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Original Research

Quality and Reliability Analysis of YouTube as a Source for Patient Education on Dupuytren's Contracture



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YouTube**Purpose:** This study seeks to assess the quality and reliability of YouTube videos on Dupuytren's contracture.**Methods:** The first 50 unique videos on Dupuytren's contracture were evaluated by searching YouTube for Dupuytren's contracture. Video metrics, source, and content type were recorded. Video reliability was assessed using the *Journal of American Medical Association* (JAMA) Benchmark criteria. Video educational quality was assessed using the Global Quality Score (GQS) and a Dupuytren's Contracture-Specific Score (DC-SS).**Results:** The total number of views for all 50 videos evaluated was 1,908,608 (mean, 38,172.16 ± 5,502.45 views). The mean reliability (JAMA) score was 2.21 ± 0.69 (range 0–4), the mean educational quality (GQS) score was 2.80 ± 1.28 (range 1–5), and the mean disease-specific (DC-SS) score was 6.05 ± 2.17 (range 0–15). Nonphysician health care professionals had the most popular videos, but the lowest DC-SS. GQS varied based on the video source, with physician-uploaded videos having the highest average quality scores. Physician source was an independent positive predictor of higher quality (GQS) ($\beta = 0.477$).**Conclusions:** Videos on Dupuytren's contracture were frequently viewed on YouTube but had overall low educational quality and reliability. Of the videos that discussed collagenase as a treatment option, 40% failed to mention percutaneous needle aponeurotomy. Patients may be exposed to an incomplete set of treatment options. Educational content on YouTube should be interpreted cautiously and proper in-office education and high-quality resources for Dupuytren's contracture should be provided by physicians.**Type of Study/Level of Evidence:** Therapeutic IV.Copyright © 2024, THE AUTHORS. Published by Elsevier Inc. on behalf of The American Society for Surgery of the Hand. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

The internet has become a part of modern-day life and allows patients to access information more readily than ever before. Patients have been reported to use the internet to understand their health conditions at tremendously high rates.¹ YouTube, the second most visited website globally, is a video-sharing platform that allows users to upload and view a continuously updated library of millions of videos.² In addition to being a source of entertainment, YouTube has gained recognition as a health information resource.³ YouTube has the potential to be a valuable source of information for both patients and health care providers; however, the quality and reliability of videos found are variable.⁴ Unlike the scientific

literature, YouTube does not have a systematic peer-review process, which can lead to patients viewing unverified, inaccurate, or misleading health information.

Dupuytren's contracture is a disorder characterized by slow, progressive fibrosis of the palmar aponeurosis of the hand. As the condition evolves, patients can develop characteristic nodules and cords, which can ultimately contract leading to fixed flexion deformity of the affected digit(s).⁵ Treatment is indicated when the disease starts to affect activities of daily living. This usually coincides with a positive tabletop test, metacarpophalangeal joint contracture greater than or equal to 30°, or proximal interphalangeal joint contracture greater than 15° to 20°. Although there is no cure for Dupuytren's disease, evidence-based treatment options include percutaneous needle aponeurotomy (PNA), collagenase injections, and surgical fasciectomy.^{5–7} Regardless of the treatment modality, recurrence is common and occurs in 20% to 50% of patients 5 years after treatment.⁶

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Numerous studies examining YouTube videos on orthopedic conditions have shown overall poor quality and reliability, including common hand and upper extremity diagnoses.^{8–11} However, no study has systematically analyzed the quality and reliability of YouTube videos on Dupuytren's contracture. We hypothesize that the quality and reliability of information obtained from YouTube videos on Dupuytren's contracture is low, incomplete, and insufficient to give patients useful and accurate information regarding Dupuytren's contracture and their treatment options.

Materials and Methods

YouTube search

On April 28, 2023, a search on the YouTube online library (<https://youtube.com/>) was performed with the keywords "Dupuytren's contracture" while using the incognito mode option in the Google Chrome browser.¹² Search results were ordered by the default settings (by relevance) of YouTube. Only the first 50 videos based on this search were extracted for evaluation as previous studies have shown this method to be an acceptable means for video selection and collection (Supplemental Table 1).^{8,13} Videos that were not in English, unavailable without signing into a YouTube account, did not have proper sound support, or did not relate to Dupuytren's contracture were excluded from the study.

Characteristics of extracted videos

Video characteristics were collected and extracted to Microsoft Excel (Microsoft Excel, Redmond, VA). For each video, the following variables were collected: video title, Uniform Resource Locator (URL), source account verification status, upload date, days since upload, total views, view ratio (views/day), duration in seconds, total likes, total dislikes, like ratio, and video power index (VPI). The like ratio was calculated as follows: $(\text{likes} * 100) / (\text{likes} + \text{dislikes})$. The VPI was calculated as follows: $(\text{like ratio} * \text{view ratio}) / 100$. The VPI measures an index of video popularity based on the number of views and likes, and both the like ratio and VPI have been used in previous literature to standardize measurements of relative likeness and popularity.¹⁴ Of note, YouTube recently removed the ability for its users to see the dislike count of videos. To bypass this, a Google Chrome extension called "Return YouTube Dislike" was used to restore visibility of the dislike count and to allow the authors to appropriately score and grade the videos included in this study.¹⁵

Similar to previously established methodology, the video sources/uploaders were categorized as follows: academic (authors affiliated with research groups, academic centers, or universities/colleges), physician (independent physicians or physician groups), health professionals (nonphysician allied health professionals, nonphysician groups, personal trainers), medical sources (content from health-related websites), or commercial.^{8,13} The content of each video was categorized as follows: disease-specific information, patient experience, surgical management, nonsurgical management, exercise training, or advertisement.

Evaluation of video reliability, educational quality, and content quality

Two reviewers (J.H.K and J.F.H.) independently viewed and graded all 50 videos using the following scoring tools: the *Journal of the American Medical Association* (JAMA) Benchmark Score to assess video reliability, the Global Quality Scale (GQS) to assess educational quality, and the Dupuytren's Contracture-Specific Score (DC-SS) to assess specific content quality.^{14,16–18}

Table 1
The *Journal of American Medical Association* Benchmark Score*

Criteria	JAMA Description
Authorship	Are affiliations and credentials of all authors and contributors provided?
Attribution	Are references and sources for all content provided and all copyright information clearly listed?
Currency	Are the dates of which the content was posted and subsequently updated, if applicable, provided?
Disclosure	Is full disclosure provided for video ownership, conflicts of interest, sponsorships, advertising, and commercial funding?

* Answering "yes" to each question adds one point to the total score of the video.

Table 2
The Global Quality Score*

Score	GQS Description
1	Video is of poor quality and flow with information missing and is unlikely to be useful for patients.
2	Video is generally of poor quality and flow with limited information given and is of limited use to patients.
3	Video is of moderate quality and flow with some information adequately discussed and is somewhat useful for patients.
4	Video is of good quality and flow with most of the relevant information discussed and is useful for patients.
5	Video is of excellent quality and flow and very useful for patients.

* The score that correlates with the description chosen represents the final score.

Table 3
The Dupuytren's Contracture-Specific Score*

Category	Criteria
Patient Presentation	Describes the patient's symptoms. Describes nodules, cords, and/or contractures.
General Information	Explains the underlying anatomy affected. Mentions it's unclear etiology. Describes patient population and risk factors.
Diagnosis and Evaluation	Mentions physical examination findings. Mentions use of measurements and clinical photographs to track disease progression.
Treatment	Mentions conservative management (steroid injections, splinting, and/or bracing). Mentions needle aponeurotomy as another form of non-operative treatment. Mentions enzyme injections as another form of non-operative treatment. Mentions the indications for operative treatment. Mentions open surgical technique.
Post-Intervention Course	Outlines a general recovery period. Describes complications and risks with intervention. Describes clinical outcomes with and/or without intervention.

* One point is given for each criteria included.

The JAMA Benchmark Score (Table 1) consists of scoring based on four individual criteria: authorship, attribution, currency, and disclosure. One point is awarded for each criterion present in a video. Higher scores (max of four) indicate greater video reliability. Although this scoring tool has not been validated, it has been widely used in the previous literature to assess the reliability of online videos and resources.^{8,13,14}

The GQS utilizes a five-point scale (Table 2) to assess overall quality, flow, topics covered, and usefulness, providing an evaluation of the educational quality of a video.^{14,17} Each video is matched to one of the five descriptions where higher scores (max of five) indicate greater educational quality. Again, this scoring tool has not been validated but has been widely used in the previous literature.

The DC-SS was created by the authors to evaluate the content quality pertaining specifically to information about Dupuytren's contracture (Table 3). This scoring tool is composed of 15 items

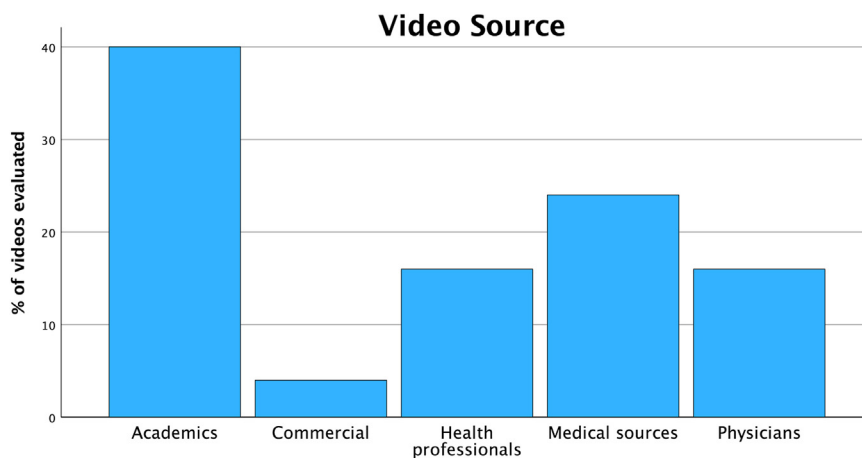


Figure 1. Percentage of videos from source categories.

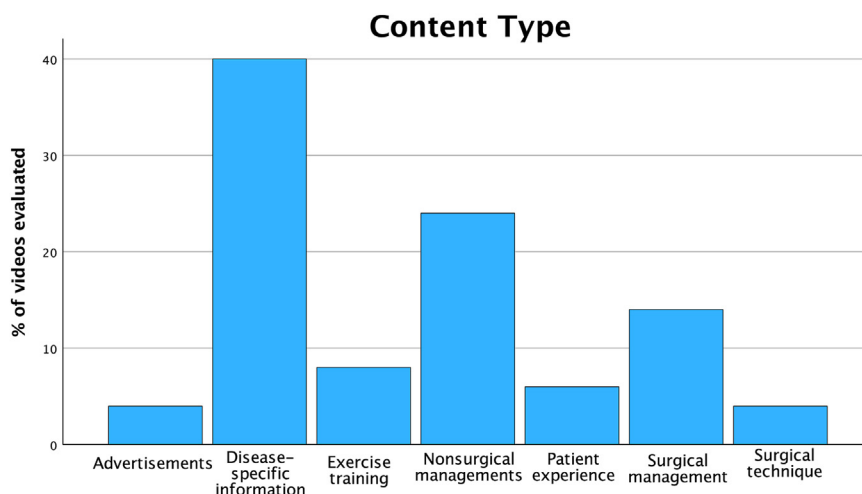


Figure 2. Percentage of videos from content type categories.

directly from the guidelines published by the American Academy of Orthopedic Surgeons, which is a method shown to be feasible and accepted in previous literature.^{8,10,13,14,18–22} One point is assigned for each of the 15 items that are present in the video, and higher scores (max of 15) indicate greater Dupuytren’s contracture-specific content quality.

After all videos were scored independently by the two reviewers, an average score from each scoring tool was obtained. Kappa agreement was 0.96 ($P < .001$) for the JAMA score, 0.796 for GQS ($P < .001$), and 0.875 for DC-SS ($P < .001$). This supports that there was near-perfect agreement between scorers for JAMA and DC-SS scores and substantial agreement between scorers for the more subjective GQS score.²³

Statistical analysis

Descriptive statistics were used to analyze video data characteristics, JAMA score, GQS score, and DC-SS. Continuous variables are shown as means with standard deviations and ranges, and categorical variables are presented as relative frequencies with percentages. The Shapiro–Wilk test was used to assess normality. One-way analysis of variance (ANOVA) tests and Kruskal–Wallis tests were used to determine whether the different scoring metrics varied based on video source or content type for normally

distributed and non-normally distributed data, respectively. Multivariate linear regression analyses were used to determine whether video characteristics, source, or content type were independent predictors of JAMA scores, GQS, or DC-SS. A two-tailed P value of less than 0.05 was used to indicate statistical significance.

Results

The mean video duration videos was 431.42 seconds \pm 636.99 seconds (range, 59–4,089 seconds). The total number of views for all 50 videos evaluated was 1,908,608 (mean, 38,172.16 \pm 5,502.45 views). The mean number of days since upload was 1,774.40 days \pm 1,460.17 days. The mean view ratio was 22.38 \pm 24.34. Videos received a mean of 326.23 \pm 548.317 likes and 13.3 \pm 23.60 dislikes. The mean like ratio was 95.91 \pm 4.85, and the mean VPI was 21.48 \pm 24.36.

For video sources, 20 videos (40%) came from academic sources, 12 (24%) from medical sources, 8 (16%) from physicians, 8 (16%) from health professionals, and 2 (4%) from commercial sources (Fig. 1).

In total, 20 (40%) of videos were classified as disease-specific information, 12 (24%) as nonsurgical management, 7 (14%) as surgical management, 4 (8%) as exercise training, 3 (6%) as patient experience, 2 (4%) as surgical technique, and 2 (4%) as advertisements (Figure 2).

Table 4
Mean Views by Video Source and Video Content Category

Category	Mean Views	SD
Video Source		
Health professionals	59,009	59,639
Academics	45,138	62,581
Physicians	41,601	66,630
Medical sources	15,608	22,022
Commercial	6,828	1,057
Content Type		
Surgical technique	146,484	131,441
Disease-specific information	46,371	64,452
Exercise training	39,179	32,694
Nonsurgical management	27,493	36,014
Patient experience	22,085	17,464
Surgical management	18,148	17,986
Advertisements	4,136	4,864

SD, standard deviation.

Among the video sources, nonphysician health professionals had the highest mean number of views $59,009.24 \pm 59,639.11$, and commercial had the lowest mean number of views at $6,828 \pm 1,057.83$ (Table 4).

For the different video content types, videos on surgical technique had the highest mean views at $146,484.00 \pm 131,441.25$, followed by Dupuytren's contracture-specific information at $46,271.65 \pm 64,452.87$. The lowest viewed content category was advertisements, with a mean of $4,136.50 \pm 4,864.188$ views (Table 4).

The mean JAMA score was 2.21 ± 0.69 , the mean GQS was 2.80 ± 1.28 , and the mean DC-SS score examining was 6.05 ± 2.17 . The highest DC-SS scores came from academic sources with a mean of 7.37 ± 3.03 , and the lowest DC-SS scores came from nonphysician health professionals with a mean of 4.88 ± 2.48 . The highest JAMA scores also came from academic sources with a mean of 2.48 ± 0.7 , and the lowest came from medical sources with a mean of 1.87 ± 0.86 . The highest mean GQS score was from physicians at 3.63 ± 1.19 , with the lowest coming from commercial sources at 1.75 ± 1.17 (Table 5). The lowest components of the JAMA score assessed were regarding attribution and disclosure (82% of videos with no attribution or disclosure). Attribution involved content creators citing sources for ideas presented. Disclosure involved videos providing information regarding conflicts of interest, sponsorship, or advertising.

Regarding the treatment components of the DC-SS score on treatment options, 20% of videos mentioned conservative management, 40% of videos mentioned PNA, 50% of videos mentioned enzyme injection, and 60% mentioned open surgical technique. There was a statistically significant difference in the number of videos that mentioned the minimally invasive treatment methods of PNA versus enzyme injections ($P = .014$). Notably, of the videos that mentioned enzyme injections, 40% did not mention PNA. For videos that mentioned PNA, 25% did not mention enzyme injections. For videos that mentioned open surgical technique, 67% mentioned enzyme injections, and 60% mentioned PNA. In total, 66% of videos failed to mention any potential complications from treatment.

For content types, the highest mean DC-SS score was from surgical technique videos at 8.75 ± 1.77 , closely followed by disease-specific information videos at 7.33 ± 2.96 . The lowest DC-SS scores came from exercise training videos with a mean of 3.25 ± 1.94 . The highest mean JAMA score came from disease-specific information videos at 2.45 ± 2.96 , and the lowest was from both surgical technique and advertisement videos, both with means of 2.00 ± 0.00 . The highest mean GQS came from disease-specific information with a mean of 3.28 ± 1.12 , closely followed by

Table 5
Mean Quality and Reliability Scores by Video Source and Video Content Category

	JAMA	GQS	DC-SS
	Mean (SD)	Mean (SD)	Mean (SD)
Source Category*			
Academic	2.48 (0.70)	3.13 (1.17)	7.37 (3.03)
Commercial	2.00 (0.00)	1.75 (1.18)	5.75 (2.48)
Health professionals	2.19 (0.53)	2.44 (0.98)	4.88 (2.48)
Medical sources	1.87 (0.86)	2.13 (1.33)	6.25 (2.63)
Physicians	2.13 (0.10)	3.63 (1.19)	6.25 (2.90)
Content Category†			
Advertisements	2.00 (0.00)	1.00 (0.00)	3.5 (0.71)
Disease-specific information	2.45 (2.96)	3.28 (1.12)	7.33 (2.96)
Exercise training	1.5 (0.58)	1.5 (0.58)	3.25 (1.94)
Nonsurgical management	2.25 (0.039)	3.08 (1.10)	6.13 (3.16)
Patient experience	2.00 (0.00)	1.5 (0.50)	3.67 (1.33)
Surgical management	2.07 (0.73)	2.57 (1.62)	4.86 (3.22)
Surgical technique	2.00 (0.00)	3.50 (0.07)	8.75 (1.77)

SD, standard deviation.

* P value for video source between-group effects: JAMA = .140, GQS = .032, and DC-SS = .113.

† P value for video content type between-group effects: JAMA = .238, GQS = .017, and DC-SS = .055.

nonsurgical management at 3.08 ± 1.10 , with the lowest mean GQS from advertisements at 1.00 ± 0 (Table 5).

We did not find significant between-group interactions between the video source and JAMA ($P = .140$) or DC-SS score ($P = .113$). However, there was significance between the video source and GQS score ($P = .032$). Similarly, no significance was demonstrated between content type and DC-SS ($P = .055$) or JAMA score ($P = .140$). However, there was significance between interactions for content type and GQS score ($P = .017$) (Table 5).

Three individual multivariate linear regression analyses were performed to determine whether there were independent associations between video characteristics, content sources, content type, and quality and reliability scores while controlling for days since upload. Negative predictors suggest a lower score and positive predictors indicate a higher score associated with a content source, content type, or video characteristic. For this analysis, video content sources were broken down into physician, academic, and all other categories, with the reference category being nonphysician health professionals. Content types were grouped as disease-specific information, surgical technique, nonsurgical management, and all other categories, with the reference category as exercise training. These analyses found duration in seconds ($\beta = 0.442, P = .003$) and disease-specific information ($\beta = 0.616, P = .015$) were independent predictors of higher JAMA scores. In addition, physician source was an independent predictor of higher GQS scores ($\beta = 0.477, P = .011$).

Discussion

In the modern era, patients have wide and instantaneous access to information and are searching the internet for information on their health conditions.¹ YouTube is incredibly accessible, and its visual nature is appealing. Because YouTube does not currently have a peer-review process for its videos, content is uploaded freely and is not required to meet certain standards. Our study's purpose was to evaluate the quality and reliability of the information found on YouTube specifically regarding Dupuytren's contracture. We found that although videos were viewed in large numbers, they had overall low quality and reliability.

The mean number of views for the 50 videos assessed was 38,172.16, which is similar, albeit less, than the number of views found in some studies evaluating the quality of YouTube videos on other common orthopedic conditions. An evaluation of the quality

of YouTube videos on the posterior cruciate ligament found an average of 50,477.9 views, and a similar evaluation of videos regarding cubital tunnel syndrome found an average of 72,108 views.^{8,9} However, when compared to the evaluation of YouTube videos on more niche orthopedics topics, such as distal radius fracture immobilization, which had an average view count of 2,615.5, we found a higher mean number of views.²⁴ Regardless, our data indicate that videos on Dupuytren's contracture are being viewed frequently, indicating that this information, with its low average quality and reliability, is being accessed by patients.

The mean JAMA score examining academic reliability was 2.21 out of 4, the mean GQS score examining overall quality for patient education was 2.80 out of 5, and the mean DC-SS score examining Dupuytren's contracture-specific information was 6.05 out of 15. These average scores indicate an overall low to moderate quality and reliability of information. GQS scores varied based on video source ($P = .032$), with physicians (mean = 3.63, standard deviation = 1.19) and Academic Sources (mean = 3.13, standard deviation = 1.18) having the highest average scores (Table 5). We also found that the video being uploaded by a physician was an independent predictor of a higher GQS. This is in line with similar studies, which found that a physician-made video was an independent predictor of a higher GQS score.⁹ This makes intuitive sense, as physicians have extensive training and clinical experience regarding the diseases that they treat, enabling them to present topics in a way that is most helpful to patients.

Furthermore, DC-SS scores uploaded by academic sources, medical sources, and physicians were the three highest DC-SS scores for the video source category (Table 5). Despite being the highest out of the source categories, even these traditionally more reputable sources still missed over half of the important topics on Dupuytren's contracture. In addition, although these had the most comprehensive information on Dupuytren's contracture, they were not the most viewed videos (Table 4). Similar results have been produced in previous studies, showing that the view ratio (views/time since upload) was a negative predictor of the quality of content.²⁵

Another issue that arises from the unregulated nature of YouTube is the potential for bias in the information presented. In a systematic review of health-related educational material on YouTube, Osman et al⁴ found that only 32% of videos appeared neutral toward health content according to their bias-based classification. For the treatment options component of the DC-SS score, we found significant differences in the rates of treatment options mentioned in the videos. PNA and collagenase clostridium histolyticum (CCH) injections have been shown to improve Dupuytren's contracture and are less invasive compared to surgical fasciectomy. Multiple randomized controlled trials have shown comparable outcomes between these two minimally invasive treatment options.^{26–28} More recently, Jørgensen et al²⁹ showed a lower recurrence rate for patients treated with enzyme injections compared to PNA. This study only included patients with isolated metacarpophalangeal joint contractures, and is at odds with results previously reported on the treatment of proximal interphalangeal joint contractures.²⁸ Cost analysis has shown that collagenase injections have a higher average cost (US \$4,453.66) compared to PNA (US \$2,010.27) and are even more expensive than open fasciectomy (US \$3,394.90).³⁰ Our evaluation found a disproportionate number of videos mentioning collagenase injections compared to PNA (50% of videos mentioning CCH injection versus 40% of videos mentioning PNA, $P = .014$). Of the videos that mentioned collagenase injections, 40% failed to mention PNA, whereas videos that mentioned PNA failed to mention enzyme injections in only 25% of videos. The increased mention of enzyme injections compared to PNA could be explained by several reasons. Enzyme injections are more popular than PNA,

comprising 23% and 4% of the market share for Dupuytren's procedures, respectively. Furthermore, the market share of PNA decreased from 4.9% in 2015 to 3.3% in 2019.³⁰ This could be due to physicians' familiarity, perceived ease of use, or fear of neurovascular or tendinous lesions when performing PNA due to close proximity with the digital adhesions.³¹ However, given the cost-benefit analysis we feel that CCH injections were overrepresented when compared to PNA, and this could be in part due to awareness generated by the pharmaceutical industry.

The ease of access and popularity of the YouTube platform provide a unique opportunity for physicians and academic centers to produce quality educational content for their patients. However, the creation of quality content requires a significant investment of time, energy, and resources by creators and may not have a measurable return. Even if physicians upload educational content to YouTube, there is no guarantee that it will end up reaching a large audience. However, physicians could potentially create a video for certain topics (ie, instructions post fasciectomy for Dupuytren's contracture) and provide a direct link to their patients, which would bypass the search algorithm and ensure that their patients are getting high-quality information.

The results presented in this study have limitations. First, only the first 50 videos on YouTube were evaluated. Although there are many more videos on Dupuytren's contracture on YouTube, by evaluating the first 50 videos, we went much further from the top of the algorithm than the typical user would be expected to view. In addition, not all videos that were analyzed seemed to be aimed at patients looking for information on Dupuytren's contracture. Regardless, these videos still will likely be encountered by patients, as they are produced by the YouTube algorithm when a user searches for Dupuytren's contracture. In addition, the scoring systems used, although similarly used in numerous comparable studies, have not been validated. Despite this, the interrater reliability was substantial to near-perfect for all three scoring systems.²³

YouTube videos on Dupuytren's contracture, although frequently viewed, had low overall quality and reliability. The clinical significance of these findings is important for both patients and surgeons alike. The study results suggest much of the educational content on YouTube should be interpreted cautiously, and proper in-office education and high-quality resources for Dupuytren's contracture should be provided by physicians. Future studies are needed to evaluate the quality and reliability of YouTube videos on conditions not yet assessed in the literature.

Conflicts of Interest

No benefits in any form have been received or will be received related directly to this article.

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