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Assessment of YouTube as an online educational tool in teaching laparoscopic Roux-en-Y gastric bypass: A LAP-VEGaS study

Armaun D. Rouhi [a], Jeffrey L. Roberson [a], Emily Kindall [a], Yazid K. Ghanem [b], William S. Yi [a], Noel N. Williams [a], Kristoffel R. Dumon [a,*]

[a] Division of Surgical Education, Department of Surgery, University of Pennsylvania Perelman School of Medicine, Philadelphia, PA, United States
[b] Department of Surgery, Cooper University Hospital, Camden, NJ, United States

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ABSTRACT

Background: General surgery residents frequently access YouTube® for educational walkthroughs of surgical procedures. The aim of this study is to evaluate the educational quality of YouTube® video walkthroughs on Laparoscopic Roux-en-Y gastric bypass (LRYGB) using a validated video assessment tool.

Methods: A retrospective review of YouTube® videos was conducted for "laparoscopic Roux-en-Y gastric bypass", "laparoscopic RYGB", and "laparoscopic gastric bypass." The top 100 videos from three YouTube® searches were gathered and duplicates were removed. Included videos were categorized as Physician (produced by individual physician), Academic (university/medical school), or Society (professional surgical society) and rated by three independent investigators using the LAParoscopic surgery Video Educational GuidelineS (LAP-VEGaS) video assessment tool (0–18). The data were analyzed using one-way ANOVA with Bonferroni correction and Spearman's correlation test.

Results: Of 300 videos gathered, 31 unique videos met selection criteria and were analyzed. The average LAP-VEGaS score was 8.67 (SD 3.51). Society videos demonstrated a significantly higher mean LAP-VEGaS score than Physician videos ($p = 0.023$). Most videos lacked formal case presentation (71%), intraoperative findings (81%), and operative time (76%). No correlation was demonstrated between LAP-VEGaS scores and number of likes or views, video length, or upload date.

Conclusions: LRYGB training videos on YouTube® generally do not adhere to the LAP-VEGaS guidelines and are of poor educational quality, signaling areas of improvement for educators.

Introduction

Laparoscopy has become the mainstay of general surgery residency; however, its adoption is hindered by the procedure's varying technical complexity as well as the underlying learning curve [1]. Combined with some trainees having less operative exposure in recent years, surgical trainees often look for electronic resources, such as YouTube®, to augment in person learning [2–5]. There has been a substantial increase in the number of medical education videos published on the Internet annually [6]. Yet, in the absence of clear publishing guidelines, there is a concern surrounding their ability to transmit and teach evidenced-based practices [7,8].

The LAParoscopic surgery Video Educational GuidelineS (LAP-VEGaS) video assessment tool was created in 2018 by an international consensus committee as a checklist to assist in the development of educational and reliable laparoscopic educational videos [9]. This committee was comprised of surgical educators from 26 institutions in the United Kingdom, Ireland, Italy, Australia, Japan, India, and France [9]. Prior to the publication of LAP-VEGaS, there was no validated instrument for the assessment of laparoscopic surgery videos nor any uniform set of guidelines for video-based laparoscopic education. The LAP-VEGaS score has been demonstrated to be highly accurate in identifying videos of educational value as well as having a high degree of generalizability and internal consistency [9]. Previously utilized to analyze the educational value of YouTube® videos on laparoscopic sleeve gastrectomy (LSG), LAP-VEGaS scoring demonstrated that most publicly available videos failed to meet acceptable educational standards [10].

* Corresponding author at: Department of Surgery, Hospital of the University of Pennsylvania, 3400 Spruce Street, 4th Floor Silverstein, Philadelphia, PA 19104, United States.
E-mail address: kristoffel.dumon@pennmedicine.upenn.edu (K.R. Dumon).

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Laparoscopic Roux-en-Y gastric bypass (LRYGB) poses a challenge to surgical trainees as it is a multi-abdominal quadrant operation with laparoscopic suturing and knot tying [11]. Multiple educational programs spanning from workshops to full postgraduate fellowships have been created to assist in the development of the skills needed to safely perform this metabolic surgery [12,13]. However, learners have indicated a preference for e-learning compared to or in addition to traditional teaching patterns, and multiple systematic reviews have demonstrated the ability of virtual education modalities to bolster knowledge and performance [14]. This study utilizes the validated LAP-VEGaS video assessment tool to retrospectively assess and determine the educational value of publicly available LRYGB training videos on YouTube®.

Methods

Study design

Adapting previous methods by de'Angelis et al., YouTube® (www.youtube.com, YouTube LLC, San Bruno, CA, USA) searches were performed on Google Chrome (version 103.0.5060.134) browsing software under default settings on May 16, 2023 using the search terms "laparoscopic gastric bypass", "laparoscopic Roux-en-Y gastric bypass", and "laparoscopic RYGB" [15]. Searches were conducted in a private browsing window after history and cache were cleared from the browser. Videos returned by each search were sorted by relevance, as per the default settings of the online platform. The first 100 videos from each search were gathered and duplicates were removed. Similar to the selection crieria of previous LAP-VEGaS studies, videos with concomitant procedures, patient education, and non-English language commentary were excluded to reflect those training videos most likely to be accessed by surgical trainees (Table 1) [15–17]. Final included videos were categorized as Physician (produced by individual physician), Academic (produced by university or medical school), or Society (produced by professional surgical society), and then analyzed for quality using the LAP-VEGaS video assessment tool. This study was based exclusively on the assessment of public-domain videos and no ethical approval was necessary.

The LAP-VEGaS video assessment tool includes 9 questions regarding essential educational criteria (1. Institutional information; 2. Formal case presentation; 3. Patient position and access; 4. Step-by-step procedural walkthrough; 5. Intraoperative findings; 6. Operative time; 7. Graphic aids; 8. English-language audio/visual commentary; 9. Appropriate image quality and video speed) and each question is scored on a 0–2 scale (0 = not presented, 1 = partially presented, 2 = completely presented), with total LAP-VEGaS scores ranging from 0 to 18 [9]. Higher scores signify greater adherence to the LAP-VEGaS guidelines and higher quality educational videos for surgical trainees. Videos with LAP-VEGaS scores greater than or equal to 15 are generally considered appropriate resources for surgical education [9,15].

The primary outcome of the study was the LAP-VEGaS score for each included video. The upload date, number of likes and number of views at the time of analysis, video length, and URL were secondarily assessed. Additionally, areas for improvement were identified as components of the LAP-VEGaS criteria that were not fulfilled.

Table 1
Inclusion and exclusion criteria.

Inclusion	Laparoscopic Roux-en-Y gastric bypass videos
	Live surgery recorded by endoscopic camera
	Complete procedure shown
Exclusion	Non-English language commentary
	Revision of gastric bypass
	Concomitant procedures (e.g. hernia repair or band removal)
	Conversion procedures (e.g. gastric sleeve conversion to RYGB)
	Patient engagement, education, or testimonial
	Advertisements

Three senior general surgery residents evaluated each video independently and blinded to each other's scoring. Prior to scoring, these investigators reviewed and discussed the LAP-VEGaS guidelines as a group to set standards for scoring and mitigate bias. Calculation of Cohen's *kappa* for inter-rater reliability was performed on the LAP-VEGaS scores recorded by each investigator to assess the level of agreement, with values ≤ 0 as indicating no agreement, 0.01–0.20 as slight agreement, 0.21–0.40 as fair, 0.41–0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1.00 as near perfect agreement [18]. The mean LAP-VEGaS score was used in analysis. Our group has previously utilized the LAP-VEGaS criteria to assess the educational quality of publicly available laparoscopic cholecystectomy and jejunostomy training videos [16,17].

Statistical analysis

Categorical variables were presented as counts with frequency percentages, and continuous variables were shown as mean ± standard deviation. One-way ANOVA with Bonferroni correction was used to compare mean LAP-VEGaS scores between video categories. Spearman's correlation test was performed to measure the association between LAP-VEGaS scores and upload date, number of likes, number of views, and video length. A p-value<0.05 was considered statistically significant. Statistical analyses were performed using Stata version 17.0 (StataCorp, College Station, Texas, USA).

Results

Of the 300 YouTube® videos gathered, 31 unique training videos met selection criteria and were included in the study. Characteristics of included videos are listed in Table 2. The video category breakdown was 14 (45%) Physician, 10 (32%) Society, and 7 (23%) Academic.

The average LAP-VEGaS score for included videos was 8.67 ± 3.51 with a median of 9.00 (range 2.00–16.33) (Table 3). Inter-rater reliability was 0.73. Society video walkthroughs demonstrated a significantly higher mean LAP-VEGaS score than Physician videos (11.33 ± 2.48 vs 6.78 ± 3.04, $p = 0.023$), while no other significant differences were observed between video categories (Table 4). Overall, most YouTube® training videos failed to provide formal case presentation (71%), intraoperative findings (81%), and operative time (76%) (Table 5).

There was no association between LAP-VEGaS score and date of video upload ($r_s = -0.385$, $p = 0.085$), number of likes ($r_s = 0.196$, $p =$

Table 2
Video characteristics.

Characteristic	N (%) or Median (IQR)
Upload Date	
2010	2 (6.5)
2011	3 (9.7)
2012	2 (6.5)
2013	2 (6.5)
2014	1 (3.2)
2015	3 (9.7)
2016	2 (6.5)
2017	1 (3.2)
2018	4 (12.9)
2019	5 (16.1)
2020	3 (9.7)
2021	1 (3.2)
2022	2 (6.5)
Likes	41 (6–105)
Views	5378 (864–26,729)
Length (minutes)	9.4 (8.5–12.3)
Country of Origin	
United States	22 (71.0)
United Kingdom	2 (6.5)
Turkey	2 (6.5)
Malaysia	2 (6.5)
India	3 (9.7)

Table 3
LAP-VEGaS scores by video category.

Video Category	Mean ± SD
Academic	8.33 ± 3.64
Physician	6.78 ± 3.04
Society	11.33 ± 2.48
Overall	8.67 ± 3.51

Table 4
Mean differences in LAP-VEGaS scores by video categories.

	Academic	Physician
Physician	−1.56 (p>0.999)	
Society	3.00 (p = 0.319)	4.56 (p = 0.023)*

* Indicates significance (p<0.05).

0.396), number of views (r_s=0.194, p = 0.400), and video length (r_s=−0.029, p = 0.900). A strong positive correlation was demonstrated between the number of views and likes (r_s=0.963, p<0.001).

Discussion

Online video-based instruction has become increasingly utilized in surgical education, especially in the current COVID era [19–21]. The number of surgical training videos on open-access platforms such as YouTube® has also increased in recent years, raising concerns regarding video content and quality [6]. To the authors' knowledge, no previous study has assessed the quality of videos demonstrating LRYGB. As such, the educational value of online LRYGB training videos for surgical trainees has not been determined. The aim of this study was to evaluate the quality of freely available YouTube® video walkthroughs on LRYGB using the LAP-VEGaS video assessment tool.

Our findings suggest online training videos on LRYGB are of poor educational quality, with the average LAP-VEGaS score of 8.67 ± 3.51 falling below the recommended score of 15 for suitable educational resources [9,15]. Six of 9 LAP-VEGaS criteria, including author's information and step-by-step procedural walkthrough, were fulfilled by a majority of videos assessed, which is consistent with previous research on LSG training videos [10]. However, several essential criteria were notably missing from the majority of analyzed LRYGB videos, including intraoperative references to anatomy, formal case presentation, and operative time, raising significant concerns related to educational suitability. Consistent with the findings of other studies, our analysis found no association between LAP-VEGaS score and upload date, video length, and number of views or likes [10,22].

Online LRYGB videos produced by professional surgical societies demonstrated significantly higher LAP-VEGaS scores than those produced by individual physicians, suggesting surgical society video walkthroughs to be more suitable educational resources for general surgery trainees. This may be due to a greater number of individuals involved in the production and review of educational materials from professional societies compared to those created by an individual physician. However, a majority of LRYGB training videos from professional surgical societies still lacked key LAP-VEGaS criteria like formal case presentation (71%), operative time (77%), and intraoperative findings (81%), indicating these educational walkthroughs may nonetheless benefit from standardization with the LAP-VEGaS guidelines.

Compared to this study, previous reports using the LAP-VEGaS video assessment tool have demonstrated training videos in laparoscopic abdominal surgery and otolaryngology to be of low educational value. Chapman et al. analyzed YouTube® videos on LSG using the LAP-VEGaS guidelines, ultimately finding a median LAP-VEGaS score of 6 [10]. Similarly, Luu et al. applied the LAP-VEGaS video assessment tool to YouTube® training videos on different forms of laparoscopic neck dissection and also identified poor educational quality with a mean LAP-VEGaS score of 8.74 ± 3.10 [22]. While the present study suggests that LRYGB YouTube® videos are of comparable, if not slightly greater, educational quality than those on LSG and laparoscopic neck dissection, all three studies still demonstrate inadequate quality to meet trainees' basic educational needs. As such, surgical videos available to trainees on YouTube® may benefit from standardization with the LAP-VEGaS educational criteria.

This study is the first to utilize the LAP-VEGaS video assessment tool to assess the educational quality of YouTube® video walkthroughs on LRYGB for surgical trainees. The findings of this study are notable in that a poor overall quality of LRYGB training videos has been demonstrated using a validated assessment tool, particularly among videos produced by individual physicians, which was the most prevalent category in this study. The LAP-VEGaS guidelines and video assessment tool were created to help standardize the quality of online video resources for laparoscopic surgery training. While the LAP-VEGaS video assessment tool lacks criteria regarding technical quality, pre-operative imaging, and procedure-specific measures, the LAP-VEGaS guidelines highlight basic educational requirements for online surgical videos and may strengthen the educational quality of physician-made videos. Although a majority of videos in the present study failed to display operative time, for example, this missing criterion and others should be emphasized in the production of online educational content rather than be considered not educationally relevant or useful. In order to ensure robust educational value, all laparoscopic surgical training videos should undergo a rigorous planning and development process with the LAP-VEGaS guidelines in mind. By prospectively ensuring that all components are included, surgical educators can produce a more educational and informative online surgical walkthrough. Furthermore, following production, independent reviewers can evaluate video content for inclusion of essential LAP-VEGaS criteria, such as formal patient presentation, step-by-step procedural walkthrough, intraoperative findings highlighting key anatomy, operative time, and graphic aids [9].

Study limitations

The present study had several limitations. The search terms used by surgical trainees to access educational walkthroughs of LRYGB may vary, although those utilized in this study were the most common for LRYGB. Additionally, video walkthroughs produced in languages other

Table 5
Percentage of each LAP-VEGaS criteria that were unfulfilled by video category.

LAP-VEGaS Criteria	Academic (N,%)	Physician (N,%)	Society (N,%)	Overall (N,%)
1. Authors and institution information	0 (0)	0 (0)	0 (0)	0 (0)
2. Formal case presentation	6 (86)	13 (89)	3 (30)	22 (71)
3. Patient position and access	1 (14)	8 (57)	4 (40)	13 (42)
4. Step-by-step procedural walkthrough	1 (14)	7 (50)	5 (50)	13 (42)
5. Intraoperative findings demonstrated	6 (86)	14 (100)	5 (50)	25 (81)
6. Operative time and other relevant outcomes	7 (100)	14 (100)	3 (30)	24 (77)
7. Additional graphic aids	1 (14)	9 (64)	5 (50)	15 (48)
8. Audio or written commentary in English language	3 (43)	3 (21)	0 (0)	6 (19)
9. Appropriate image quality and video speed	0 (0)	2 (14)	0 (0)	2 (7)

than English were excluded from analysis in this study, meaning the results may not be generalizable to educational videos developed for non-English-speaking audiences. Lastly, the present study had a relatively small sample size of 31 videos included for LAP-VEGaS scoring and analysis. However, these 31 videos represent all English-language LRYGB training videos that exist on YouTube®, as our systematic search of 300 training videos revealed only 31 videos that met our selection criteria for trainee utilization. Thus, the relatively small sample size reflects inadequate availability of video-based resources for LRYGB training, which may also suggest a lack of overall educational quality of publicly available online training videos on the procedure. Despite these limitations, the rigor of the present study was enhanced by using a validated assessment tool with three trained and independent raters with substantial inter-rater reliability.

Conclusion

The majority of available YouTube® video walkthroughs on LRYGB fail to meet the basic educational needs of surgical trainees as per the LAP-VEGaS guidelines. Standardization of LRYGB training videos with the LAP-VEGaS guidelines can ensure videos are of suitable educational value for trainees.

Authors' contributions

ADR, JLR, and KRD conceived the original idea and study design. JLR, EK, and YKG gathered and scored videos. ADR and JLR performed data analysis and interpretation. ADR and JLR contributed to manuscript writing and preparation. All authors contributed to critical revision and editing. All authors approved the final version of the manuscript.

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Data availability

Data pertaining to this research are available from the principal investigator and corresponding author, K.R.D.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

[1] Guillou PJ, Quirke P, Thorpe H, et al. Short-term endpoints of conventional versus laparoscopic-assisted surgery in patients with colorectal cancer (MRC CLASICC trial): multicentre, randomised controlled trial. Lancet 2005;365(9472):1718–26. https://doi.org/10.1016/S0140-6736(05)66545-2.

[2] Varley I, Keir J, Fagg P. Changes in caseload and the potential impact on surgical training: a retrospective review of one hospital's experience. BMC Med Educ 2006; 6:6. https://doi.org/10.1186/1472-6920-6-6. Published 2006 Jan 18.

[3] Bell Jr RH, Biester TW, Tabuenca A, et al. Operative experience of residents in US general surgery programs: a gap between expectation and experience. Ann Surg 2009;249(5):719–24. https://doi.org/10.1097/SLA.0b013e3181a38e59.

[4] Rapp AK, Healy MG, Charlton ME, Keith JN, Rosenbaum ME, Kapadia MR. YouTube is the Most Frequently Used Educational Video Source for Surgical Preparation. J Surg Educ 2016;73(6):1072–6. https://doi.org/10.1016/j.jsurg.2016.04.024.

[5] Abdelsattar JM, Pandian TK, Finnesgard EJ, et al. Do you see what I see? How we use video as an adjunct to general surgery resident education. J Surg Educ 2015;72 (6):e145–50. https://doi.org/10.1016/j.jsurg.2015.07.012.

[6] Celentano V, Browning M, Hitchins C, et al. Training value of laparoscopic colorectal videos on the World Wide Web: a pilot study on the educational quality of laparoscopic right hemicolectomy videos. Surg Endosc 2017;31(11):4496–504. https://doi.org/10.1007/s00464-017-5504-2.

[7] Singh AG, Singh S, Singh PP. YouTube for information on rheumatoid arthritis–a wakeup call? J Rheumatol 2012;39(5):899–903. https://doi.org/10.3899/jrheum.111114.

[8] Stahel PF, Moore EE. Peer review for biomedical publications: we can improve the system. BMC Med 2014;12:179. https://doi.org/10.1186/s12916-014-0179-1. Published 2014 Sep 26.

[9] Celentano V, Smart N, Cahill RA, et al. Development and validation of a recommended checklist for assessment of surgical videos quality: the LAParoscopic surgery Video Educational GuidelineS (LAP-VEGaS) video assessment tool. Surg Endosc 2021;35(3):1362–9. https://doi.org/10.1007/s00464-020-07517-4.

[10] Chapman D, Weaver A, Sheikh L, MacCormick AD, Poole G. Evaluation of Online Videos of Laparoscopic Sleeve Gastrectomy Using the LAP-VEGaS Guidelines. Obes Surg 2021;31(1):111–6. https://doi.org/10.1007/s11695-020-04876-8.

[11] Lo HC, Wu SM. Reappraisal learning curve of laparoscopic Roux-en Y gastric bypass: retrospective results of one hundred and eight cases from a low-volume unit. BMC Surg 2021;21(1):86. https://doi.org/10.1186/s12893-021-01058-w. Published 2021 Feb 15.

[12] Lord JL, Cottam DR, Dallal RM, et al. The impact of laparoscopic bariatric workshops on the practice patterns of surgeons. Surg Endosc 2006;20(6):929–33. https://doi.org/10.1007/s00464-005-0182-x.

[13] Oliak D, Owens M, Schmidt HJ. Impact of fellowship training on the learning curve for laparoscopic gastric bypass. Obes Surg 2004;14(2):197–200. https://doi.org/10.1381/096089204322857555.

[14] Zendejas B, Cook DA, Hernández-Irizarry R, Huebner M, Farley DR. Mastery learning simulation-based curriculum for laparoscopic TEP inguinal hernia repair. J Surg Educ 2012;69(2):208–14. https://doi.org/10.1016/j.jsurg.2011.08.008.

[15] de'Angelis N, Gavriilidis P, Martínez-Pérez A, et al. Educational value of surgical videos on YouTube: quality assessment of laparoscopic appendectomy videos by senior surgeons vs. novice trainees. World J Emerg Surg 2019;14:22. https://doi.org/10.1186/s13017-019-0241-6. Published 2019 May 9.

[16] Rouhi AD, Roberson JL, Kindall E, et al. What are trainees watching? Assessing the educational quality of online laparoscopic cholecystectomy training videos using the LAP-VEGaS guidelines [published online ahead of print, 2023 Jun 23] Surgery 2023. https://doi.org/10.1016/j.surg.2023.05.021. S0039-6060(23)00316-1.

[17] Roberson JL, Rouhi AD, Bader AL, et al. Evaluation of the educational quality of publicly available online videos on laparoscopic jejunostomy by utilizing the LAP-VEGaS guidelines [published online ahead of print, 2023 Jun 12] Surg Endosc 2023. https://doi.org/10.1007/s00464-023-10165-z. 10.1007/s00464-023-10165-z.

[18] Landis JR, Koch GG. An application of hierarchical kappa-type statistics in the assessment of majority agreement among multiple observers. Biometrics 1977;33 (2):363–74.

[19] Ahmet A, Gamze K, Rustem M, Sezen KA. Is Video-Based Education an Effective Method in Surgical Education? A Systematic Review. J Surg Educ 2018;75(5): 1150–8. https://doi.org/10.1016/j.jsurg.2018.01.014.

[20] Mao BP, Teichroeb ML, Lee T, Wong G, Pang T, Pleass H. Is Online Video-Based Education an Effective Method to Teach Basic Surgical Skills to Students and Surgical Trainees? A Systematic Review and Meta-analysis [published online ahead of print, 2022 Aug 3] J Surg Educ 2022. https://doi.org/10.1016/j.jsurg.2022.07.016. S1931-7204(22)00178-7.

[21] Zern NK, Yale LA, Whipple ME, et al. The impact of the COVID-19 pandemic on medical student education: Implementation and outcome of a virtual general surgery curriculum. Am J Surg 2022;224(1):612–6. https://doi.org/10.1016/j.amjsurg.2022.03.035. Pt B.

[22] Luu NN, Yver CM, Douglas JE, Tasche KK, Thakkar PG, Rajasekaran K. Assessment of YouTube as an Educational Tool in Teaching Key Indicator Cases in Otolaryngology During the COVID-19 Pandemic and Beyond: Neck Dissection. J Surg Educ 2021;78(1):214–31. https://doi.org/10.1016/j.jsurg.2020.06.019.