



The Reliability and Viewer Interest of YouTube® Videos Presenting Endoscopic Ear Procedures

Endoskopik Kulak Prosedürlerini Gösteren YouTube® Videolarının Güvenilirliği ve İzleyici İlgisi

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ABSTRACT Objective: This study aimed to evaluate the reliability and viewer interests of YouTube® endoscopic ear surgery videos based on the LAP-VEGaS video quality assessment tool. **Material and Methods:** The present study evaluated 720 videos after a search on YouTube® with the keywords “endoscopic tympanoplasty, endoscopic ear surgery, endoscopic myringoplasty, and endoscopic mastoidectomy” during the time period between October 2005 to June 2020. The parameters depicting viewer interest such as the total number of views, comments, subscribers, likes, dislikes, source of videos, and video upload date were assessed. Besides, LAP-VEGaS video quality assessment tool were also analyzed. **Results:** Among 720 videos that were compatible with the keywords of the study, only 201 (27%) of them were in agreement with the inclusion criteria. Low-quality videos comprised 164 (81.5%) videos, and high-quality videos consisted of 37 (18.5%) videos. The video rates presented by universities were higher in the high-quality video group than the low-quality video group (29.7% vs. 9.1%). Considering the didactic voice and the presence of didactic steps, it was significantly higher in the high-quality video group compared to the low-quality video group (86.5% vs. 22.6%, $p<0.001$; 97.3% vs. 85.4%, $p: 0.04$, respectively). The higher image quality was observed in the high-quality group compared to the low-quality quality group (81.1% vs. 27.4%, $p<0.001$). **Conclusion:** Overall, only 18.5% of YouTube® videos were defined as high-quality videos. The videos classified in the high-quality group were presented by university hospitals, with better didactic information and voice.

Keywords: Educational activities; instructional films and videos; tympanoplasty

ÖZET Amaç: Bu çalışma, LAP-VEGaS video kalite değerlendirme anketine dayalı olarak YouTube® endoskopik kulak cerrahisi videolarının güvenilirliğini ve izleyicilerin ilgisini değerlendirmeyi amaçlamıştır. **Gereç ve Yöntemler:** Bu çalışmada, YouTube®’da “endoskopik timpanoplasti, endoskopik kulak cerrahisi, endoskopik miringoplasti ve endoskopik mastoidektomi” anahtar kelimeleri ile Ekim 2005-Haziran 2020 arasında yapılan bir aramanın ardından 720 video değerlendirildi. Toplam izlenme sayısı, yorumlar, aboneler, beğeniler, beğenmemeler, videoların kaynağı ve video yükleme tarihi gibi izleyici ilgisini gösteren parametreler değerlendirildi. Ayrıca LAP-VEGaS video kalitesi değerlendirme anketi de analiz edildi. **Bulgular:** Araştırmanın anahtar kelimeleri ile uyumlu 720 videodan sadece 201’i (%27) dâhil edilme kriterlerine uyuyordu. Düşük kaliteli videolar 164 (%81,5) videodan ve yüksek kaliteli videolar 37 (%18,5) videodan oluşuyordu. Üniversitelerin sunduğu video oranları, yüksek kaliteli video grubunda düşük kaliteli video grubuna göre daha yüksekti (%29,7’ye karşı %9,1). Didaktik ses ve didaktik adımların varlığı, yüksek kaliteli video grubunda düşük kaliteli video grubuna göre anlamlı olarak daha yüksekti (sırasıyla %86,5’e karşı %22,6, $p<0,001$; %97,3’e karşı %85,4, $p: 0,04$). Düşük kaliteli gruba kıyasla yüksek kaliteli grupta daha yüksek görüntü kalitesi gözlemlendi (%81,1’e karşı %27,4, $p<0,001$). **Sonuç:** Genel olarak YouTube® videolarının yalnızca %18,5’i yüksek kaliteli videolar olarak tanımlandı. Yüksek kaliteli grupta sınıflandırılan videolar, üniversite hastaneleri tarafından daha iyi didaktik bilgi ve ses ile sunuldu.

Anahtar Kelimeler: Eğitim faaliyetleri; eğitici filmler ve videolar; timpanoplasti

Endoscopic procedures are widely used in otolaryngology practice for the treatment of a variety of indications.¹ The correction of tympanic mem-

brane perforation either by myringoplasty and tympanoplasty approach, ventilation tube insertion, dilation of Eustachian tube, round window fistula

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repair, ossicular reconstruction, cholesteatoma surgeries, and otosclerosis treatment could be possible via endoscopic surgery.² The endoscopic procedure enables surgeons a much larger surgical view with a better visual image, shorter operation time, less postoperative pain, and a faster recovery period.¹

The training for endoscopic surgeries requires text-book knowledge combining with hands-on training. Besides, visual learning materials such as surgery videos performed by experts could also shorten the learning curve of the procedures than conventional-only teaching methods.³

Up to now, digital platforms have provided a colossal online virtual resource for surgical training. YouTube® (Google Industries, San Bruno, California, ABD) is the most widely used digital media platform, and also could be utilized as a surgical video source.⁴ More and more surgeons have realized the importance of YouTube® and have watched the surgical videos presented by different disciplines as a virtual educational source.⁵

The educational reliability of YouTube® videos have been evaluated for different disorders and procedures such as endometrioma, thyroid and larynx cancer, tonsillectomy, and rhinoplasty.⁵⁻⁹ The major concern that arose from these studies is the educational accuracy of these videos differ in different specialties due to insufficiency of a scientific peer-review process.⁹ Moreover, most of these videos presented only surgical steps without any didactic steps of the technique, preoperative information, and operative setup, which is an essential part of the education.^{9,10} Since there is an increasing number of endoscopic ear surgery videos on the YouTube® platform, there is the lack of data with the educational reliability of these videos yet.

The goal of this study was to see if YouTube® videos describing endoscopic ear surgery were educationally accurate and engaging to viewers.

MATERIAL AND METHODS

An online video evaluation was performed with keywords such as “endoscopic tympanoplasty, endoscopic ear surgery, endoscopic myringoplasty, and endoscopic mastoidectomy” on YouTube®

(<https://www.youtube.com>). These keywords were picked based on past research on search terms related to endoscopic ear surgery.¹

The video search included 720 videos, all of which had the previously selected keywords and lasted longer than 5 minutes. The study was defined as an observational research using publicly accessible data and no ethics committee approval was required.

VIDEO ANALYSIS

Videos depicting otolaryngology procedures other than performed via the endoscopic approach were excluded. Videos demonstrating only individual experiences by healthcare providers were also excluded. Duplicate videos and videos in languages other than English were omitted. Two otolaryngologists (HB, EE), who have performed endoscopic ear surgery for five years and presented their clinical experience on this subject in the literature, examined and rated all of the films after removing those that were irrelevant to the study's goal.¹¹

Hospital/clinic, surgeon/practitioner, and university were identified as video sources. Likes, dislikes, comments, views, and subscribers were all counted. The like ratio [number of likes x 100/(like+dislike)], view ratio, and Video Power Index (VPI; like ratio x view ratio/100) were calculated based on the time since the video was uploaded, the number of views per day, the total duration of the video, and the like ratio [number of likes x 100/(like+dislike)].¹² The videos' didactic voice, music, image quality, didactic steps, subtitles, and type of endoscopic treatment were all recorded.

THE RELIABILITY ANALYSIS

All videos were rated regarding their quality using a previously determined 9-item questionnaire with each item ranging from 0 (item not given) to 2 (item extensively given), namely the LAP-VEGaS surgical video quality assessment tool.¹³ The following were the questions; i) Are the authors' and institution's names mentioned? ii) The case presentation, which includes patient and imaging facts, operation indication, any comorbidities, and previous surgery information? iii) Do you have a description of the patient's

position, access ports, extraction site, and surgical team? iv) Is the surgical technique described in detail? v) Are intraoperative findings shown alongside a valid reference to normal anatomy? vi) Are the surgical results, such as surgical time, morbidity, and histology, reported? vii) Are there any extra graphics, such as diagrams, snapshots, or images, to help define anatomical landmarks and surprising findings? viii) Is there any audio or written commentary in English? ix) Is the image quality satisfactory, with a good view of the surgery field and a smooth, fast-moving video?

A high-quality video was defined as for the videos with total score of ≥ 11 at the LAP-VEGaS video assessment tool. Regarding LAP-VEGaS scores, all of the included videos were divided into two groups, i.e., low-quality videos (< 11 total LAP-VEGaS scores) and high-quality videos (≥ 11 LAP-VEGaS score).

STATISTICAL ANALYSIS

SPSS Version 20 was used for the statistical analysis (SPSS, Inc., Chicago, IL). To report the agreement between two independent authors, the kappa coefficient was determined. The continuous variable distribution was analyzed using the Kolmogorov-Smirnov test. To compare Lap-VEGaS score and continuous variables with non-homogeneous distributions, the Mann-Whitney U-test was performed. Continuous variables with normal distribution were analyzed using the independent sample t-test. The categorical research variables were compared using the chi-square test or Fisher's exact test. Statistical significance was defined as a p value of less than 0.05.

RESULTS

The kappa score was 0.78 providing a significant agreement between the researchers regarding video analysis. Considering the total 720 videos, only 201 (27%) were meet the inclusion criteria. The low-quality videos comprised 164 (81.5%) videos and the high quality videos consisted of 37 (18.5%) videos.

The majority of the videos both in the low and high-quality videos were presented by surgeon/practitioners (81.7% vs. 59.5%, respectively). The video

rates presented by universities were higher in the high-quality video group than the low-quality video group (29.7% vs. 9.1%). Overall the source of the videos was significantly differed between the study groups ($p: 0.007$).

Regarding the presence of the didactic voice and presenting the didactic steps, it was considerably higher in the high-quality group compared to the low-quality group (86.5% vs. 22.6%, $p < 0.001$; 97.3% vs. 85.4%, $p: 0.04$, respectively). The higher image quality was observed in the high-quality group compared to that of the low-quality group (81.1% vs. 27.4%, $p < 0.001$). The high-quality video group added a higher rate of subtitles to the videos than the low-quality video group (67.6% vs. 19.5%, $p < 0.001$).

The high-quality video group mostly (70.3%) presented tympanomastoidectomy procedures, whereas the low-quality video group (75.0%) presented myringoplasty procedures. The type of surgeries also significantly differed between the study groups ($p < 0.001$).

In regards to interest of the viewers and technical video analysis, the mean numbers of views, subscribers, and likes were 3344.46 ± 7774.91 , 2903.28 ± 6629.86 , and 15.61 ± 33.83 , respectively, in the low-quality group and the mean numbers for these parameters in the high-quality group were 2228.27 ± 3423.72 , 6347.43 ± 13967.61 , and 17.56 ± 17.61 , respectively. The video length was significantly lower in the high-quality group than the low-quality group (629 ± 642.73 vs. 664.26 ± 527.26 , $p: 0.01$). The time passed since video upload was significantly higher in the low-quality group than the high-quality group (1397.95 ± 813.95 vs. 1073.1 ± 569.4 , $p: 0.03$).

There was no statistically significant difference between the study groups in terms of music, subscribers, views, likes, dislikes, comments, view/day ratio, like/subscriber, like/view, view/subscriber, VPI, and like ratio (Table 1).

As expected, all LAP-VEGaS scores were significantly higher for all parameters in the high-quality video group compared to the low-quality video group (Table 2).

TABLE 1: Comparison of the endoscopic ear procedures in regards to LAP-VEGaS scores.

	Low-quality videos (n=164) n (%), mean±SD	High-quality videos (n=37) n (%), mean±SD	p value
Source			
Surgeon/practitioner	134 (81.7)	22 (59.5)	0.007
Hospital/ENT clinic	15 (9.1)	4 (10.8)	
University	15 (9.1)	11 (29.7)	
Didactic voice			
No	127 (77.4)	5 (13.5)	<0.001
Yes	37 (22.6)	32 (86.5)	
Music			
No	129 (79.1)	29 (78.4)	0.594
Yes	34 (20.8)	8 (21.6)	
Image quality			
Very low quality	31 (18.9)	0 (0)	<0.001
Low quality	88 (53.7)	7 (18.9)	
High quality	45 (27.4)	30 (81.1)	
Didactic steps			
No	24 (14.6)	1 (2.7)	0.04
Yes	140 (85.4)	36 (97.3)	
Subtitles			
No	132 (80.5)	12 (32.4)	<0.001
Yes	32 (19.5)	25 (67.6)	
Type of endoscopic surgery			
Cadaveric dissection course	1 (0.6)	0 (0)	<0.001
Myringoplasty	123 (75)	11 (29.7)	
Tympanomastoidectomy	40 (24.4)	26 (70.3)	
Technical analysis of the videos			
Number of subscriber	2903.28±6629.86	6347.43±13967.61	0.642
Number of view	3344.46±7774.91	2228.27±3423.72	0.814
Number of like	15.61±33.83	17.56±17.61	0.055
Number of dislike	1.41±3.81	0.7±1.2	0.338
Number of comment	2.68±5.97	2.13±3.52	0.762
Video length (sec.)	664.26±527.26	629±642.73	0.01
Time passed since video upload (days)	1397.95±813.95	1073.1±569.4	0.03
View/day	960.38±1881.92	830.29±993.32	0.618
Like/subscriber	0.1±0.42	0.05±0.09	0.72
Like/view	0.01±0.02	0.01±0.009	0.059
View/subscriber	13.31±50.62	5.46±15.58	0.428
VPI	2.21±4.7	2.17±2.26	0.08
Like ratio	89.24±19.79	96.37±5.98	0.08

VPI: Video Power Index; ENT: Ear nose throat; SD: Standard deviation.

DISCUSSION

In this study, the videos in the high-quality group were mainly presented by university hospitals, with better didactic information and

voice, which are known as crucial parts in surgery training. Also, the high-quality videos were with better image quality, and the majority of them presented tympanomastoidectomy procedures.

TABLE 2: The comparison of LAP-VEGaS scores of the endoscopic ear procedures of the study groups.

	Low-quality videos (median/minimum-maximum)	High-quality videos (median/minimum-maximum)	p value
Authors and institution information	1 (0-2)	2 (1-2)	<0.001
Formal presentation of the case, including patient details and imaging, indication for surgery, comorbidities and previous surgery	0 (0-2)	2 (1-2)	<0.001
Position of patient, access ports, extraction site and surgical team	1 (0-2)	2 (1-2)	<0.001
The surgical procedure is presented in a standardized step by step fashion	2 (0-2)	2 (0-2)	<0.001
The intraoperative findings are clearly demonstrated, with constant reference to the anatomy	0 (0-2)	1 (0-2)	<0.001
Relevant outcomes of the procedure are presented, including operating time, postoperative morbidity and histology when appropriate	0 (0-2)	0 (0-2)	<0.001
Additional graphic aid is included such as diagrams, snapshots and photos to demonstrate anatomical landmarks, relevant or unexpected finding, or to present additional educational content	0 (0-2)	1 (0-2)	<0.001
Audio/written commentary in English language is provided	0 (0-2)	2 (0-2)	<0.001
The image quality is appropriate with constant clear view of the operating field. The video is fluent with appropriate speed	1 (0-2)	2 (1-2)	<0.001
Total score	5 (1-11)	13 (12-18)	<0.001

The classical surgical education requires master-apprentice relation, reference books, guidelines, and hands-on training. The learning curve of the surgical training could be shortened with visual didactic sources compared to written sources.^{14,15} In the internet era, surgical training has been moved one step forward from the operating rooms to the online platforms. YouTube® is one of the very first video platform utilized as a source of online information. YouTube® has a comprehensive video archive of a variety of specialties.¹⁶ The subscribers of the platform could upload any video contents without any relevant confirmation process and no peer-review process.¹⁷ There are no standards of health-related videos considering evidence-based medicine.⁸ Moreover, misleading digital surgery videos could be detrimental than being beneficial for inexperienced healthcare professionals.¹⁴

The YouTube® videos in health-related issues reported that the videos had less accurate data regarding the management of diseases.^{18,19} It was also reported that the instructional accuracy of YouTube® videos was inconclusive, depending on the disease and the video source.^{14,20}

In otolaryngology, Nissan et al. conducted a study to analyze patients' views about the otoplasty

procedure.²¹ They looked through the first fifty videos on the otoplasty process and found that physician-related websites had less accurate information. Unaffiliated websites, on the other hand, provided patients with more accurate information regarding otoplasty.²¹ In another study, Enver et al., performed a YouTube™ search considering the keyword “larynx cancer” and evaluated the first 200 videos.²² Videos presented by university-hospital profiles had significantly better quality rates and had higher reliability and usefulness scores. In our study the high-quality videos were fewer than the videos classified as low-quality counterparts. In the same line with Enver et al. the videos presented by universities were with the highest video quality and better didactic information and voice in our study.²² These results could be explained with that the surgeons in an academic platform could try to present the surgical steps meticulously being aware of the common surgical guidelines and educational concerns.

According to the results of the video technical analysis on YouTube®, misleading videos were seen more than trustworthy videos. Lee et al. looked at patients' general information on gallstone disease. The authors reported that the videos classified in the useful category had less views and likes than the

videos classified as misleading. On the other hand, another study evaluated the videos related to prematurity retinopathy and the authors reported that useful videos were with favorable views and likes than misleading videos.⁵ Lee et al. reported that misleading videos were with the same video length as in the useful videos.⁵ Biggs et al. evaluated rhinosinusitis videos and the authors presented that the useful and informative videos prone to be longer than misleading videos.²³ In our study, there was no significant difference between the study groups considering the number of views, subscribers, comments, likes, and VPI rates, but the video length was significantly higher in low-quality group.²³ The difference of the viewers' interest could be explained that the video ratings could be depend on being a follower of surgeon rather than the usefulness of surgical video.

There was a significant difference between the study groups regarding the time passed since video upload. This difference could be explained with that the endoscopic procedures with high quality systems are commonly performed in last decade and the experience of surgeons is expanding.

The strength of our study could be explained with the comprehensive and detailed evaluation of the endoscopic ear surgery videos with a validated LAP-VEGaS assessment tool. On the other hand, the uploaded videos on YouTube® platform consist of previously processed versions of the full operations and the other video platforms depicting surgical procedures could not be evaluated in our study.

In our study, only 18.5% of YouTube® videos presenting the endoscopic ear surgery procedures were defined as high-quality videos. The videos classified in the high-quality group were presented by university hospitals with better didactic steps and image quality. Further studies comparing with different digital platforms should be conducted to provide the best online source of virtual surgery education.

CONCLUSION

- Endoscopic procedures are widely used in otolaryngology practice for the treatment of a variety of indications
- YouTube® is the most widely used digital media platform, and also could be utilized as a surgical video source
- The major concern that arose from these studies is the educational reliability of these videos differ in different specialties due to the lack of a scientific peer-review process
- Only 18.5% of YouTube® videos presenting the endoscopic ear surgery procedures were defined as high-quality videos
- The videos classified in the high-quality group were presented by university hospitals with better didactic steps and image quality

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Hacer Baran; **Design:** Elif Elibol; **Control/Supervision:** Hacer Baran, Elif Elibol; **Data Collection and/or Processing:** Hacer Baran, Elif Elibol; **Analysis and/or Interpretation:** Hacer Baran; **Literature Review:** Hacer Baran, Elif Elibol; **Writing the Article:** Hacer Baran, Elif Elibol; **Critical Review:** Hacer Baran; **References and Fundings:** Elif Elibol; **Materials:** Hacer Baran, Elif Elibol.

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