New learning area in laparoscopic gastrectomy for gastric cancer: YouTube® or WebSurg®?

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INTRODUCTION

Gastric cancer is one of the most common cancers in the world.[1] In the treatment of gastric cancer, laparoscopic and robotic surgeries are more popular besides open surgery. Laparoscopic gastrectomy was first performed by Kitano in gastric cancer surgery.[2] Due to the advancement of technology, less post-operative pain, early return to normal life and good oncological results, laparoscopic surgery has started to attract attention among surgeons.[3] Laparoscopic gastrectomy and subsequent reconstructions are an experienced procedure and require a high learning curve. At the same time, laparoscopic gastrectomy cannot be performed routinely in many centres, because there is still no standardisation where it is performed, and therefore, new learning areas are needed for residents working in these centres for surgical training. These areas are various courses, video training sets and video platforms watched over the internet. The most frequently used platforms are YouTube® and WebSurg®. Our aim is to compare these two online video platforms in terms of laparoscopic gastrectomy and to evaluate the contribution of video platforms to surgical training and whether they have sufficient technical quality.

Materials and Methods: We made a search on YouTube® and WebSurg® using the keyword ‘laparoscopic gastrectomy’ on 13 November 2020. A total of 143 videos were analysed, 111 of them on YouTube® and 32 on WebSurg®. All these videos were examined by two surgical oncologists experienced in laparoscopic gastrectomy and using laparoscopy in their daily practice.

Results: The average video duration was 53.54 min in the YouTube® group and 18.20 min in the WebSurg® group, and this difference was found to be statistically significant between the two groups. According to the LGSS based on surgical procedures, the average score of WebSurg® videos was 10.37 and of YouTube® videos was 5.55, and there was a statistically significant difference between the two groups.

Conclusions: Today, video platforms have started to play a major role in surgical training. Of these platforms examined, WebSurg® is superior to YouTube® in terms of education and quality, but these platforms still have some deficiencies and need regulation.

Keywords: Gastric cancer, laparoscopic gastrectomy, surgical education, WebSurg, YouTube®
new learning areas are needed for residents and specialists working for surgical training. These areas are various courses, video training sets and video platforms watched over the internet. The most frequently used platforms are YouTube® and WebSurg®.

YouTube® was launched in 2005 and is a free, easily accessible online platform with 2 billion views per day and 1 billion hours of video watching and 500 h of new videos are being uploaded every minute.[4–6] As in all sectors, its popularity has increased in the medical community, especially because it can be accessed from many places (computer, tablet and smartphone). Furthermore, visual and auditory media have started to be used more by surgeons, especially in terms of surgical techniques, and this is thought to increase learning ability.[7,8] WebSurg® is a video platform that provides educational videos about minimally invasive surgical procedures. It is IRCAD’s online university and Web 2.0 phenomenon. It was launched in 2000 in Strasbourg by Professor Jacques Marescaux and his team. It may also provide insufficient, non-transparent, biased or false information due to the multitude and diversity of authors providing content across all video platforms. Our aim with this study is to compare these two online video platforms in terms of laparoscopic gastrectomy and to evaluate the contribution of video platforms to surgical training and whether they have sufficient technical quality.

**MATERIALS AND METHODS**

We made a search on YouTube® and WebSurg® using the keyword ‘laparoscopic gastrectomy’ on 13 November 2020. Then, we sort videos by upload date and filtered videos longer than 10 min specifically, because long videos are more educational. We determined the mutual videos in each group and accepted them as belonging to the first platform they were uploaded to. Searches were made according to the website’s default settings. A total of 565 videos were found in the two groups. All videos were examined by two surgical oncologists experienced in laparoscopic gastrectomy and using laparoscopy in their daily practice. The growing conflicts were resolved by joint decisions. The publications and educational status of the surgeon who published the video or performed the operation were investigated on the internet. Animations, congress presentations, lectures, patient experiences those who underwent additional surgery in the same session, benign diseases and bariatric cases were excluded from the study. A total of 143 videos were analysed: 111 of them on YouTube® and 32 on WebSurg®.

In the search that has been made on YouTube®, there were 480 videos in total and 236 of them were not included because they were bariatric surgery. Among a total of 244 results, those shorter than 10 minutes (102 videos), congress presentations (15), wedge resection for stromal tumors and lipoma (4), esophageal cancer (1), additional organ resection (1), remnant cancer (1), duplication (5) and (4) surgical videos for urgent surgical interventions were extracted and 111 videos were evaluated. In the search made on WebSurg®, 1 <10 min, 48 bariatric, 1 robotic and 3 operative techniques were removed and 32 videos remained. This study did not require approval by the local research ethics board as it involved publicly available data only.

We evaluated videos in terms of duration, video provider (academic, private and other), image quality, upload year, audio narration, video language, number of views, number of likes and dislikes and subtitles. The videos were divided into two groups according to the source: medical doctor and institution.

We measured videos’ popularity: views and likes using the Video Power Index (VPI). The liking rate is (like × 100/ (like + dislike)), the view rate is (number of views/days) and finally VPI is found as like rate × view rate/100.[9,10] Bernard et al. used the global quality score system to evaluate the relationship of videos with educational value.[11] The Journal of the American Medical Association (JAMA) benchmark criteria were used in terms of quality, transparency and reliability of the videos.[12] One point is given for each criterion.

We created a laparoscopic gastrectomy scoring system for the analysis of videos about gastric cancer [Table 1]. In this way, we scored the videos to measure their quality. This type of scoring system is very rare in the literature, and when creating this scoring system, we modified the scoring system created

**Table 1: Laparoscopic gastrectomy scoring system**

| Laparoscopic gastrectomy scoring system | Points |
|----------------------------------------|--------|
| Image quality                          | High definition | 1 |
| Audio-subtitle                         | Yes    | 1 |
| Uploader                               | Medical doctor | 1 |
| Is the title enough?                   | Yes    | 1 |
| Clinical data                          | Yes    | 1 |
| Pre-operative radiological image       | Defined | 1 |
| Bowel cleansing                        | Yes    | 1 |
| Camera angel                           | Defined | 1 |
| Intra-abdominal pressure               | Defined | 1 |
| Surgeon position                       | Defined | 1 |
| Patient position and trocar placement  | Defined | 1 |
| D1 dissection                          | Yes    | 1 |
| D2 dissection                          | Yes    | 1 |
| Reconstruction                         | Yes    | 1 |
| Extraction of specimen                 | Yes    | 1 |
| Complication management                | Yes    | 1 |
| Pathology result                       | Yes    | 1 |
| Outcome                                | Yes    | 1 |
by Zhang et al.\(^\text{[13]}\) according to our own clinical experience. In this scoring system, 18 criteria were created by expanding video technical features, preoperative information of patients, characteristics of surgical instruments, patient and surgeon position, intra-operative steps and post-operative results. In the scoring system, 1 point was given for each criterion. Each score increase indicates that the quality of that video generally increases in every aspect. Finally, the total score for each video from these 18 criteria was calculated.

**Statistical analysis**

SPSS (SPSS Inc., Chicago, IL, USA) 11.5 software was used in the analysis of the data. For descriptive analysis, quantitative variables were presented as mean ± standard deviation and median (minimum–maximum) and qualitative variables were presented as number of patients (percentage). The mean distributions of the quantitative data were tested with the Shapiro–Wilk test and histogram curves. In terms of the quantitative variable, the difference between the categories of the qualitative variable with two categories was examined using the Mann–Whitney U-test for those who provided normal distribution assumptions and using the Student’s t-test for those who did not provide. The Chi-squared test and Fisher’s exact test were used to evaluate the relationship between the two qualitative variables. The statistical significance level was accepted as 0.05.

**RESULTS**

When searching with laparoscopic gastrectomy criteria, a total of 143 videos were analysed: 111 on YouTube\(^\text{®}\) and 32 on WebSurg\(^\text{®}\). The average video duration was 53.54 min in the YouTube\(^\text{®}\) group and 18.20 min in the WebSurg\(^\text{®}\) group, and this difference was found to be statistically significant between the two groups (\(P = 0.011\)). In terms of likes, YouTube\(^\text{®}\) videos had an average of 11.00 likes, whereas in the WebSurg\(^\text{®}\) group, the average was 94.31, and the difference was statistically significant (\(P < 0.001\)). Watching features of surgical videos are shown in Table 2.

82 (74.5%) videos added to YouTube\(^\text{®}\) and 32 (100%) videos added to WebSurg\(^\text{®}\) were uploaded by a medical doctor, and there was a statistically significant difference between the two groups (\(P = 0.001\)). In terms of operation types, total and subtotal gastrectomy cases were found at similar rates and no significant difference was found between the two groups (\(P = 0.313\)). \(D_1\) and \(D_2\) dissections were performed at a high rate on both video platforms. The features of the loaded cases are shown in Table 3.

The laparoscopic gastrectomy scoring system, VPI, global scoring system and JAMA scores were compared for the popularity, training and image quality of the uploaded videos. According to the LGSS based on surgical procedures, the average score of WebSurg\(^\text{®}\) videos was 10.37 and of YouTube\(^\text{®}\) videos was 5.55, and there was a statistically significant difference between the two groups (\(P = 0.001\)). In terms of image quality, the average VPI score of WebSurg\(^\text{®}\) videos was 3.19 and of YouTube\(^\text{®}\) videos was 1.42, and the difference was statistically significant (\(P = 0.001\)). The JAMA score of whose videos were viewed in terms of quality, transparency and trust was 2.75 in WebSurg\(^\text{®}\) and was statistically high (0.024). GSS which was evaluated for comparison in terms of education and mean scores of the videos scanned in WebSurg\(^\text{®}\) was 3.00, and it was statistically significantly higher (\(P = 0.001\)). The comparison of scoring systems is shown in Table 4.

**DISCUSSION**

The curative approach in gastric cancer treatment is gastrectomy and lymphadenectomy.\(^\text{[14]}\) In recent years, articles are showing the advantages of laparoscopic gastrectomy compared to open surgery.\(^\text{[15]}\) After it was first described by Kitano in 1994, laparoscopic surgery has become increasingly standard in the treatment of gastric cancer in the past decade.\(^\text{[16]}\) Laparoscopic surgery has been searched more over the internet for learning purposes in the last 10 years than open and robotic surgery. Gastrectomy results on Google\(^\text{®}\) in the last 10 year is shown in Figure 1.\(^\text{[17]}\) However, laparoscopic surgery requires experience and especially the difficulty of reconstruction and lymphadenectomy brings difficulties in the education process. Learning curves are variable in laparoscopic total gastrectomy and subtotal gastrectomy.\(^\text{[18,19]}\) In countries

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**Table 2: Video characteristics**

| Variables            | YouTube\(^\text{®}\) | WebSurg\(^\text{®}\) |
|----------------------|----------------------|----------------------|
|                      | Mean±SD              | Median (minimum-maximum) | Mean±SD              | Median (minimum-maximum) |
| Number of views      | 1521.33±3286.45      | 356.00 (1.00-21476.00) | 4108.25±2368.53      | 3448.00 (697.00-10674.00) |
| Like                 | 11.00±21.12          | 4.00 (0.00-143.00)    | 94.31±85.84          | 76.00 (10.00-409.00)     |
| Dislike              | 0.33±0.81            | 0.00 (0.00-4.00)     | 0                    | 0                     |
| Video duration (min) | 53.54±67.52          | 18.29 (10.07-297.00)  | 18.20±9.82           | 15.41 (10.00-56.56)     |

\(^a\)Mann-Whitney U-test. SD: Standard deviation
### Table 3: Descriptives

| Variables                                      | Video platform | P     |
|------------------------------------------------|----------------|-------|
| Operation type                                 |                |       |
| Laparoscopic subtotal gastrectomy              | 56 (50.4)      | 14 (43.75) | 0.313<sup>a</sup> |
| Laparoscopic total gastrectomy                 | 50 (45)        | 18 (56.25)  |               |
| Laparoscopic proximal gastrectomy              | 5 (4.6)        | 0      |               |
| Language                                       |                |       |
| English                                        | 33 (29.7)      | 32 (100)  | <0.001<sup>b</sup> |
| Other                                          | 10 (9)         | 0      |               |
| None                                           | 68 (61.3)      | 0      |               |
| Uploader                                       |                |       |
| Medical doctor                                 | 82 (74.5)      | 32 (100)  | 0.001<sup>b</sup> |
| Institute                                      | 29 (25.5)      | 0      |               |
| Image quality                                  |                |       |
| High definition                                | 77 (69.3)      | 29 (90.6)  | 0.016<sup>a</sup> |
| Low definition                                 | 34 (30.7)      | 3 (9.4)   |               |
| Information                                    |                |       |
| Voice                                          | 10 (9)         | 32 (100)  | 0.001<sup>b</sup> |
| Subtitle                                       | 26 (23.4)      | 0      |               |
| None                                           | 75 (67.6)      | 0      |               |
| Informing about the patient                    |                |       |
| Yes                                            | 30 (27)        | 22 (68.75) | <0.001<sup>b</sup> |
| No                                             | 81 (73)        | 10 (31.25) |               |
| Title proficiency                              |                |       |
| Yes                                            | 79 (71.1)      | 28 (87.5)  | 0.061<sup>b</sup> |
| No                                             | 32 (28.9)      | 4 (12.5)   |               |
| Pre-operative radiological image               |                |       |
| Yes                                            | 15 (13.5)      | 15 (46.8)  | 0.001<sup>b</sup> |
| No                                             | 96 (86.5)      | 17 (53.2)  |               |
| Bowel cleansing                                |                |       |
| Mentioned                                      | 0              | 1 (3.1)   | 0.224<sup>a</sup> |
| Not mentioned                                  | 111 (100)      | 31 (96.9)  |               |
| Camera angle                                   |                |       |
| Mentioned                                      | 0              | 5 (15.6)   | 0.001<sup>a</sup> |
| Not mentioned                                  | 111 (100)      | 27 (84.4)  |               |
| Intra-abdominal pressure                       |                |       |
| Mentioned                                      | 1 (0.9)        | 0      | 0.590<sup>a</sup> |
| Not mentioned                                  | 110 (99.1)     | 32 (100)  |               |
| Surgeon position                               |                |       |
| Yes                                            | 11 (9.9)       | 20 (62.5)  | 0.001<sup>b</sup> |
| No                                             | 100 (90.1)     | 12 (37.5)  |               |
| Patient position and trocar placement          |                |       |
| Yes                                            | 20 (18)        | 31 (96.8)  | 0.001<sup>b</sup> |
| No                                             | 91 (82)        | 1 (3.2)   |               |
| D1 dissection                                  |                |       |
| Yes                                            | 108 (97.2)     | 31 (96.8)  | 0.898<sup>a</sup> |
| No                                             | 3 (2.8)        | 1 (3.2)   |               |
| D2 dissection                                  |                |       |
| Yes                                            | 99 (89.1)      | 27 (84.3)  | 0.535<sup>a</sup> |
| No                                             | 12 (10.9)      | 5 (15.7)   |               |
| Reconstruction                                 |                |       |
| Yes                                            | 95 (85.5)      | 32 (100)  | 0.023<sup>a</sup> |
| No                                             | 16 (14.5)      | 0      |               |
| Reconstruction (lap-open)                      |                |       |
| Open                                           | 4 (3.6)        | 2 (6.25)   | 0.055<sup>a</sup> |
| Laparoscopic                                   | 90 (81)        | 30 (93.75) |               |
| No                                             | 17 (15.4)      | 0      |               |
| Reconstruction type                            |                |       |
| R and Y                                        | 92 (82.2)      | 25 (78.1)  | 0.604<sup>a</sup> |
| Billroth 1                                     | 2 (1.8)        | 5 (15.6)   |               |
| Billroth 2                                     | 1 (0.9)        | 2 (6.3)    |               |
| No                                             | 16 (15.1)      | 0      |               |

Contd...
with a high incidence of gastric cancer, these curves can be reached more easily, and where the incidence is low, this situation may direct surgeons to websites containing various educational courses, conferences and surgical videos. First, Keelan et al. researched the effectiveness of YouTube\textsuperscript{®} on vaccination studies.\cite{20} Many studies have been carried out in the continuation of this and the lack of a system that evaluates the reliability of the YouTube\textsuperscript{®} platform has led to questioning the academic competence of YouTube\textsuperscript{®}.\cite{21} For this reason, new platforms such as WebSurg\textsuperscript{®} have emerged for academic videos. Celentano et al. showed that 86.7% of surgical residents routinely watch surgical training videos and stated that YouTube\textsuperscript{®} and WebSurg\textsuperscript{®} are the most common sources for online surgical videos.\cite{22} In this study, we compared YouTube\textsuperscript{®} and WebSurg\textsuperscript{®} video platforms, which are the two important resources for surgeons.

In video lectures, verbal narration for surgeons, demonstration with figures, verbal or subtitle of important anatomical structures, specifying key places and explaining all steps of surgery including pre-operative, perioperative and post-operative periods will be very important for surgeons who are new to laparoscopic surgery and in the learning period. At the same time, the importance of video image quality cannot be discussed to clearly evaluate difficult anatomical structures and surgery. When the video quality was evaluated in previous studies with the video rate of high-definition resolution (720p and 1080p) being below 50%,\cite{23,24} this rate is gradually increasing with the developing technology.\cite{13} In our study, this rate was 69% on YouTube\textsuperscript{®} and 90% on WebSurg\textsuperscript{®} ($P = 0.016$). The fact that the language of expression is English makes the video universally more understandable and uploading the video by a medical professional can improve the quality of video training. On WebSurg\textsuperscript{®}, the language of expression in all videos is English (100%) and all videos are uploaded by the surgeons, which provides ease of learning. These rates on Youtube\textsuperscript{®} are 29.7% and 74.5%, respectively.

Gastric cancer surgery should be considered as a whole. Information about the patient, preoperative imaging,
patient and surgeon position, trocar placement, type of camera used, removal of the specimen, reconstruction, intraoperative complication management and postoperative follow-up data are important and overlooked steps of the procedure. For this reason, having all these data in an educational video for the surgeon using online platforms will increase the usefulness of the video. When both the platforms were compared, the difference in all steps was statistically significant (P < 0.001, VPI = 0.001, P = 0.001, VPI = 0.001, P = 0.001, P = 0.001, P = 0.001, P = 0.001, P = 0.001, P = 0.0263 and P = 0.001). Based on our clinical experience, there is little mention of preoperative bowel cleansing, prophylactic antibiotic therapy and intra-abdominal pressures on both platforms, which constitutes a disadvantage for new learners of laparoscopic surgery.

One of the most important steps in laparoscopic gastric cancer surgery is lymph node dissection. There was no statistically significant difference in showing the dissection steps performed on both platforms (P = 0.989 and P = 0.535).

Reconstruction is the most difficult step in laparoscopic surgery for most surgeons. It should be performed intra-corporeally or extra-corporeally depending on the experience and choice of the surgeon. After laparoscopic subtotal gastrectomy, generally, four types of gastrointestinal reconstruction were applied: oesophagogastronomy, gastroduodenostomy (Billroth I), loop gastrojejunostomy (Billroth II) and Roux-en-Y. There is still no consensus in the literature about which reconstruction method is the best after laparoscopic distal gastrectomy. Anastomosis selection may vary according to tumour localisation and surgeon preference. Roux-en-Y is the most preferred method on both the platforms. Most of the anastomosis was performed intra-corporeally on both the platforms, and linear staples were preferred for reconstruction. After anastomosis, openness is closed by hand stitching or with the help of a stapler depending on the surgeon’s preference. In patients who had anastomosis with linear stapler, the opening after stapler implantation was closed with two methods. While the opening was closed with linear stapler in 18 patients, it was closed with laparoscopic sutures in 73 patients. Based on our clinical experience, the intra-corporeal anastomosis techniques provide convenience to the surgeon, considering the patient factors (obesity, short mesentery, etc.).

In our study, videos on both the platforms were watched and evaluated by two surgical oncologists. In the evaluation, the scoring system created by Zhang et al. was modified, and the laparoscopic gastrectomy scoring system, Video Power Index, JAMA and global scoring systems were compared. In LGSS where we evaluated many factors together, the average score was found to be 5 for YouTube and 10.25 for WebSurg, and this difference was statistically significant (P = 0.001). The difference between the two groups was statistically significant in the other three scoring systems (P = 0.001, P = 0.024 and P = 0.001). This difference is due to the fact that all of the videos on the WebSurg site are prepared and edited by professionals. However, surgeons who upload videos on Youtube want to show their surgical skills rather than training. At the same time, they care more about patients watching these surgeries rather than their colleagues. In addition, some of the video uploads are uploaded by companies and institutions. We think that all these factors cause Youtube videos to be inadequate. Although these two platforms can make significant contributions to laparoscopic surgery, these platforms will not be as effective as observations, courses, conferences and surgery to be performed in the observation of a mentor in experienced centres. However, in today’s conditions, surgical instructors should direct professionals on the learning curve to reliable resources.

According to this study, an ideal video format can be developed. First of all, a 20-min video will be enough. It is very important for those who upload videos to the platforms to be surgeons and highlight the important parts of the video. Videos uploaded outside of health-care professionals can be both unnecessarily long and misleading about education. Videos must be in HD quality and contain voice prompts. When the video is being uploaded, the preoperative information of the patients should be well
informed and the patient–surgeon position should be shown. In addition, not only the resection part but also the reconstruction part and the specimen extraction should be included in the video. If complications have developed, the management of the complication and the pathology result should also be mentioned at the end of the video.

There are some limitations in our study. There may be videos that were added or deleted, especially after the date we searched. Although there are other video platforms besides YouTube® and WebSurg®, we compared these two most used and popular platforms.

CONCLUSIONS

Today, video platforms have started to play a major role in surgical training. Of these platforms that we have examined, WebSurg® is superior to YouTube® in terms of education and quality, but these platforms still have some deficiencies and need regulation. With all these, the contribution of visual training videos to surgical training cannot be denied. In the future, visual training, conducted or directed by medical professionals, will contribute significantly to modern surgical training.

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Conflicts of interest
There are no conflicts of interest.

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