An Exploratory Study on Pediatric Inguinal Hernia Videos on the YouTube Platform

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Aim: A study was conducted to explore the characteristics of the videos on pediatric inguinal hernia repair on YouTube and compare the most popular videos (MPV) with the least popular ones in terms of educative value vis-a-vis their popularity.

Materials and Methods: The term “Pediatric inguinal hernia repair” was searched for on YouTube on August 15, 2021, with the filter set to “view rate.” Pertinent data were collected from the 50 MPV and the 50 least popular videos (LPV) and then compared. The h-index and affiliation of the surgeon were obtained from the Scopus database, and their affiliation was further categorized as academic or nonacademic.

Results: One hundred and seventy-five videos were found with median views of MPV: LPV being 9270 (interquartile range [IQR] – 12099):127 (IQR – 194), respectively (P < 0.0001). Most of the videos in the MPV and LPV groups were uploaded from the United States of America (USA) (MPV – 17 and LPV – 13) and India (MPV – 15 and LPV – 15). The MPV were on YouTube for a median duration of 3.1 (IQR – 5.5) years as compared to 1.2 (IQR – 2.3) years for the LPV (P < 0.0001). Ninety-two surgeons were identified. The median h-index of the surgeons of MPV was 3 (IQR – 12) in comparison to 1 (IQR – 10) of LPV (P = 0.13). The ratio of academic versus nonacademic affiliation among MPV and LPV was almost equal in both the groups.

Conclusions: On either end of the spectrum of popularity, the majority of the pediatric inguinal hernia videos on YouTube were surgical videos uploaded from the USA and India. The educative value of these videos was found to be low and widely dispersed. Surgeons from both academic and nonacademic affiliations had contributed similarly.

Keywords: Hernia, laparoscopy, pediatric inguinal hernia, YouTube

Original Article

INTRODUCTION

YouTube is an online video-sharing social media platform with more than 1 billion monthly users, second only to Google.[1] With its vast viewership, it allows individuals and organizations to promote their work to a wider audience in any discipline. Videos related to health care, health education, and surgical techniques are also available freely for the masses. Over the years, it has been realized that videos meant for medical professionals are also being shared on the platform with a broad uptake.[2] Edited surgical videos are often resorted on as ready reference by both trainees and consultants alike. This repository of videos can be used for patient education and learning the nuances of surgery. It can also be viewed by anxious parents to understand the surgery their child is subjected to. Parental exposure to these videos can help alleviate anxiety. Still, a diametrically opposite effect can also result if the content is judged to be too graphic, or conversely, too scientific.

Inguinal hernia repair is one of the index surgical procedures in pediatric surgery.[3] With easy access to...
the Internet on our mobile devices, videos on YouTube can be a rich source of information, with great potential to improve surgical performance and confidence. However, due to a lack of peer review, standardization, and quality control, the information available must be critically scrutinized by the trainees, preferably under the guidance of senior and more experienced surgeons.

We sought to explore the characteristics of the videos on pediatric inguinal hernia repair (PIHR) on YouTube and compare the most popular videos (MPV) with the least popular videos (LPV). Furthermore, the educative value of the videos was extrapolated from the h-index of the surgeon featured in the videos as a surrogate. Various metrics (duration since uploaded on YouTube, length of the video, h-index, and affiliation of surgeon) affecting the popularity of the videos were also analyzed and compared between the MPV and the LPV.

Materials and Methods

The YouTube (https://www.youtube.com) (Google LLC, San Bruno, CA, United States of America [USA]) search function was used to search videos with the term “Pediatric inguinal hernia repair.” The filter was set to sort the videos by “view.” The data from the 50 MPV and 50 LPV were compiled on August 15, 2021, which included basic information of the video uploaded, including view count, country from which uploaded, language, duration since uploaded (years), length of the video (seconds), name of the uploader/organization, and number of likes, dislikes, and comments.

All the shortlisted videos were watched completely by four authors (M. S., D. J., P. G., and AKD), and the content was categorized into “operative video” or “academic narration/lecture” for professionals, or “health education video” for the lay public. A video was categorized as “animated” if the video did not involve actual surgery on humans; instead, graphical two- or three-dimensional multimedia were used in the video. A video was labeled as “edited” if it was found to be such by any one of the authors (AKD, VJ, or DKY). If the video had mixed features regarding the content, animation, and editing, the dominant feature was decided after a mutual discussion between AKD, V. J., and DKY.

For operative videos, the type of surgery performed was noted (open or laparoscopic). Each operative video in the most popular category was further evaluated for key characteristics. If a surgeon could be identified in the description or in the video, the details of the surgeon were obtained from the Scopus database to confirm their h-index and affiliation, which was categorized as academic or nonacademic as ascertained by a general Internet search. The h-index is an author-level metric that measures the productivity and citation impact of a scientist, depending on the “academic age” of the researcher. This academic factor has been taken as a surrogate for the technical expertise of the surgeon for the purpose of this study. Further statistical analysis was only performed for those videos in which a surgeon could be assigned. The operative videos were further characterized by checking their contents with a set of five key steps as assigned by four authors (PG, DKY, VJ, and AKD), with each author having more than 10 years of experience in either open or laparoscopic pediatric surgery.

Median (interquartile range [IQR]) and ranges were obtained for continuous variables. The h-index data were categorized as 0–10 and >10. The P value was calculated using the Kruskal–Wallis test, and $p < 0.05$ was considered statistically significant.

Results

A total of 175 videos were found on August 15, 2021. The 50 MPV and 50 LPV were shortlisted. For the MPV, the median views were 9270 (IQR – 12099). The majority of these videos were uploaded from the USA ($n = 17$, 34%) followed by India ($n = 15$, 30%), with both these countries constituting 64% of the total uploads. The majority of the videos were in the English language ($n = 47$), followed by one each in Hindi, Vietnamese, and Spanish language. The median duration of these videos on the platform was 3.1 years (0.1–12.2 years). The average length of the video was 7.2649 s (0:37–53:26 s). The uploader of the video was an individual YouTube account holder in 34 videos (68%), and 16 videos (32%) were from YouTube accounts of organizations. The mean number of likes, dislikes, and comments on these videos was 131.28 (range: 1500–1), 11.98 (range: 107–0), and 14.5 (range: 136–0), respectively.

There were 39 videos demonstrating operative surgeries, 10 videos on patient information, and 1 video with academic training-based content. Among the operative videos, there was an almost equal number of open ($n = 20$) and laparoscopic videos ($n = 19$); four videos were animated surgical videos. The majority (70%) of the surgical videos were edited. A surgeon could be identified in 47 videos, with 14 surgeons having an h-index of more than 10% and 54% having an academic affiliation. The demonstration of key operative steps in these videos is described in Table 1.

In comparison, the median views for the LPV were 127 (IQR – 194); the difference with MPV was statistically significant ($P < 0.0001$). The majority of these videos originated from India ($n = 15$, 30%) and...
the USA \(n=13, 26\%\), which constituted 56\% of the total uploads. The majority of the videos were in the English language \(n=45\). The average video length was 7:27:12 s. The videos were on the platform for a median duration of 1.9 years (range: 8.2–0.1 years) which was statistically significant in comparison to MPV \((P = P < 0.0001)\). Like the MPV group, the uploader could be identified as an individual YouTube account holder in 72\% of the videos \(n=36\), and organizational account uploads constituted 28\% of the uploads \(n=14\). The mean number of likes, dislikes, and comments on these videos was 3.3 (range: 0–23), 0.08 (range: 0–1), and 1.2 (range: 0.23), respectively.

There were a higher number of videos for patient information compared to the MPV group (18 vs. 10), but they still constituted only 36\% of the total LPV. Operative surgical videos constituted 58\% of the total LPV, of which laparoscopic surgeries constituted the vast majority (93\%, \(n=27\)). The demonstration of key surgical steps in these videos is described in Table 2.

Of the surgical videos, 93\% were edited. A surgeon could be identified in 92\% \(n=46\) of the videos, and 13 had a Scopus h-index of more than 10. Of these identified surgeons, 47\% had an academic affiliation. The median h-index of the surgeons of MPV was 3 (IQR – 12) in comparison to 1 (IQR – 10) of LPV \((P = 0.13)\). The ratio of academic/nonacademic affiliation among MPV and LPV was almost equal in both the groups (24/22).

The surrogates of educative value (h-index \([\text{those with } \leq 10 \text{ or more than } 10]\) and the affiliation \([\text{academic or nonacademic}]\)) are compared with the variables (view count, duration of the video since it is in platform, and the length of the video) in Tables 3 and 4. Table 3 depicts a comparison of surrogates of educative value with surrogates of popularity and quality comparing the MPV and LPV groups. With the exception of duration of video by authors with academic affiliation and h-index >10, under all other variables, there was a statistically significant difference between LPV and MPV.

On comparing the videos in terms of the studied variables in Table 4 (the views, years uploaded, and duration of video), with the surrogates of quality (Scopus h-index and academic affiliation), there was no statistical difference noted, except for the duration of video in the LPV category between academically affiliated and nonacademically affiliated.

**DISCUSSION**

Social media has had a great impact on education since its inception and plays a key role in disseminating scientific information. Academic information on the Internet is not just limited to journals; it now encompasses the use of blogs, social networks, videos, and discussion forums. YouTube is the most popular form of social media in the USA, with three-quarters of adults using the platform.\(^{[1,4]}\) Videos related to surgical conditions form a section of interest to surgical trainees and consultants alike but are also seen by parents for gathering information on the disease their child has been affected by. Pediatric inguinal hernia has an incidence of 3\%–5\% in term infants and 13\% in infants born at <33 weeks of gestational age.\(^{[3]}\) It is one of the common procedures performed by a surgical trainee during residency.

As medical education becomes increasingly digital, surgical videos available on public platforms become an easy and quick source of information to busy trainees who often use these videos to prepare for surgery.\(^{[6]}\)

| Table 1: Description of operative steps in the most popular videos of pediatric inguinal hernia repair |
|---------------------------------------------------------------|
| **Steps of surgery (open)** | **Number of videos (open, n=20), n (%)** | **Steps of surgery (laparoscopic)** | **Number of videos (laparoscopic, n=19), n (%)** |
|-----------------------------|----------------------------------------|--------------------------------------|----------------------------------|
| Incision                    | 12 (60)                                | Port number and position             | 10 (52)                          |
| Identification/dissection of cord structures                    | 17 (85)                                | Internal method of tackling the hernia sac | 14 (75)                        |
| High/deep ligation         | 15 (75)                                | Deep ring closure                    | 17 (89)                          |
| Tackling the distal sac    | 12 (60)                                | Type of suture                       | 9 (47)                           |
| Final appearance           | 13 (65)                                | Final appearance                     | 8 (42)                           |

| Table 2: Description of operative steps in the least popular videos of pediatric inguinal hernia repair |
|---------------------------------------------------------------|
| **Steps of surgery (open)** | **Number of videos (open, n=2), n (%)** | **Steps of surgery (laparoscopic)** | **Number of videos (laparoscopic, n=27), n (%)** |
|-----------------------------|----------------------------------------|--------------------------------------|----------------------------------|
| Incision                    | 2 (100)                                | Port number and position             | 7 (26)                           |
| Identification/dissection of cord structures                    | 2 (100)                                | Internal method of tackling the hernia sac | 9 (33.3)                        |
| High/deep ligation         | 2 (100)                                | Deep ring closure                    | 27 (100)                         |
| Tackling the distal sac    | 1 (50)                                 | Type of suture                       | 1 (3)                            |
| Final scar                 | 2 (100)                                | Final appearance                     | 5 (18.5)                         |
Table 3: Comparison of surrogates of educative value with surrogates of popularity and quality in both most popular videos and least popular videos groups

| Class                  | Variables         | Total (n=92) (LPV/MPV) | Median (IQR) | P*     | LPV (n=46) | MPV (n=46) | P*     |
|------------------------|-------------------|------------------------|--------------|--------|------------|------------|--------|
| Scopus h-index         |                   |                        |              |        |            |            |        |
| ≤10                    | Views              | 35/32                  | 133 (165)    | 8453.5 (16875.5) | <0.0001 | 127.5 (138.5) | 7517 (10256) | <0.0001 |
|                        | Years uploaded    | 35/32                  | 1.20 (2.0)   | 2.9 (5.4) | 0.0017 | 1.2 (2.05) | 2.75 (5.0) | 0.0075  |
|                        | Duration of video | 35/32                  | 3.15 (3.71)  | 4.51 (7.28) | 0.0084 | 2.31 (2.69) | 5.66 (10.87) | 0.0038  |
| >10                    | Views              | 11/14                  | 123 (234)    | 11096 (6486) | <0.0001 | 1.8 (3.3)  | 3.8 (3.5)  | 0.0159  |
|                        | Years uploaded    | 11/14                  | 1.2 (2.0)    | 2.75 (5.0) | 0.0075 | 1.2 (2.05) | 2.75 (5.0) | 0.0075  |
|                        | Duration of video | 11/14                  | 5.35 (15.12) | 4.39 (4.60) | 0.5840 | 4.79 (6.85) | 4.39 (4.25) | 0.8088  |
| Academic affiliation   |                   |                        |              |        |            |            |        |
| No                     | Views              | 24/22                  | 127.5 (138.5) | 7517 (10256) | <0.0001 | 1.2 (2.0)  | 2.75 (5.0) | 0.0075  |
|                        | Years uploaded    | 24/22                  | 1.2 (2.0)    | 2.75 (5.0) | 0.0075 | 1.2 (2.05) | 2.75 (5.0) | 0.0075  |
|                        | Duration of video | 24/22                  | 2.31 (2.69)  | 5.66 (10.87) | 0.0038 | 2.31 (2.69) | 5.66 (10.87) | 0.0038  |
| Yes                    | Views              | 22/24                  | 138 (216)    | 10681.5 (8579.5) | <0.0001 | 1.7 (2.2)  | 3.80 (5.1) | 0.0029  |
|                        | Years uploaded    | 22/24                  | 138 (216)    | 10681.5 (8579.5) | <0.0001 | 1.7 (2.2)  | 3.80 (5.1) | 0.0029  |
|                        | Duration of video | 22/24                  | 4.79 (6.85)  | 4.39 (4.25) | 0.8088 | 4.79 (6.85) | 4.39 (4.25) | 0.8088  |

*P*-value was calculated using Kruskal–Wallis test statistic. LPV: Least popular videos, MPV: Most popular videos, IQR: Interquartile range

Table 4: Comparison of the various video characteristics with surrogates of educative value in both most popular videos and least popular videos groups

| Video popularity | Variables | Scopus h-index, median (IQR) | P* | Academic affiliation, median (IQR) | P* |
|------------------|-----------|-------------------------------|----|-----------------------------------|----|
|                  |           | ≤10                           |    | >10                               |    |
| LPV              | Views     | 133 (165)                     | 0.9897 | 127.5 (138.5)                     | 0.3972 |
|                  | Years uploaded | 1.20 (2.0) | 0.9383 | 1.2 (2.05) | 0.4740 |
|                  | Duration of video | 3.15 (3.71) | 1.075 | 2.31 (2.69) | 0.454 |
| MPV              | Views     | 8453.5 (16875.5)              | 0.8206 | 7517 (10256)                     | 0.2307 |
|                  | Years uploaded | 2.9 (5.4) | 0.4377 | 2.75 (5.0) | 0.3730 |
|                  | Duration of video | 4.51 (7.28) | 0.6161 | 5.66 (10.87) | 0.2483 |

*P*-value was calculated using Kruskal–Wallis test statistic. IQR: Interquartile range, LPV: Least popular videos, MPV: Most popular videos

However, being a public platform and not an accredited medical resource, there is no restriction on the type and nature of upload; hence, the quality of information disseminated becomes questionable. Compared to traditional journals, which are subject to rigorous quality control by peer review and editorial process, there does not exist a system to standardize the videos for their content and validity on a public platform. Another pitfall is that the uploader of the video has no compulsion to provide credentials; he may choose to remain completely anonymous and is not compelled to cite his sources. Although senior consultants are experienced enough to differentiate poor techniques from good ones, this distinction may not be possible in the naïve mind of a trainee who may potentially adopt an erroneous technique.[7] This point is also applicable with respect to patient information videos, which may lead to incomplete facts being disseminated and propagated.[8]

The USA accounted for the second-highest number of scientific and technical journal articles in 2018, succeeded only by China and followed by India. Similarly, most of the videos in our study were contributed by the USA and India; this is also attributable to the increased utility and popularity of YouTube in the USA, along with a high academic output per capita basis.[1,3,9]

The majority of the videos available often only focus on the key part of the procedure, which might be acceptable to the experienced surgeon, but for a trainee, it reduces the academic impact of the video. Although in the field of laparoscopic surgery, LAP-VEGas guidelines aid in the production of high-quality laparoscopic videos, no such guidelines exist for open surgical description by videography.[10] The Global Operative Assessment of Laparoscopic Skills is a validated assessment tool for grading overall technical proficiency for laparoscopic surgery; however, it could not be implemented in our study as most videos were edited and shortened. An alarming study published by Rodriguez et al. showed that top-ranked laparoscopic cholecystectomy videos on YouTube showed suboptimal technique with only one in ten
having an adequate critical view of safety and five videos demonstrating potentially dangerous safety violations.[11]

There are limited indices that can be applied to judge the surgical expertise of a surgeon from a public forum, where most videos are extensively edited. The surrogate indices that have been used are the popularity of the videos, in terms of the response from the audience as judged by the number of views, rating (likes and dislikes), comments, and ratio of likes to the duration of the video on the platform. The academic expertise of the surgeon, as derived from the h-index and academic affiliation, can also be used as in a previous study.[12]

In a cross-sectional study of laparoscopic fundoplication, it was found that only 39.4% of the studies that were rated as “good,” the good-rated videos correlated with longer length of the video clip. In our study, however, we found that both the MPV and LPV were of almost equal length.[13]

However, academic expertise does not necessarily translate to surgical and technical expertise, and this remains a limitation of this study, where the median h-index comparison between the two groups did not gain statistical significance despite both the groups having the same number of academic and nonacademic affiliated surgeons. We noted that on comparing the academic affiliation and h-index in two groups of LPV and MPV in terms of the number of views, duration of the video, and years uploaded, there was no statistical significance in difference which could help in correlating the academic affiliation with the video quality.

As far as ratings (likes and dislikes) are concerned, they can be rated by anybody browsing the internet. Hence, without knowing who were the raters or their credentials, the true value of these attributes in evaluating the videos in question remain questionable. Even when it is assumed that only the professionals or parents of children suffering from pediatric inguinal hernia are the viewers, nonmedical viewers may rate a video poorly if the content was felt to be too graphic, or conversely, too scientific. Hence, relying on the number of likes or dislikes may not be an ideal parameter for comparison, as also seen in other studies.[14]

Our study was not designed to assess video quality. However, a spin-off observation was that the quality of video reporting remains another issue, with most of the surgical videos lacking patient information and description data pertaining to the procedure, which may be imperative to the resident population being targeted as the audience, as seen in our study only 12% of the videos described the case before demonstrating the steps of the procedure. Essential aspects of reporting include formal case details, description of patient positioning and incision, educational content such as written or auditory commentary on the surgical steps, and technical aspects such as key dissection steps and type of suture material used, along with the final appearance of scar of the incision or port sites, which have also found to be missing in videos by other studies.[15] This helps improve the academic quality.

There is a need for further development of multimedia resources to augment medical learning, which can serve as a reliable source of information for trainees and consultants alike, which has been evaluated and recommended as standard by a series of surgical experts in the field. This becomes more important in the era of the COVID-19 pandemic, which has led to reduced surgical exposure in certain institutes.[16] Resources available on YouTube can be further refined by a change in their policy by seeking patient information and consent for surgical uploads, promoting organizational uploads, and making surgeon and hospital-based details mandatory. Surgeons can also improve their quality of videos by making it more informative, depending on the target audience. In addition, a running footnote or a disclaimer in operative videos to focus on the point that these videos are not for training purposes and viewers’ discretion is needed to peruse these videos to supplement their knowledge gained from traditional sources. This would ensure that surgical trainees are not carried away.

The limitation of this study is that a standardized tool to evaluate the quality of the video could not be used as most videos were “edited” by the uploader. Since the “ratings by view” were taken at a specific time point, it is imperative to understand that they would change over time. Hence, the study can be considered as capturing a screenshot of a dynamic phenomenon.

**Conclusions**

YouTube serves to be a rich resource for academic learning; however, it cannot be directly adapted to practice without caution. The educative value of these videos on PIHR was found to be low and widely dispersed, as extrapolated from the h-index of the surgeons. Surgeons from both academic and nonacademic affiliations had contributed similarly.

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**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Global Top Websites by Monthly Visits 2020. Statista. Available from: https://www.statista.com/statistics/1201880/
most-visited-websites-worldwide/. [Last accessed on 2021 Oct 28].

2. Jyot A, Baloul MS, Finnesgard EJ, Allen SJ, Naik ND, Gomez Ibarra MA, et al. Surgery website as a 24/7 adjunct to a surgical curriculum. J Surg Educ 2018;75:811-9.

3. Grosfeld JL. Current concepts in inguinal hernia in infants and children. World J Surg 1989;13:506-15.

4. Perrin A, Anderson M. Share of U.S. Adults Using Social Media, Including Facebook, Is Mostly Unchanged Since 2018. Pew Research Center. Available from: https://www.pewresearch.org/fact-tank/2019/04/10/share-of-u-s-adults-using-social-media-including-facebook-is-mostly-unchanged-since-2018/. [Last accessed on 2021 Oct 28].

5. Grossman R, Sgarbura O, Hallet J, Søreide K. Social media in surgery: Evolving role in research communication and beyond. Langenbecks Arch Surg 2021;406:505-20.

6. 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;73:1072-6.

7. de’Angelis N, Gavriilidis P, Martínez-Pérez A, Genova P, Notarnicola M, Reitano E, 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.

8. Loeb S, Sengupta S, Butaney M, Macaluso JD Jr, Czarniecki SW, Robbins R, et al. Dissemination of misinformative and biased information about prostate cancer on YouTube. Eur Urol 2019;75:564-7.

9. Scientific and Technical Journal Articles | Data. Available from: https://data.worldbank.org/indicator/IP.JRN.ARTC.SC?most_recent_value_desc=true. [Last accessed on 2021 Oct 28].

10. Celentano V, Smart N, McGrath J, Cahill RA, Spinelli A, Obermair A, et al. LAP-VEGAS Practice Guidelines for reporting of educational videos in laparoscopic surgery: A joint trainers and trainees consensus statement. Ann Surg 2018;268:920-6.

11. Rodriguez HA, Young MT, Jackson HT, Oelschlager BK, Wright AS. Viewer discretion advised: Is YouTube a friend or foe in surgical education? Surg Endosc 2018;32:1724-8.

12. Shires CB, Wilson CD, Sebilek M. Thyroid surgery YouTube videos: Estimating quality by surgeon characteristics and view rate. Gland Surg 2019;8:207-11.

13. Frongia G, Mehrabi A, Fonouni H, Rennert H, Golriz M, Günther P. YouTube as a potential training resource for laparoscopic fundoplication. J Surg Educ 2016;73:1066-71.

14. Park KB, Kim MJ, Lee JS. Analysis of the educational value of YouTube laparoscopic appendectomy videos. J Minim Invasive Surg 2019;22:119-26.

15. Haslam RE, Seideman CA. Educational value of YouTube surgical videos of pediatric robot-assisted laparoscopic pyeloplasty: A qualitative assessment. J Endourol 2020;34:1129-33.

16. Dhawan S. Online learning: A panacea in the time of COVID-19 crisis. J Educ Technol Syst 2020;49:5-22.