</i>	2017	From public domain websites only 12.5% are of good quality
Carr BD. <i>et al</i>	2018	Education may play a more important role than experience.
Nijssen MA. <i>et al</i>	2016	SVL Improves Critical View of Safety in Laparoscopic Cholecystectomy
Chen CB. <i>et al</i>	2016	SVL Increases resident utilization and recognition of the critical view of safety
Niemann AC. <i>et al</i>	2018	simulated operative decision-making
Nazari T. <i>et al</i>	2020	SVL prepares medical students to perform surgical procedures
Scully RE <i>et al</i>	2020	After the teaching videos, the complication

SVL: Surgical Video Learning

A research study has analyzed the educational quality of laparoscopic cholecystectomy (LC) on internet. The study demonstrated that an active filtering process is necessary to improve the quality control of the videos. Only 15.1% were evaluated as 'good' and only videos uploaded by tertiary centers showed the highest educational value.(4).The importance of correct laparoscopic cholecystectomy learning by video-coaching was researched usyng an Youtube quality selection based on Global Objective Assessment of Laparoscopic Skills (GOALS) score establishment of a critical view of safety (CVS) as objective teaching-point. Only 10 videos was screened as "good quality" and only one of these has achieved adequate critical view of safety. The other videos had have other potentially dangerous techniques such as hot ultrasonic shears on the duodenum, non-clipping of the cystic artery, blind dissection in the hepato-cystic triangle and damage to the liver capsule. The home message was that high-quality is the key for the best learning videos. With the use of low quality, video learning become a foe not a friend in learning point.(6)To confirm the fact that internet can be a friend but also a foe, in a cross-sectional study, a search was performed on YouTube for videos about Laparoscopic Fundoplication. The authors demonstrated 39.4% videos was good quality, 32.4% were moderate and 28.2% were poor based on video duration, uploading source, and the views/days online ratio. The study revealed that good-rated videos were significantly longer (22.0 ± 5.2min) and the cut-off video

CVS in LC was reached in 69% of the pre-teaching interention patients , in 73% after the first teaching intervention and in 82% after the second intervention (overall p = 0.070). After the teaching videos, the complication rate and the rate of reaching CVS did not improve significantly but improve. Probably, more personal videos learning for every surgeon may be more effective.(10,11,12,13,14).(Table 1)

DISCUSSION

We reviewed the current evidence literature for the video-based surgical education methods, discussing the advantages and disadvantages on the teaching of technical and non-technical surgical skills in laparoscopic and robotic surgery (15,16,17). Many studies had revealed the use of videos in minimally invasive surgery and the use of a head-mounted GoPro in open surgery are a dynamic tool that provides high-quality materials for operative review in surgery and have the potential to augment the training experience. Video-based assessments before and after surgery that include intraoperative decision-making, can help assess individual perceptions of safe practices without the risk of harm to the patient. Video should be used in addition to standard techniques in the surgical education (18) when surgical volume is not sufficient to ensure quality and patient safety. (19) The Pittsburgh group has created a video library techniques to learn Minimally Invasive Pancreatic Resections

(MIPR). The MIPR video-programm has been broken up into seven steps: video-learning is one of the steps to improve the major operative techniques in pancreatic resections. In this way, the video library allows preparation prior to the operating room. It is a virtual curriculum that seems to improve performance for residents. The video library promotes preparation and recognition of tissue planes and assists with intra-operative performance.(19) A study by Michigan Bariatric Surgery Collaborative (MBSC) demonstrated that surgical videos can be used in the context of quality improvement, can reduce learning curves for complex procedures and also have the potential to identify variations in operative technique as well as their impact on patient outcomes.(20,21). Video-based surgical education methods has advantages on the teaching of technical and nontechnical surgical skills helping intraoperative decision-making, improves anatomic knowledge, simulated real operation, reduce operation time. As disadvantages, SVL is merely a theoretical pedagogics, it doesn't increase manual skills, it doesn't provides a feed-back to the training and it's challenging to seek out an honest quality video learning which teaches correct surgical skills.

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Conclusions

Based on these findings, we believe that the creation of quality and scientifically accurate videos appears to be the future landscape for video-based learning. VLS can help assess individual perceptions of safe practices without the risk of harm to the patient. It can be used in addition to standard techniques in the surgical education (18) when surgical volume is not sufficient to ensure quality and patient safety and an effective and efficient teaching method to improve surgical residents' technical skills. However, be careful because most videos have other potentially dangerous techniques. The home message was that high-quality is the key for the best learning videos. With the use of low quality, video learning become a foe not a friend in learning point.

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