Available online at www.sciencerepository.org

Science Repository

Technical Note

A Technical Guide to Recording Antegrade Mesenteric Bypass from the Surgeon's Point of View

Maria Lalama[1], Sinan Kallo Jabori[1], Emily Swafford[1], Marwan Sheckley[2], Arash Bornak[1] and Jorge Rey[1*]

[1]Division of Vascular and Endovascular Surgery, University of Miami, Miami, Florida, USA
[2]Arizona College of Osteopathic Medicine, Midwestern University, Glendale, Arizona, USA

ARTICLE INFO

Article history:
Received: 22 December, 2021
Accepted: 11 January, 2022
Published: 28 January, 2022

Keywords:
Antegrade bypass
mesenteric artery bypass
video coaching
surgical education
COVID-19

ABSTRACT

The COVID-19 pandemic has forced education to transform into a virtual platform. The decreased number of open cases performed by general and vascular surgical trainees necessitates the supplementation of intraoperative education with digital technologies. We present the benefits and drawbacks of recording, editing, and uploading surgical procedures for educational use. In this paper, we describe an educational video of an antegrade mesenteric bypass to treat chronic mesenteric ischaemia. Fomenting a common practice of filming surgeries is a step towards creating a high-definition video library for surgical trainees to familiarize themselves with procedures and/or enhance their learning, especially during mandated social distancing.

Introduction

During the COVID-19 pandemic, many practices were mandated to postpone elective surgeries. Surgical education programmes had to adapt by restructuring their training to ensure continued growth and development of residents and fellows [1, 2]. Many programmes achieved this shift by increasing the use of digital education, such as e-learning platforms, surgical simulation training, and video recordings. Video recordings and technologies are not new in surgical education. However, because of fewer opportunities for residents in operating room (OR) learning environments, they are now ostensibly an essential part of surgical education [3]. The practice of video capturing during live surgery still needs significant improvements [4]. One option for improvement is the use of LoupeCam® (VizVocus Inc.), a high-definition camera that can be attached to loupes or headlights. This resource can be used to create a video library that is open to surgical trainees. We present a case of video-based learning that demonstrates the surgical technique for an antegrade mesenteric bypass for chronic mesenteric ischaemia (CMI).

Methods

I Video Recording

After receiving patient consent for filming, the ProHD 720p LoupeCam was chosen (ProHD 720p LoupeCam, VizVocus Inc.; Scottsdale, Arizona) and used to film an antegrade mesenteric bypass for CMI. The camera is capable of recording high-definition, surgical-grade videos at a 1280×720 resolution and uses well-integrated LED light that allows for easy alignment, increased depth of field, and better focus. Before beginning the surgery, the LoupeCam was head-mounted on the surgeon, adjusted for comfort, and oriented to the surgeon's perspective. A medical student was in the OR during the entirety of the procedure to ensure that the camera was focused and to pause the recording whenever necessary. The ProHD LoupeCam weighs 0.46 oz which is most likely why the surgeon did not complain about additional fatigue or neck strain caused by the camera. Editing was later accomplished using iMovie 11 (Apple Inc; Cupertino, Calif.).

Correspondence to: Jorge Rey, M.D., Division of Vascular and Endovascular Surgery, University of Miami, 1321 Northwest 14th Street #600, Miami, Florida, 33125, USA; Tel: 3052430783; E-mail: jrey@med.miami.edu

http://dx.doi.org/10.31487/j.SCR.2022.01.03

II Surgical Technique

This surgical procedure has been formerly described by Chalmers (2017) [5]. In brief, the patient underwent general endotracheal anaesthesia and was positioned supinely with arms at 80 degrees. Chest, abdomen, and groins were prepped and draped in a standard sterile fashion. A midline incision was made from the xiphoid process to the pubic symphysis, and the skin, subcutaneous tissues, and fascia were passed through to enter the peritoneal cavity. No adhesions were lysed, and all bowels were viable. An incision of the left triangular ligament of the liver was made, and the left hepatic lobe was retracted to the right. The lesser omentum was then incised, and the stomach was inferiorly retracted to identify and retract the esophagus. The right crus of the diaphragm was identified and divided, and both the celiac artery and 6 cm of the supraceliac (above the celiac) artery were dissected out. After retracting the transverse colon and the small bowel to the right, the ligament of Treitz was taken down, and the duodenum was medialized until control of a soft area of the superior mesenteric artery without plaque was obtained.

After administration of systemic heparin, proximal control was achieved, and the supraceliac aorta was clamped. An anterior longitudinal arteriotomy was made in the supraceliac aorta, and the bypass was grafted with a 12×6 mm rifampin-soaked Dacron graft. The graft was cut obliquely, and a proximal anastomosis was performed in an end-to-side fashion to the supraceliac aorta with a running 3-0 Prolene suture. The supraceliac clamp was released, and the graft was tunneled to the retropancreatic superior mesenteric artery. An end-to-side anastomosis to the distal limb of the superior mesenteric artery and the celiac artery was both completed with running 5-0 Prolene sutures. Hemostasis was obtained. The patient's abdomen was irrigated with normal saline and closed in layers.

Video 1 (Link) demonstrates the surgical technique mentioned above.

Results

During the procedure, the camera recorded for a continuous 255 minutes and 20 seconds. The length of the final video after editing was 7 minutes and 47 seconds. This procedure was recorded strictly for educational purposes, and personal identifiable image collection was avoided. The camera did not interfere with operative sterility or functioning in the operating room. The camera's battery life was fully charged before the surgery, and it did not create a problem during the surgery.

Discussion

Becoming a surgeon is an endeavor requiring many years of training. Even upon completion of formal training in residencies and fellowships, a career in surgery demands a lifelong dedication to learning and honing surgical skills. It is known that a person retains 10-15% of what is read, 10-20% of what is heard, and 20-30% of what is seen; yet, when audio and video materials are concomitantly employed, 40-50% is retained [6]. This fact exemplifies the importance of video-based learning in surgical education. Previous studies on video coaching validate its benefits, demonstrating that its use improves training time, learning duration, acquisition of surgical skills, and trainee satisfaction [7, 8]. Thus, with the decline of surgical procedures performed by trainees, the supplementation of intraoperative education with digital technologies such as video-based coaching becomes increasingly essential. Our use of video coaching demonstrating a less frequently performed operation, an antegrade mesenteric bypass, provides surgical trainees with opportunities to increase knowledge, skill, and satisfaction, as proven in similar studies [7, 8].

Operating while video recording has its limitations and numerous challenges can arise (i.e., blood covering the field, light exposure, camera battery life, etc.) [3]. The biggest drawback we experienced during recording was when the camera lost focus during surgery, and it was not possible to stop the surgeon to fix this at that moment. It is necessary to have someone, such as a medical student, constantly monitoring and correcting the camera position throughout the procedure to ensure a suitable recording is attained. When done correctly, however, video-based coaching can help advance the education of a newer generation of surgery residents, especially when involving infrequently performed surgical operations.

Conclusion

The decreased number of open cases performed by general and vascular surgical trainees necessitates the supplementation of intraoperative education with digital technologies. The advantages of using the ProHD LoupeCam are that it can be used to create quality video recordings of operative procedures shown from the surgeon's point of view. The videos can be used to create a video library to aid surgical residents. The biggest disadvantage we experienced was when the camera lost focus during surgery. This is especially troublesome because there is no way to fix this after the incident. Overall, we were able to record and illustrate an operation that will facilitate surgical resident education. As video technology continues to improve, the effective use of videos as surgical education tools may accordingly advance the quality and efficiency of intraoperative resident education.

REFERENCES

1. Scullen T, Mathkour M, Maulucci CM, Dumont AS, Bui CJ et al. (2020) Letter to the Editor Impact of the COVID-19 Pandemic on Neurosurgical Residency Training in New Orleans. *World Neurosurg* 139: 718-719. [Crossref]
2. Kogan M, Klein SE, Hannon CP, Nolte MT (2020) Orthopaedic Education During the COVID-19 Pandemic. *J Am Acad Orthop Surg* 28: e456-e464. [Crossref]
3. Jacquemart M, Bouletreau P, Breton P, Mojallal A, Sigaux N (2016) Teaching Surgical Procedures with Movies: Tips for High-quality Video Clips. *Plast Reconstr Surg Glob Open* 4: e1025. [Crossref]
4. Graves SN, Shenaq DS, Langerman AJ, Song DH (2015) Video Capture of Plastic Surgery Procedures Using the GoPro HERO 3+. *Plast Reconstr Surg Glob Open* 3: e312. [Crossref]
5. Chalmers RTA (2017) Antegrade Aortoceliac/Mesenteric Bypass for Chronic Mesenteric Ischemia. *Operative Dictations General Vascular Surgery* 659-661.
6. Prinz A, Bolz M, Findl O (2005) Advantage of three dimensional animated teaching over traditional surgical videos for teaching ophthalmic surgery: a randomised study. *Br J Ophthalmol* 89:1495-1499. [Crossref]

7. Ahmet A, Gamze K, Rustem M, Sezen KA (2018) Is Video-Based Education an Effective Method in Surgical Education? A Systematic Review. *J Surg Educ* 75: 1150-1158. [Crossref]

8. Augestad KM, Butt K, Ignjatovic D, Keller DS, Kiran R (2020) Video-based coaching in surgical education: a systematic review and meta-analysis. *Surg Endosc* 34: 521-535. [Crossref]