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Video Coaching as an Efficient Teaching Method for Surgical Residents—A Randomized Controlled Trial

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BACKGROUND: As surgical training is evolving and operative exposure is decreasing, new, effective, and experiential learning methods are needed to ensure surgical competency and patient safety. Video coaching is an emerging concept in surgery that needs further investigation.

DESIGN: In this randomized controlled trial conducted at a single teaching hospital, participating residents were filmed performing a side-to-side intestinal anastomosis on cadaveric dog bowel for baseline assessment. The Surgical Video Coaching (SVC) group then participated in a one-on-one video playback coaching and debriefing session with a surgeon, during which constructive feedback was given. The control group went on with their normal clinical duties without coaching or debriefing. All participants were filmed making a second intestinal anastomosis. This was compared to their first anastomosis using a 7-category-validated technical skill global rating scale, the Objective Structured Assessment of Technical Skills. A single independent surgeon who did not participate in coaching or debriefing to the SVC group reviewed all videos. A satisfaction survey was then sent to the residents in the coaching group.

SETTING: Department of Surgery, HôpitalMaisonneuve-Rosemont, tertiary teaching hospital affiliated to the University of Montreal, Canada.

PARTICIPANTS: General surgery residents from University of Montreal were recruited to take part in this trial. A total of 28 residents were randomized and completed the study.

RESULTS: After intervention, the SVC group ($n = 14$) significantly increased their Objective Structured Assessment of Technical Skills score (mean of differences 3.36, [1.09-5.63], $p = 0.007$) when compared to the control group ($n = 14$) (mean of differences 0.29, $p = 0.759$). All residents agreed or strongly agreed that video coaching was a time-efficient teaching method.

CONCLUSIONS: Video coaching is an effective and efficient teaching intervention to improve surgical residents' technical skills. (J Surg Ed ▮:▮▮▮-▮▮▮. Crown Copyright © 2016 Published by Elsevier Inc. on behalf of the Association of Program Directors in Surgery. All rights reserved.)

KEY WORDS: surgical education, video coaching, simulation, experiential learning, residency, surgery

COMPETENCIES: Practice-Based Learning and Improvement, Interpersonal Skills and Communication

INTRODUCTION

Surgical training is evolving.[1] Not so long ago, surgical residency was on an apprenticeship basis and hours spent at the hospital were countless.[2] As medicine advances, numerous surgical interventions have been replaced by less-invasive approaches such as peptic ulcer disease medical treatment, endovascular stenting, nonoperative trauma management, and endoscopic retrograde cholangiopancreatography to name a few.[3] With the advent of laparoscopy, what were once junior resident cases have become senior resident cases.[3] These, along with restricted work hours, are all the reasons why efficient ways of teaching technical skills outside of the operating room (OR) are essential to the modern surgical training curriculum.[4] Moreover, surgeons'

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technical abilities have a linear relationship with surgical complications, patient morbidity, and mortality.[5] Simulation is a modern way to cope with less intraoperative training, but has inconsistently shown to be transferrable to the OR.[6,7] Recently published articles with promising results used video-based coaching to enhance nontechnical skills and surgical performance, while reducing technical errors in laparoscopy, a model the sports industry has been using for years.[8-10] Abundant literature exists for simulation in laparoscopic surgery, but there remains a void in open surgery.[11]

Coaching relates to a cooperative process between a coach and a coachee, which includes "providing objective and constructive feedback to help a coachee recognize what works and what can be improved and inspire them to maximize their potential" (http://www.coachfederation.org/). Another important component of coaching is motivating a trainee to strive for better performance and providing guidance to the fulfillment of this objective. As proposed by the Wisconsin Surgical Coaching Framework,[12] surgical coaching is broad and can apply to cognitive, technical, or nontechnical skills. There exist 2 main models of coaching for technical skills: one is video-based and the other is intraoperative.

Video-based coaching allows the teacher and trainee to fully concentrate on the technical aspect of the procedure by removing the clinical context, responsibilities, and external pressure inherent to intraoperative coaching.[12] Although it may be an effective teaching method, preparing video-based coaching sessions can be time-consuming, thereby limiting its long-term feasibility.[13]

The main purpose of this study was to evaluate if a novel video-based coaching technique using a canine simulation model can efficiently enhance surgical residents' technical skills as measured by a global rating scale. Further, we assessed students' appreciation of the video-based training experience by means of a satisfaction survey to evaluate whether such a teaching modality could realistically be implemented in a technical skills training curriculum.

METHOD

Trial Design

Between May 2015 and July 2015, we conducted a single-blinded prospective randomized controlled trial (Clinicaltrials.gov registration: NCT02529254), which contained 2 arms, Surgical Video Coaching (SVC) and Control (C). Participants were allocated to each group respecting a 1:1 ratio.

Subjects

All residents from postgraduate year 1 (PGY-1) to PGY-4 from the University of Montreal general surgery program were recruited in 2015 to take part in this study. PGY-5 residents were excluded because of mandatory absence from clinical duties for board examinations during the study period. The study was conducted at Maisonneuve-Rosemont Hospital, a University of Montreal affiliated hospital, in its dedicated surgical skills laboratory where there is an OR strictly for simulation purposes. Institutional Ethics Board approval and written informed consent from all participants were obtained before enrollment.

Baseline Assessment

Residents were evaluated on their performance on an open, 2-layer side-to-side intestinal anastomosis on cadaveric dog bowel. To simulate human bowel, dog bowel was resected from research Hound dogs after their planned necropsy and were frozen immediately. Pieces of bowel could then be warmed individually for each anastomosis. The procedure was recorded using a mounted SONY digital camcorder. All recruited participants were filmed after being asked in a standardized manner to perform a 2-layer side-to-side intestinal anastomosis. This technique had been previously taught during a live pig wet lab to all the residents as part of the program's current simulation curriculum. For uniformity purposes, the same surgical assistant was used for all recorded anastomoses. Residents were informed that the assistant was instructed to be nonproactive, and that they should tell him exactly how to assist them throughout the procedure. This assistant was also responsible for starting and ending the recording. Video sequences were then sent to Maisonneuve-Rosemont Hospital's Audiovisual Department for brief video editing intended to shorten the video by cutting out repetitive tasks that had already appeared in the sequence, such as knot tying and continuous suturing.

Interventions

Coaching Framework

A literature review was conducted in pursuit of a proper coaching model that would suit the surgical context and would grant uniformity to the coaching sessions. The Goals, Reality, Options, Wrap-up (GROW) model was chosen. The GROW model is a well-established coaching framework that has already been used and adapted to the surgical video-based coaching context.[8] This stepwise approach balances the discussion of a coaching session through 4 categories of questions.

Goals: Orients the meeting on a specific endpoint or desired improvement identified by the trainee.

Reality: Illustrates the actual situation, for example, a recorded video.

Options: Identifies obstacles to the desired endpoints and focuses on implementable methods to improve in these specific aspects.

Wrap-up: Elaboration of an improvement action plan and how to overcome identified obstacles.