*Research Article*

# Çocuk Cerrahisi Dergisi
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# Is It Possible To Learn on Thoracoscopıc Repair of Esophageal Atresia Onlıne From "Dr. Youtube"?

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## ABSTRACT

**Aim**: Esophageal atresia (EA) is the disconnection of the proximal and distal parts of the esophagus and is a pathology that needs to be surgically corrected. With the technological and technical developments in recent years, thoracoscopic repair of EA can be performed. In this study, it was aimed to evaluate the thoracoscopic repair of EA videos published on YouTube.

**Methods**: Videos obtained by searching YouTube for "Thoracoscopic repair of esophageal atresia" on July 6, 2020 were evaluated according to criterias of LAP-VEGaS and critical view of safety (CVS).

**Results:** 23 videos were included in this study. The median (IQR) (%) of the videos conforming to the criterias of LAP-VEGaS was 24% (18-37%). The median (IQR) (%) of the videos conforming to the criterias of CVS was 85% (85-100%). A strong correlation was found between video length and CVS conformity percentage (p<0,01). It was determined that 71% of the CVS criteria were 100% complied with.

**Conclusion:** Despite the high conformity of the videos to CVS, their conformity to LAP-VEGaS was low.For this reason, it was concluded that the trainees who will watch the video should also check whether the video is refereed or quality controlled.

**Keywords:** *Critical view of safety, esophageal atresia, laparoscopic video guidelines, thoracoscopy.*

**Levels of evidence:** Level VI.

## Introductıon

Esophageal atresia (EA) is the interruption of the upper third of the esophagus and ending as a blind sac behind the membranous trachea. Although EA is the most common congenital malformation of the esophagus, its incidence is 2.43 per 10,000 births [1].

The first thoracoscopic repair for EA was performed by Lobeve et al in 1999 for EA without tracheoesophageal fistula (TEF)[2]. The first thoracoscopic repair for EA with TEF was performed by Rothenberg in 2000[3].

In recent years, with the increase in the experience of pediatric surgeons, advances in anesthesia and the introduction of minimally invasive instruments in line with technical developments, thoracoscopic repair of EA (TREA) has become widespread.

It has been observed that traditional medicine education has also changed in recent years. Especially with the effect of the COVID-19 pandemic, there have been both positive and negative changes in academic life[4]. There were disruptions in face-to-face education and many elective surgeries could not be performed during this period. For these reasons, learning techniques have been added to traditional medicine education through online training, seminars and videos. These new developments are important in terms of the continuity of the academic functioning and the education process. With the implementation of these new educational techniques and the fact that special surgeries such as TREA cannot be performed in every center, those who are interested in this subject are trying to learn online.

In this study, it was aimed to evaluate the TREA videos published on YouTube (YouTube, San Bruno, CA) from an educational point of view.

## Material and Method

### Study Design

On July 6, 2020, a search was made for "Thoracoscopic repair of esophageal atresia" on YouTube (YouTube, San Bruno, CA), a free video sharing platform. According to the search results, those whose video language is not in English, in cartoon or animation format, illustrations, congress presentations, those containing only a part of the surgery, duplicate videos uploaded with different titles, and mistagged videos were not included in the study. Obtained videos were evaluated by a single person according to the LAParoscopic surgery Video Educational GuidelineS (LAP-VEGaS) and CVS criterias. The numbers of visualizations, video length, likes, dislikes, comments and days online of the videos were recorded.

### Evaluation of surgical and educational quality of videos

#### LAP-VEGaS

A guideline developed using the Delphi methodology was published by Celentano et al. in 2018, aiming to provide a consensus on how to report an educational surgical video[5] (Table 1). While the videos were evaluated according to LAP-VEGaS, those that met the criteria were scored as 1 and those that did not meet the criteria were scored as 0. Scores from 37 criterias of LAP-VEGaS were calculated as percentages.

#### Critical View of Safety

Current guidelines recommend CVS for surgical safety. There is no current CVS consensus for TREA in the literature. The CVS evaluation stages of TREA were designed based on our clinical experience and the process mentioned in the article reported by Kanojia et al[6]. The determined CVS criteria are given in Table 2. Those who met these criteria were scored as 1, those who did not fit were scored as 0, and the total score obtained was calculated as a percentage.

#### Limitations of Study

In this study, there is no information about the ages of the viewers and whether they are medical faculty trainees. At the same time, it was not possible to determine how many times each viewer watched the video in the number of visualizations. The number of duplicate views is unknown. The content of the comments to the videos was not checked. It is not known whether the purpose of uploading the videos to the system is really educational purposes. It is not known how many times the surgeon who performed the operation in the videos had performed this operation before.

#### Statistical Analysis

Statistical analysis was performed with IBM SPSS Statistics 25.0 (IBM Corp., Armonk, New York, USA). Kolmogorov– Smirnov and Shapiro–Wilk tests were used for assessing assumption of normality.

**Table 1.** LAP-VEGaS practice guidelines for reporting of educational videos in laparoscopic surgery.

| | **Author's information and video introduction** |
|---|---|
| 1 | The video must include authors' information such as names, institution(s), country, and year of surgery. Contact details of the corresponding author must be provided. |
| 2 | It should be specified if the video was presented at national/international meetings or recorded during a live broadcast. |
| 3 | The title of the video must include the name of the procedure performed and of the pathology treated. |
| 4 | If the video is intended for training, this should be specified and specific learning objectives could be presented. The aim of the video and relevance of the case presented should be stated. |
| 5 | In case the procedure is performed by a surgical trainee, it should be mentioned how many previous cases the trainee has performed to contextualize the video. |
| 6 | Patient consent should be obtained. |
| 7 | A conflicts of interest disclosure must be present. |
| | **Case presentation** |
| 8 | All radiology pictures, videos, and reports should be anonymized and the name of the patient should never be mentioned. All patient recognizable body parts such as eyes and tattoos should be obscured. |
| 9 | The video should include one or more slides or audio commentary with formal presentation of the case, including age, sex, American Society of Anesthesiologists (ASA) score, body–mass index, indication for surgery, comorbidities, and history of previous surgery. |
| 10 | Results of preoperative imaging should be presented. |
| 11 | Preoperative treatments, workup for surgery, and blood test results should also be briefly presented if relevant for the case. |
| | **Demonstration of the surgical procedure** |
| 12 | The position of the patient on the operating table must be clearly demonstrated, including variations during the surgery. |
| 13 | The position of the surgical and anesthetic team should be demonstrated, including scrub nurse position and position of extra assistants. |
| 14 | The position of trocars must be detailed. It should be mentioned where additional trocars can be inserted in case of unexpected findings or technical difficulties. |
| 15 | The site for specimen extraction should be demonstrated. |
| 16 | Details of special equipment needed for the procedure should be provided, such as vessel sealer devices, wound protectors, manipulators, and surgical staplers. |
| 17 | The surgical procedure should be presented in a standardized step-by-step manner. |
| 18 | Every chapter should be clearly introduced and explained. The intraoperative findings need to be demonstrated, with constant reference to the anatomy. |
| 19 | Additional maneuvers and suggestions to face progression failure should be demonstrated—for instance, additional ports or assistants, change of the position of the patient, or rescue maneuvers in case of unexpected events such surgical stapler malfunction or equipment failure. |
| 20 | Relevant additional intraoperative investigations should be mentioned and demonstrated. |
| 21 | Describing the criteria for conversion to open surgery and the site of the incision in case of conversion might be useful in training videos. |
| 22 | The open part of the procedure should be mentioned or demonstrated if the video is intended for training. |
| | **Outcomes of the procedure** |
| 23 | Outcomes of the procedure must be presented, including operating time, blood loss, cosmesis with a picture of the healed wounds, length of hospital stay, and postoperative morbidity. |
| 24 | Histopathology assessment of the specimen should be presented. In case of malignancy, the number of retrieved lymph nodes and TNM staging should be detailed. Pictures of the specimen are desirable. |
| | **Associated educational content** |
| 25 | Additional educational content must be included. Diagrams, photos, snapshots, and tables should be used to demonstrate anatomical landmarks and relevant or unexpected findings. |
| 26 | Audio/written commentary in English must be provided. |
| | **Peer review of surgical videos** |
| 27 | Educational videos must undergo formal peer review before publication. It should be stated if the video has been peer reviewed before publication. |
| 28 | Peer review should assess not only the safety of the procedure performed but also the supplementary educational content presented. |
| 29 | Peer review should be undertaken by both surgical trainers and trainees. |
| 30 | Videos should be amended and resubmitted, where possible, according to the reviewers' comments with a point-by-point answer. |

| | Cont. of Table 1 |
|---|---|
| 31 | Image quality should be assessed. When excessive smoke, low-definition, or suboptimal views are present for more than 25% of the duration of the procedure, the video should be rejected for poor image quality. |
| 32 | Video should play at 1x speed. Where video is played faster or slower, the speed should be indicated in the respective video segments (e.g., 2x, 4x, 0.5x). |
| | **Use of surgical videos in educational curricula** |
| 33 | Routine video recording of the procedure and review with feedback sessions should be mandatory in every training program. |
| 34 | Video recording can be useful to continue professional development even at the completion of the learning curve, to review unusual findings, and to reflect on complications and outcomes. |
| 35 | Videos demonstrating unusual cases and management of intraoperative complications should be shared at conferences. |
| 36 | Formative assessment of the surgical performance should involve peer review of unedited videos, using standardized assessment tools. |
| 37 | The web platform should record the number of times the video has been watched for audit purposes. Moreover, it should allow comments and webchats to facilitate feedback and interaction among trainers and trainees. |

**Table 2.** Critical view of safety assessment

| | |
|---|---|
| 1 | Identification of azygos vein and vagus nerve |
| 2 | Determination of the upper pouch and distance by pushing the pre-placed feeding tube by the anesthetist |
| 3 | Incision of the endothoracic fascia to identify the medially curving lower pouch with the vagus nerve overlying it |
| 4 | Dissection of the lower pouch fistula with preservation of the vagus nerve |
| 5 | All around mobilization of the upper pouch and also ruling out a rare upper pouch fistula |
| 6 | Performing the anastomosis and placing the transanastomotic catheter |
| 7 | The placement of a chest drain placed under vision |

Parametric values are reported as the mean – standard deviation, and nonparametric values are reported as median (25–75 percentiles). Spearman correlation was used to determine possible relationships between nonparametric values. A value of $p<0.05$ was considered statistically significant.

## Results

A search was made on YouTube (YouTube, San Bruno, CA) for "Thoracoscopic repair of esophageal atresia" on July 6, 2020. As a result of the search, 41 videos were listed. Of the 41 videos, 2 were mistagged. The video language was not in English,

**Table 3.** Characteristics of videos

| | | No. of visualizations | Length (sec) | No. of likes | No. of dislikes | No. of comments | No. of daysonline | CVS conformity percentage (%) | LAP-VeGAS conformity percentage (%) |
|---|---|---|---|---|---|---|---|---|---|
| **N** | Valid | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| | Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Mean** | | 2302,65 | 791,39 | 12,74 | ,57 | 3,13 | 1584,87 | 89,00 | 26,22 |
| **Median** | | 660,00 | 391,00 | 11,00 | 0,00 | 2,00 | 1284,00 | 85,00 | 24,00 |
| **Std. Deviation** | | 3044,51 | 1224,46 | 12,36 | ,84 | 4,38 | 1178,56 | 9,10 | 12,88 |
| **Percentiles** | 25 | 283,00 | 186,00 | 1,00 | 0,00 | 0,00 | 447,00 | 85,00 | 18,00 |
| | 50 | 660,00 | 391,00 | 11,00 | 0,00 | 2,00 | 1284,00 | 85,00 | 24,00 |
| | 75 | 4378,00 | 693,00 | 19,00 | 1,00 | 6,00 | 2705,00 | 100,00 | 37,00 |

LAP-VEGaS: the LAParoscopic surgery Video Educational GuidelineS, CVS: Critical view of safety

**Table 4.** Correlation analysis of video evaluation data with Spearsmean's rho test

| | | No. of visuali-zations | Length (sec) | No. of likes | No. of dislikes | No. of comments | No. of daysonline | CVS conformity percentage (%) | LAP-VeGAS conformity percentage (%) |
|---|---|---|---|---|---|---|---|---|---|
| **Spearman's rho** | | | | | | | | | |
| No. of visualizations | Correlation Coefficient | 1,000 | ,504[*] | ,469[*] | ,447[*] | ,030 | ,708[**] | ,099 | ,436[*] |
| | Sig. (2-tailed) | | ,014 | ,024 | ,033 | ,890 | ,000 | ,653 | ,038 |
| | N | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| Length (sec) | Correlation Coefficient | ,504[*] | 1,000 | ,214 | ,128 | ,097 | ,126 | ,546[**] | ,412 |
| | Sig. (2-tailed) | ,014 | | ,327 | ,561 | ,660 | ,566 | ,007 | ,051 |
| | N | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| No. of likes | Correlation Coefficient | ,469[*] | ,214 | 1,000 | ,511[*] | ,595[**] | ,126 | ,208 | ,294 |
| | Sig. (2-tailed) | ,024 | ,327 | | ,013 | ,003 | ,565 | ,340 | ,173 |
| | N | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| No. of dislikes | Correlation Coefficient | ,447[*] | ,128 | ,511[*] | 1,000 | ,403 | ,200 | ,134 | ,163 |
| | Sig. (2-tailed) | ,033 | ,561 | ,013 | | ,057 | ,361 | ,542 | ,459 |
| | N | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| No. of comments | Correlation Coefficient | ,030 | ,097 | ,595[**] | ,403 | 1,000 | -,131 | ,407 | -,053 |
| | Sig. (2-tailed) | ,890 | ,660 | ,003 | ,057 | | ,550 | ,054 | ,812 |
| | N | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| No. of daysonline | Correlation Coefficient | ,708[**] | ,126 | ,126 | ,200 | -,131 | 1,000 | -,037 | ,091 |
| | Sig. (2-tailed) | ,000 | ,566 | ,565 | ,361 | ,550 | | ,867 | ,680 |
| | N | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| CVS conformity percentage (%) | Correlation Coefficient | ,099 | ,546[**] | ,208 | ,134 | ,407 | -,037 | 1,000 | ,289 |
| | Sig. (2-tailed) | ,653 | ,007 | ,340 | ,542 | ,054 | ,867 | | ,182 |
| | N | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| LAP-VeGAS conformity percentage (%) | Correlation Coefficient | ,436[*] | ,412 | ,294 | ,163 | -,053 | ,091 | ,289 | 1,000 |
| | Sig. (2-tailed) | ,038 | ,051 | ,173 | ,459 | ,812 | ,680 | ,182 | |
| | N | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |

LAP-VEGaS: the LAParoscopic surgery Video Educational GuidelineS, CVS: Critical view of safety,
*: Correlation is significant at the 0.05 level (2-tailed), **: Correlation is significant at the 0.01 level (2-tailed)

cartoon or animation formats, illustrations, congress presentations, those containing only a part of the surgery, and duplicate videos uploaded with different titels were excluded from the study. The remaining 23 videos were included in the study. The numbers of visualizations, video length, likes, dislikes, comments and days online, LAP-VEGaS and CVS conformity percentages of the videos are shown in Table 3.

In the correlation analysis of the video evaluation datas, a moderate correlation was found between the number of visualizations of the videos and the video length, likes and dislikes, and LAP-VeGAS conformity percentages *(p<0,05)*. At the same time, a strong correlation was found between the number of visualizations and days online *(p<0.01).* A strong correlation was found between video length and CVS conformity percentage *(p<0.01).* There was a moderate correlation between the number of likes and dislikes of the videos *(p<0.05).* In addition, a strong correlation was found between the number of likes of the videos and the number of comments *(p<0.01)* (Table 4). Among the LAP-VeGAS criterias, the most conformity criteria were items 3, 17 and 31 (Table 5). It was determined that 71% of the CVS criterias were 100% compatible (Table 6).

**Discussıon**

Esophageal atresia is a congenital anomaly that should be considered in the differential diagnosis of newborns with postpartum feeding difficulties or

**Table 5.** Conformity percentage of LAP-VeGAS' criterias

| No. of LAP-VeGAS' criterias | Conformity percentage (%) |
|---|---|
| 1 | 78 |
| 2 | 30 |
| 3 | 95 |
| 4 | 4 |
| 5 | 0 |
| 6 | 0 |
| 7 | 0 |
| 8 | 82 |
| 9 | 60 |
| 10 | 52 |
| 11 | 26 |
| 12 | 52 |
| 13 | 17 |
| 14 | 39 |
| 15 | 0 |
| 16 | 30 |
| 17 | 95 |
| 18 | 39 |
| 19 | 4 |
| 20 | 13 |
| 21 | 4 |
| 22 | 4 |
| 23 | 21 |
| 24 | 0 |
| 25 | 4 |
| 26 | 34 |
| 27 | 0 |
| 28 | 0 |
| 29 | 0 |
| 30 | 0 |
| 31 | 95 |
| 32 | 60 |
| 33 | 0 |
| 34 | 0 |
| 35 | 0 |
| 36 | 0 |
| 37 | 0 |

LAP-VEGaS: the LAParoscopic surgery Video Educational GuidelineS

**Table 6.** Conformity percentage of CVS criterias

| No. of CVS' criterias | Conformity percentage (%) |
|---|---|
| 1 | 86 |
| 2 | 100 |
| 3 | 100 |
| 4 | 100 |
| 5 | 100 |
| 6 | 100 |
| 7 | 43 |

CVS: Critical view of safety

respiratory distress. In 1941, Cameron Haight managed to keep her patient alive with the primary anastomosis performed by extrapleural intervention[7]. Although thoracoscopy was defined in the 1910s, the first publications in children were published in the 1970s for biopsy and debridement[8]. Pediatric surgeons began the first thoracoscopic repair attempts for EA in the early 2000s. Advances in anesthesia and the development of thoracoscopic instruments suitable for newborns also play a role in this. However, there is not much data in the literature because this procedure should be performed in selected cases and by experienced pediatric surgeons. For this reason, instructional videos on the TREA are also limited. In this study, a search on YouTube (YouTube, San Bruno, CA) using the keyword "Thoracoscopic repair of esophageal atresia" listed 41 videos and found only 23 videos that met the inclusion criteria. The low number of videos may also be associated with the low number of experienced pediatric surgeons specialized in TREA.

Along with technological developments, classical education methods are also changing. Today, online magazines, e-books, various mobile applications, simulations and online videos have started to be useful for educational purposes [9].

Current interns and medical school students are the first generation to use the internet for educational purposes [10]. At the same time, learning by watching videos has become more popular nowadays due to both the economic cost of the training in the operating room and the difficulties based on patient safety [11]. In addition, the COVID-19 pandemic has brought virtual web-based learning to the forefront of medical education [12]. For this reason, the educational value of the videos published online is very important. Since YouTube is a popular, free-to-

access video sharing platform, the videos shared may be scientifically unsatisfactory and may not have gone through the peer review process. For this reason, it is important to evaluate these videos published on a free access platform. The average length of the videos included in this study is 791.39 seconds. Since this average time value is much shorter than the standard operation time, it may create the perception from the videos that this surgical procedure is easy.

An international multi-specialty joint trainers and trainee expert committee prepared the LAP-VEGaS consensus statement to evaluate the educational value of laparoscopic surgery videos [5]. This paper is a "key stone" for the evaluation of educational laparoscopic videos. The median (IQR) (%) of the videos included in the study conforming to the LAP-

VEGaS criteria was 24% (18-37%). It is difficult to make a one-to-one comparison since there is no study in the literature on the analysis of videos of TREA. However, considering the studies using LAP-VEGaS criterias, it is noteworthy that this rate is low [13,14]."The title of the video must include the name of the procedure performed and of the pathology treated.", "The surgical procedure should be presented in a standardized step-by-step manner.", "Image quality should be assessed", "When excessive smoke, low-definition, or suboptimal views are present for more than 25% of the duration of the procedure, the video should be rejected for poor image quality." are the the most conformity (95%) criterias of the videos among the LAP-VEGaS criteria. Since items 15 and 24 of the LAP-VEGaS criteria were not conformitable for the TREA, conformity with these criteria was found to be 0%. It was determined that in any of the videos included in the study, consent was obtained from the patient's parents or legal guardian, and the conflict of interest in the published video was not stated. It was thought that this situation might cause ethical and legal problems.

Review of surgical videos relies on the use of objective assessment tools to assess both general and surgical procedure-specific skills. These assessments provide structured feedback to surgeons to improve surgical technique [15]. Among these assessment methods, peer review process has an important place. It was observed that peer review was not performed in all of the videos in this

study. This situation made us think that the videos were published online without checking the content of the videos. This may cause the viewers of the video to have incomplete or erroneous information about the surgical procedure.

Critical view of safety is prepared with the aim of minimizing the risks of a laparoscopic surgical procedure and recognizing the operation area in order to avoid anatomical alterations and altered visual perception. There is no CVS criteria defined for TREA repair in the literature yet. The CVS criteria we used in the study were designed based on our clinical experience and the process mentioned in the article reported by Kanojia et al. [6]. The median (IQR) (%) of the videos conforming to the criterias of CVS was 85% (85-100%). It was found that 71% of the CVS criteria were fully complied with in the videos. It was found that the *v. azygos* and *n. vagus* were identified in 83% of the videos, and a chest drain was placed under vision in 43%. It has been stated that adhering to the CVS criteria during the surgery will decrease the intraoperative complication rates [16]. Considering the CVS criteria that were not followed in the videos, it was thought that thissituation might increase both intraoperative and postoperative complications.

A moderate correlation was found between visualizations of videos and video length, number of like and dislike, and LAP-VeGAS conformity percentages. It was thought that the reason why the viewers preferred longer videos was that they believed that the video could be more detailed. This situation has allowed the videos to be evaluated more in terms of likes and dislikes. In addition, it was observed that there was a correlation between the number of likes and dislikes and the number of likes and comments. This situation made us think that the videos that were previously evaluated in terms of like and dislike could be evaluated more easily by the viewers. It was concluded that viewers tend to comment on the videos they like. It was determined that the number of views increased as the duration of the videos were broadcast online, as expected.

The "culture of safety" concept is based on demonstrating the CVS [17]. It can be time-consuming for CVS to be completely demolished during the operation. There was a strong correlation between the length of the videos evaluated in this study and the CVS conformity percentage. The primary

purpose of repair of EA is to anastomose both esophageal parts to each other. For this reason, it was thought that the steps of identifying the *v. azygos* and *n.vagus* and placing a chest drain under vision may have been omitted from the video, since this anastomosis process was often emphasized during the editing of the videos. CVS criteria not included in these videos may cause viewers to think that these steps may not be necessary.

## Conclusıon

Today, the interest in online training videos has increased for various reasons. Since YouTube is a user-oriented platform, uploaded videos do not go through peer review. It is necessary to be more self-sacrificing, especially when uploading videos to free public platforms. Although the adherence of the videos to CVS was high, their conformity to LAP-VEGaS was low. For this reason, it was concluded that the trainees who will watch the video should also check whether the video is refereed or quality controlled.

## Ethical Statement

Ethics committee approval was not taken as the study was an evaluation of public domain surgical videos.

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