

# YouTube Videos Provide Poor Information on High Tibial Osteotomy

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## Abstract

**BACKGROUND/AIMS:** To examine the informative features and qualities of YouTube videos on high tibial osteotomy (HTO) in terms of the informative reliability of the videos.

**MATERIALS AND METHODS:** The included videos were evaluated individually using two orthopedic surgeons using modified DISCERN score and JAMA Benchmark score. Videos were categorized according to publishing year, video type, video length, number of views, and view rates. Any correlation between these categories and JAMA and modified DISCERN scores were analyzed.

**RESULTS:** Twenty-six videos were available for evaluation. Mean-modified DISCERN and JAMA scores were 2.6 and 2.0 for observer 1 and 2.5 and 1.9 for observer 2, respectively. Median view rates of the videos published between 2008-2011, 2012-2015, and 2015-2020 were 2559.00, 3314.0, and 7458.00, respectively ( $p=0.003$ ). Other variables showed no difference compared to the publishing year groups ( $p>0.05$ ). JAMA scores by both observers were positively correlated with video length. A weak positive correlation between mean JAMA score and view rate and a positive correlation between modified DISCERN scores by both observers and video length were found. Mean-modified DISCERN scores and video length values had a strong correlation ( $p=0.001$ ;  $r=0.609$ ). A significant correlation was found between JAMA and modified DISCERN scores. Mean-modified DISCERN scores showed a moderate increase correlated with the mean JAMA score increase ( $p=0.017$ ;  $r=0.463$ ).

**CONCLUSION:** Although the view rate has increased over time, the informative quality and reliability of YouTube videos concerning HTO are low and did not improve over the last decade.

**Keywords:** High tibial osteotomy, YouTube, JAMA Benchmark score, modified DISCERN score, osteoarthritis

## INTRODUCTION

Medial compartment osteoarthritis (MCOA) of the knee is a common and challenging pathology in young and active patients. High tibial osteotomy (HTO) was developed to restore the mechanical axis of the knee, decrease the load on the medial joint compartment, and delay the progression of MCOA.<sup>1-4</sup> Due to favorable outcomes<sup>5-7</sup> in appropriately indicated young and active patients and technical developments, HTO has recently become more popular as a corrective and joint-preserving

surgery. HTO being a very technically detailed operation,<sup>8</sup> any patient offered HTO should be informed in detail before surgery.

YouTube is a global social network and an open source of information with over two billion monthly logged-in users in over 100 countries around the world, across 80 languages, and is a rapidly growing visual database with over 500 h of content uploaded every minute.<sup>9</sup>

Although started as a recreational and entertainment platform; YouTube, due to patient interest, has become a platform for medical

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information for academicians and colleagues as well as patients. Many studies have revealed that medical information on orthopaedic as well as other medical fields found on YouTube is of low quality and liability, misleading and poor.<sup>10-16</sup>

The aim of this study was to examine the informative features and qualities of the videos with a high number of views that were shared on YouTube about HTO surgery as a treatment option in young patients with medial knee osteoarthritis in terms of the informative efficiency of the videos on disease and treatment options.

While YouTube is a very popular video platform with no supervision by healthcare professionals, this study hypothesized that the videos on YouTube were providing poor medical information on HTO.

## MATERIALS AND METHODS

A search with the keywords “high tibial osteotomy”, “HTO”, “proximal tibial osteotomy”, “tibia osteotomy” and “knee osteotomy” was performed on YouTube on October 8, 2020. Non-English videos, repeated videos, inhumane videos, videos without any audio or text narration, and videos that were viewed less than 10,000 times were excluded. As the primary results, the included videos were evaluated individually by two orthopaedic surgeons using two different scoring systems: modified DISCERN score and JAMA Benchmark score. For secondary results, the videos were categorized according to publishing year, video type (animation, live surgery, patient diary, etc.), video length, number of views, and view rates. Any correlation between these categories and JAMA and modified DISCERN scores were analyzed.

DISCERN is a scoring system developed at Oxford and used to evaluate the quality of health care information, originally made up of 16 questions.<sup>17</sup> Establishing a scoring system for clarity, reliability, bias/balance, providing additional information, and uncertainty criteria, Singh et al.<sup>15</sup> modified DISCERN for the evaluation of YouTube. The reliability of information was scored from 0 to 5 (reliability score) based on 5 questions for the reliability and completeness of information. A higher modified DISCERN score means higher reliability.

The JAMA benchmarks were published as a suggestion for basic quality standards for internet information on health care.<sup>18</sup> It evaluates four features that must be clearly visible on a website: authorship (writers and contributors), attribution of references (references for all content and copyright information), disclosure (potential conflict of interest of the website), and currency (the dates on which the content was uploaded and updated). Scores are between 0 and 4, in which a higher score indicates higher video reliability.

The study was conducted in accordance with the Declaration of Helsinki Principles.

### Statistical Analysis

Data were analyzed with IBM® SPSS® Statistics 23 (IBM®, Armonk, NY, United States). The conformity to normal distribution was examined using the Shapiro-Wilk test. The Kruskal-Wallis test was used to compare quantitative data that were not normally distributed to groups of three or more. Spearman's rho correlation coefficient was used to examine the relationship between non-normally distributed quantitative variables. The in-class correlation coefficient was used to examine the agreement between the first and second experts. Analysis results are

mean  $\pm$  standard deviation for quantitative data presented as deviation and median (minimum-maximum). The significance level was taken as  $p < 0.05$ .

## RESULTS

When the exclusion criteria were applied, 26 videos were available for evaluation. 19.2% of the videos were uploaded in 2011 and 42.3% of the videos were live surgery recordings. Descriptive statistics for categorical variables are given in Table 1. Mean-modified DISCERN and JAMA Benchmark scores were 2.6 and 2.0 for observer 1 and 2.5 and 1.9 for observer 2, respectively. The mean length of the videos was 538.2 sec., whereas the shortest was 16.0 sec. and the longest was 3131.0 sec. The maximum view rate of the videos was 18979.0 views per year (v/yr), minimum was 928.0 v/yr, and the mean view rate was 6198.2 v/yr. (Table 2). Video types and median value of video lengths had significant difference ( $p=0.013$ ). The median values of animated videos, live surgery recordings, and other types were 187.00 sec., 606.00 sec., and 301.50 s, respectively. Video type and other variables median values showed no difference ( $p>0.050$ ) (Table 3).

Video publishing year groups and view rate variables showed a statistically significant difference ( $p=0.003$ ). The median view rates of the videos published between 2008-2011, 2012-2015 and 2015-2020 was 2559.00, 3314.0, and 7458.00, respectively. Other variables showed no significant difference compared to the publishing year groups ( $p>0.050$ ) (Table 4).

Total JAMA Benchmark scores by observer 1 ( $p=0.015$ ;  $r=0.473$ ) and observer 2 ( $p=0.041$ ;  $r=0.403$ ) were significantly positively correlated with video length values. A weak positive correlation between mean

**Table 1. Descriptive statistics of categorical variables of videos**

	Frequency (n)	Percentage (%)
<b>Year</b>		
2008	4	15.4
2011	5	19.2
2012	3	11.5
2013	1	3.8
2014	2	7.7
2015	1	3.8
2016	4	15.4
2017	4	15.4
2018	1	3.8
2019	1	3.8
<b>Type</b>		
Live surgery	11	42.3
Animation	5	19.2
Clinical outcome	3	11.5
Specialist narrative	2	7.7
Digital planning tutorial (for-profit)	1	3.8
Explanation on bone model	1	3.8
Patient diary	1	3.8
Seminar	1	3.8
Webinar (mixed)	1	3.8

JAMA benchmark and view rate values was found ( $p=0.047$ ;  $r=0.393$ ). A positive correlation between modified DISCERN scores by observer 1 ( $p<0.001$ ;  $r=0.639$ ) and observer 2 ( $p=0.003$ ;  $r=0.563$ ) and video length values was found. Mean-modified DISCERN scores and video length values had a statistically significant strong correlation ( $p=0.001$ ;  $r=0.609$ ) (Table 5).

The statistical analysis of JAMA ( $ICC=0,860$ ) and DISCERN ( $ICC=0.867$ ) scores showed a strong correlation between both observers (Table 6). A significant correlation was also found between the mean JAMA Benchmark and mean-modified DISCERN scores. Mean-modified DISCERN scores showed a moderate increase correlated with the mean JAMA Benchmark score increase ( $r=0.463$ ;  $p=0.017$ ).

## DISCUSSION

The most important finding of this study is that the informative quality and reliability of YouTube videos concerning HTO are low and that they did not improve over the last decade, which proves our hypothesis true. In 2017, a study analyzing the quality of YouTube videos on anterior

cruciate ligament injury and reconstruction<sup>10</sup> showed that the videos on YouTube were of low quality with a mean modified DISCERN score between 2.2 and 2.3 and a mean JAMA score between 2.3 and 2.5. Another study in 2016 analyzed the informative quality of YouTube videos on the diagnosis and treatment of hip arthritis<sup>13</sup> and showed that 86% of the videos provided poor information capacity, while only 3% provided excellent quality. The study concluded that YouTube is a poor source of accurate information about the diagnosis and treatment of hip arthritis. Several recent studies have researched the informative quality of YouTube videos on several common orthopedic problems and procedures, such as rehabilitation and return to sports after anterior cruciate ligament reconstruction, developmental dysplasia of the hip, total hip/knee arthroplasty, posterior cruciate ligament injuries, rotator cuff injuries, and treatment of Bankart lesions. All referred studies concluded that the informative/educational quality and reliability of YouTube videos were poor.<sup>19-24</sup> Among a large number of studies, we did not find any study that analyzed YouTube content concerning HTO. The results of our study were no exception to other studies mentioned above. Similar to the results of other studies analyzing videos on other

**Table 2. Descriptive statistics of quantitative variables**

	Mean	Standard deviation	Median	Minimum	Maximum
JAMA Benchmark-total (observer 1)	2.0	0.4	2.0	1.0	3.0
JAMA Benchmark-total (observer 2)	1.9	0.5	2.0	1.0	3.0
JAMA Benchmark-mean	2.0	0.4	2.0	1.0	3.0
Modified DISCERN (observer 1)	2.6	1.6	3.0	0.0	5.0
Modified DISCERN (observer 2)	2.5	1.4	3.0	0.0	5.0
Modified DISCERN mean	2.6	1.5	3.0	0.0	5.0
Views (n)	30224.2	21498.0	23681.0	11136.0	93933.0
Length (seconds)	538.2	646.9	343.0	16.0	3131.0
View Rate (view per year)	6198.2	5406.7	4361.0	928.0	18979.0

**Table 3. The comparison of quantitative variables by video type**

	Animation	Live surgery	Others	p*
JAMA Benchmark-total (observer 1)	1.80±0.84	2.09±0.30	2.10±0.32	0.441
	2.00 (1.00-3.00)	2.00 (2.00-3.00)	2.00 (2.00-3.00)	
JAMA Benchmark-total (observer 2)	1.60±0.55	2.00±0.45	2.00±0.47	0.244
	2.00 (1.00-2.00)	2.00 (1.00-3.00)	2.00 (1.00-3.00)	
JAMA Benchmark-mean	1.70±0.67	2.05±0.35	2.05±0.37	0.581
	2.00 (1.00-2.50)	2.00 (1.50-3.00)	2.00 (1.50-3.00)	
Modified DISCERN (observer 1)	2.00±1.41	3.45±0.82	2.00±1.89	0.064
	3.00 (0.00-3.00)	4.00 (2.00-4.00)	1.50 (0.00-5.00)	
Modified DISCERN (observer 2)	2.00±1.41	3.18±0.87	2.00±1.76	0.136
	3.00 (0.00-3.00)	3.00 (2.00-4.00)	2.00 (0.00-5.00)	
Modified DISCERN-mean	2.00±1.41	3.32±0.78	2.00±1.76	0.068
	3.00 (0.00-3.00)	3.50 (2.00-4.00)	2.00 (0.00-5.00)	
Views (n)	27780.80±15273.45	34356.00±27321.63	26900.80±17726.88	0.893
	26835.00 (12547.00-52952.00)	24324.00 (11260.00-93933.00)	22758.00 (11136.00-72566.00)	
Length (seconds)	156.60±90.22	671.64±413.08	582.30±929.65	0.013
	187.00 (16.00-255.00) <sup>a</sup>	606.00 (73.00-1662.00) <sup>b</sup>	301.50 (20.00-3131.00) <sup>ab</sup>	
View rate (view per year)	7139.60±6089.71	7611.55±6757.48	4172.70±2547.19	0.559
	4917.00 (2241.00-17650.00)	4540.00 (1462.00-18979.00)	3160.00 (928.00-8062.00)	

\*Kruskal-Wallis test. <sup>a,b</sup>: There is no difference between the same letters, mean ± standard deviation, median (minimum-maximum).

**Table 4. Comparison between video publishing years and quantitative variables**

	2008-2011	2012-2015	2015 and later	p*
JAMA Benchmark-total (observer 1)	1.89±0.33	2.00±0.00	2.20±0.63	0.291
	2.00 (1.00-2.00)	2.00 (2.00-2.00)	2.00 (1.00-3.00)	
JAMA Benchmark-total (observer 2)	1.67±0.50	2.00±0.00	2.10±0.57	0.133
	2.00 (1.00-2.00)	2.00 (2.00-2.00)	2.00 (1.00-3.00)	
JAMA Benchmark means	1.78±0.36	2.00±0.00	2.15±0.58	0.106
	2.00 (1.00-2.00)	2.00 (2.00-2.00)	2.00 (1.00-3.00)	
Modified DISCERN (observer 1)	2.00±1.80	2.86±1.68	3.00±1.15	0.453
	2.00 (0.00-4.00)	4.00 (0.00-4.00)	3.00 (1.00-5.00)	
Modified DISCERN (observer 2)	1.89±1.54	2.57±1.62	3.00±1.15	0.306
	2.00 (0.00-4.00)	3.00 (0.00-4.00)	3.00 (1.00-5.00)	
Modified DISCERN-mean	1.94±1.59	2.71±1.60	3.00±1.15	0.342
	2.00 (0.00-4.00)	3.00 (0.00-4.00)	3.00 (1.00-5.00)	
Views (n)	28323.00±18528.14	33712.86±28539.39	29493.10±20541.85	0.999
	24324.00 (11136.00-72566.00)	26517.00 (11260.00-93933.00)	21074.00 (12547.00-75919.00)	
Length (seconds)	318.22±302.62	617.57±538.18	680.70±901.07	0.330
	277.00 (16.00-811.00)	396.00 (49.00-1662.00)	331.00 (130.00-3131.00)	
View rate (view/year)	2855.11±2099.26	5542.43±6054.25	9665.90±5289.12	<b>0.003</b>
	2559.00 (928.00-8062.00) <sup>a</sup>	3314.00 (1875.00-18786.00) <sup>ab</sup>	7458.00 (4182.00-18979.00) <sup>b</sup>	

\*Kruskal-Wallis test. <sup>a,b</sup>: There is no difference between the same letters, mean ± standard deviation, median (minimum-maximum).

**Table 5. Relationship between scores, views, length and view rate values**

		Views	Length (s)	View rate
JAMA Benchmark-total (observer 1)	r	0.265	0.356	0.385
	p	0.190	0.074	0.052
JAMA Benchmark-total (observer 2)	r	0.050	<b>0.473</b>	0.321
	p	0.808	<b>0.015</b>	0.110
JAMA Benchmark-mean	r	0.147	<b>0.403</b>	<b>0.393</b>
	p	0.474	<b>0.041</b>	<b>0.047</b>
Modified DISCERN (observer 1)	r	-0.009	<b>0.639</b>	0.123
	p	0.966	<b>0.001</b>	0.551
Modified DISCERN (observer 2)	r	0.024	<b>0.563</b>	0.242
	p	0.909	<b>0.003</b>	0.233
Modified DISCERN-mean	r	0.024	<b>0.609</b>	0.193
	p	0.908	<b>0.001</b>	0.344

r: Spearman's rho correlation coefficient.

**Table 6. The consistency of JAMA and DISCERN scores between observers**

	ICC (95% CI)	p
JAMA	0.860 (0.688-0.937)	<0.001
DISCERN	0.867 (0.973-16.805)	<0.001

CI: Confidence interval.

orthopedic issues, our results showed that YouTube videos concerning HTO were poor with a mean JAMA score of 2 and a mean modified DISCERN score of 2.6.

Cassidy et al.<sup>10</sup> showed that neither the video quality or source, nor the number of views had no correlation with the recorded scores. Other studies<sup>22-24</sup> stated that video content uploaded by medical professionals/

academicians had higher informative quality and reliability. A study that analyzed video content quality on YouTube concerning Bankart lesion and its treatment showed that there was no difference in DISCERN or JAMA scores according to video type.<sup>19</sup> Similarly, we found no significant difference after the comparison of the scores of three different groups of video types. The type of the video did not have any effect on the scores, which means that animations, live surgery videos, and other types (webinar, seminar, patient diary etc.) had similar low informative quality and reliability. Moreover, animations and live surgery videos had similar view rates. In contrast to live surgery videos, animations were significantly shorter in time. A recent study analyzing YouTube videos on arteriovenous malformations showed that videos featuring animations had higher popularity compared to other types of videos.<sup>25</sup> The practical translation of this may be that short animations may be enough to inform patients instead of recording live surgery videos and not jeopardizing sterility and concentration during surgery.

Another result of this study was that video length and view rate showed positive correlations with both JAMA and modified DISCERN scores. A study analyzing the quality of testicular cancer videos on YouTube revealed a positive correlation between video length and both JAMA and DISCERN scores.<sup>26</sup> Similarly, another study on the informative quality of YouTube videos on hallux valgus found a positive correlation between video length and DISCERN score.<sup>27</sup> This may be explained either by the fact that answers to questions that need answering for higher quality and reliability require more time; or that any information that comes up incidentally as the video gets longer addresses the required answer to a question.

Videos from three different time periods (2008-11, 2012-15 and 2015-19) had similar poor JAMA and modified DISCERN scores. This may be interpreted as that orthopaedic society failed to improve itself in terms of self-expression and education on digital media in the last decade. View rates, however, increased in time from 2559 views per

year between 2008 and 2011 to 9666 between 2015 and 2019. This may be explained by society's increasing habit of using digital streaming platforms and/or increasing use of the Internet by patients to research health-related issues.<sup>28</sup>

Moreover, the number of YouTube videos uploaded between 2015 and 2019 comprises 38% of all included videos, with this period having the highest number of videos. Similarly, the view rate increased from 3314 per year between 2011 and 2015 to 7458 between 2015 and 2019. A search on PubMed with the keywords "HTO AND proximal tibial osteotomy" between 2008 and 2019 resulted in 281 studies, where 182 (68%) of them were published between 2015 and 2019. The increase in the number of videos, view rate, and number of studies published in PubMed may be regarded as a confirmation of the "re-interest" in HTO recently.

In addition, the consistency in the comparison of JAMA and DISCERN scores indicates the reliability, precision, and value of these scales in their evaluative qualities. Similarly, a recent study that evaluated the quality of YouTube videos on spondylolisthesis showed that DISCERN, JAMA, and Global Quality Score scores correlated among themselves.<sup>29</sup>

### Study Limitations

There are several limitations to our study. First of all, this study evaluates videos only on a single platform, namely YouTube. Videos on other popular digital platforms might have provided different results. On the other hand, because of the lack of validated tools specifically designed to evaluate online video content, we used the JAMA Benchmark scoring system that has been developed for written content, not for video content and the modified DISCERN scoring system that was developed for YouTube video content.<sup>15</sup> Another limitation of the scoring systems used in this study is that both systems are the observer dependent. Moreover, by selecting videos with a view number over 10.000, we may have overlooked videos that may be probably of higher quality but with a smaller number of views.

### CONCLUSION

Although the view rate has increased over time, the informative quality and reliability of YouTube videos concerning HTO are low and did not improve over the last decade.

### MAIN POINTS

- Although the view rate has increased over time, the informative quality and reliability of YouTube videos concerning HTO are low and did not improve over the last decade.
- Over time, the change in the social media usage habits of the population is also seen in the field of health. It seems that the increase in viewer demand for informative videos on this subject has also increased the number of shared videos over time.
- JAMA or modified DISCERN scores can be used for the evaluation or standardization of informative videos.

### ETHICS

**Ethics Committee Approval:** Ethics committee form was not required.

**Informed Consent:** Informed consent was not required.

**Peer-review:** Externally peer-reviewed.

### Authorship Contributions

Concept: K.Y., M.Y., Design: K.Y., M.Y., Materials: K.Y., Data Collection and/or Processing: K.Y., Analysis and/or Interpretation: K.Y., M.Y., Literature Search: K.Y., Writing: K.Y., M.Y., Critical Review: M.Y.

### DISCLOSURES

**Conflict of Interest:** No conflict of interest was declared by the authors.

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