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Impact of YouTube platform in the Realm of Interventional Cardiology Techniques Such as: Double Kissing Crush

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ABSTRACT

Internet has become a widely used resource for obtaining medical information.
However, the quality of information on online platforms is still debated. Our goal is to evaluate YouTube video platform regarding its' usefulness and reliability in terms of teaching the steps of Double kissing crush (DK-crush) technique.
"DK-crush", "DK-crush stenting technique", "DK-crush technique" were the key words queried on the search bar of http://www.YouTube.com. All the videos were screened and those videos in English and Turkish and those videos without voice yet involves the explanation of DK-Crush technique were included. Each video was scored according to the reference article in which the steps of the technique were explained in detail. According to the steps in the reference article, the videos were scored. One point was given for each step shown and 0 for those steps that are not demonstrated, therefore the "total DK-crush step score" (TDCS) was calculated for each video. Our aim was to evaluate the compatibility of the videos with the reference article. In addition, it was aimed to evaluate videos with HONcode, JAMA benchmark and modified DISCERN tools which are instruments to evaluate the reliability, credibility and quality of the medical information served on the internet.
A total of 26 videos met inclusion criteria and were included in the analysis. The median number of views of the videos was 1037 (IQR 194 to 4930) with a median duration of 8.55(IQR 3.19 to 15.2). The median number of the criteria consistent with the reference criteria was 12 (IQR 9,25 to 12), most videos met all the essential criteria and have certain amount of correlation with the scoring systems. Although most videos were compatible with the reference technique, we found mild correlation between modified Discern score and total DK-Crush step score. Furthermore when comparing the number of views, likes, duration of video, HONcode score and the total DK-crush step score(TDCS) were likely to be higher in the videos downloaded or presented by individuals with academic degrees.(p:0.004,p:0.02, p:0.02, p:0.02, p:0.03 respectively).
All of the videos on DK crush was prepared by healthcare professionals yet not all the uploaders or presenters in the videos have academic titles. Those videos in which DK-Crush technique was performed and presented by those with academic degrees are likely to be more instructive according to our results. Compared to the reference publication, most videos were compatible in terms of fitting the procedural steps of DK-crush. Among all videos HONcode and JAMA score has no correlation with DK-Crush step scores, yet modified Discern has mild correlation with total DK-crush step score.

Keywords: DK-crush, two stent technique, modified DISCER, JAMA benchmark, HONcode

Introduction

A bifurcation lesion could be defined as a coronary artery narrowing, involving the origin of a significant side branch ($\geq$ 2mm)or a coronary artery narrowing occurring adjacent to a significant ($\geq$ 2mm) side branch vessel (1,2).

Coronary bifurcation lesions are challenging cases for interventional cardiologist. Intervention to bifurcation lesions count for 15-20% of all percutaneous coronary interventions (PCI) (3). There are two main approaches for stenting the bifurcation lesions, first approach is provisional stenting and second approach is 2-stent technique. Provisional stent technique is not inferior to 2-stent technique yet is associated with similar rates of target vessel revascularisation and lower incidence of periprocedural complications with shorter fluoroscopy time. But there are cases with true bifurcation lesion that may benefit from 2 stent technique (4-6). Two-stent approach might be applicable for those lesions where both the main vessel and side branch (SB) are large and the distal part of the SB is significantly diseased (7).

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Several techniques are suggested for bifurcation stenting (8-10). The Double-Kissing Crush (DK crush) is a two-stent coronary bifurcation stenting strategy. Which requires several amounts of theoretical knowledge and practical experience in order to achieve a successful result.

You Tube was created in 2005 and currently it has become one of the most invoked education tools among young physicians, yet it is not clear whether the quality and credibility of this portal for educational purposes are sufficient (11).

In this study we aim to assess the videos on You Tube about DK-Crush in terms of evaluating the quality, accuracy and credibility of them in clinical practice using the modified DISCERN (modDISCERN), HONcode and JAMA benchmark (JAMA) scoring systems.

Materials and Methods

You-Tube web site was queried with the following key words; "DK-crush", "DK-crush stenting technique", "DK-crush technique". All the videos were screened and those videos presenting DK-crush technique in English and Turkish were included to the study. In addition, those videos without voice, yet involves the technique were also included. Videos which are not associated with the technique, videos in other languages were excluded. Duplicated videos were also excluded. We have evaluated the videos in terms of their educational credibility regarding to the compatibility with DK-crush steps with reference to the article published by Allison B. Hall at al. (12). In addition, the reliability, credibility and quality of the videos were evaluated with known scoring systems. Video information such as; likes, dislikes, video durations, view counts were recorded. The uploaders were classified as; videos recorded at the congress and symposiums, downloaded within the body of a hospital and videos recorded by medical professionals and broadcasted in their websites via YouTube portal. The videos were classified according to their presenters' academic status. Videos presented by those individuals with academic titles (videos from PCR congress, associate prof, prof etc.) were compared with those without academic titles.

In addition, videos were also classified as live videos, animation videos and those videos including both animation and live features. We have included all the videos which met our inclusion criteria. In our search on YouTube, videos meeting the inclusion criteria were 26, therefore 26 videos were included to the study. All the videos were assessed by two experienced interventional cardiologists according to the reference article. All videos were assessed in regard to modDiscern, HONcode and JAMA benchmark tools. General characteristics of the videos are presented in table-1.

Total DK-Crush Step Score: Double kissing crush steps were identified according to Allison B. Hall at all (12). Twelve main steps were identified for performing DK-crush procedure. These procedural steps are presented in table-2. Each video was scored according to its' compatibility to the steps identified in our reference source. Applied steps were scored as 1point, missing steps were scored as 0 point. The sum of scores were taken to identify the total DK-Crush step score (TDCS). Percentage of each performed step is presented in table 2.

HONcode, JAMA benchmark and Modified DISCERN Scores: HONcode is a scoring system created for evaluating the reliability and quality of the medical information provided via internet (13-15). It consists of 8 criteria (13). (table-3A)

The JAMA benchmark was published 1997 in Journal of the American Medical Association in terms of evaluating the quality and credibility of the videos. It consists of four criteria (16). (table -3B)

Finally, modDiscern score was also used to assess the integrity and reliability of the relevant videos. The reliability of the information given in the videos were scored from 1 to 5 (reliability score) (adapted from the Discern system for the evaluation of written health information) (17,18). (table 3C)

Ethical Approval: In consideration of; both anonymous data and the availability of free access to the videos, the ethics approval was not necessary.

Statistical Analysis: The software Jamovi statistic software version 1.27 (Vienna, Austria), was used. To describe the continuous variables median and interquartile range (IQR) were used. The Mann-Whitney U test was used to compare differences between two independent groups when the dependent variable is continuous, and not normally distributed. The histogram graphic analysis was used to check the normality of data for quantitative variables. Frequency and percentage were given for categorical data and the chi-square or Fisher test was used to compare categorical data. A Spearman correlation test was applied for HONcode, JAMA benchmark, Modified Discern, TDCS and the number of stages given in the reference article. Cronbach-alpha value was evaluated for inter-rater assessments. The P-value <0.05 was considered statistically significant.

Table 1. General characteristics of DK-crush Videos on YouTube

Variables		N=26(frequency)
Mean Duration (min)		8.55(3.19-15.2) *
Gender n:13(given)		11m (84.6%)
A number of views		1037 (194-4930)*
Duration on publishing (week)		124 (65-220) *
likes		46.6(2.2-63) *
dislike		0 (0-1) *
Video uploader		N (%)
congress and symposium.	15(57.7%)	
Hospital	1(3.8%)	
individual- website	10(38.5%)	
Type of video		N (%)
Live	19(73.1%)	
Animation	3(11.5%)	
Live+ animation	4(15.3%)	
Frequency of subtitle		51 (0-1)
Age (Given) (n:13)		71(66-72)
Reference concordance		12(9.25-12)
Academics (n, %)		15 (57.7)
Modified Discern total score		3.5(3-4)
JAMA total score		3(3-3.75)
HONcode total score		5(5-6.75)

Min: minutes *IQR

variable	academic	Non-academic	P value
like	49 (10.5-104)	2 (2-4.5)	0.004
dislike	1 ()0-4)	0 (0-1)	0.21
Number of views	2936 (666-8894)	197 (118-766)	0.02
Video duration (min)	9.37 (7.67-15.3)	1.16 (0.82-9.38)	0.02
Reference concordance	12 (12-12)	9 (8-12)	0.03
jama	3 (3-4)	3 (3-3)	0.24
Mod-discern	4 (3.5-4)	3 (2.5-3)	0.02
honcode	6 (5-7)	5 (5-5)	0.06

Min:minutes

Result

Twenty-six videos were included to the study. Fifteen (57.7%) of all videos were uploaded during the congress and symposiums, 10 (38.5%) of the videos were uploaded by a physician individually or by a professional web site. While 1 (3.8%) video was uploaded on behalf of the relevant hospital. Number of views were 1037 (194-4930 IQR), number of likes were 46.6 (2.2-63 IQR), dislikes were 0 (0-1 IQR). The number of live, animation and videos including both live cases and presentation with animation as well; were 19 (73.1%), 3(11.5%) and 4 (15.3%) respectively. Thirteen of the videos included gender information. Eleven (84.6%) cases presented were male patients. Age of the patients were given in 13 videos. Mean age was 71(66-72). Overall the median of total DK-crush step score was 12 (9.25-12 IQR) (table 1).

When assessed according to the scoring systems, following results were recorded; HONcode score was 5 (5-6,75 IQR) (table1). All videos achieved the following two parameters of HONcode

Table 2. Steps in DK-Crush and the frequency of each step among all videos

STEP	Number (%)
1-Main Vessel and Side Branch Wiring	26 (100%)
2-Main Vessel and Side Branch Preparation	23(88.5%)
3-Side Branch Stenting with Short Protrusion into the Main Vessel	25(96.2%)
4-Balloon Crushing of Side Branch Stent	24(92.3%)
5-Re-Wiring the Side Branch Through the Crushed Side Branch Stent	19(73.1%)
6-First Kissing Balloon Inflation	23(88.5)
7-Main vessel stenting across the SB	23(88.5)
8-Proximal Optimization Technique (POT)	21(80.8%)
9-Re-Wiring the SB Through the MV and SB Stents	18(69.2%)
10-Second Kissing Balloon Inflation	23(88.5%)
11-Repeat Proximal Optimization Technique (Re-POT)	19(73.1%)
12-Reviewing the Final Result	20(76.9%)

Table 3. HONcode, JAMA Benchmark, Modified-DISCERN instruments and the frequency of each criteria among all videos

HONcode (1 point for every Yes, 0 points for No)

1 Any medical or health advice given in the video must come from a qualified health professional unles A clearly stated that the information does not come from a qualified health source. 24(92.3%)

2 The information provided in the videos must be designed to support the patient's self- management but is not meant to replace a patient–physician relationship. 26(100%)

3 The information in the video maintains the right to confidentiality and respect of the individual patient featured. 26(100%)

4 Each video contains references to source data on information presented or contains a specific HTML link to source information.8(30.8%)

5 Each video containing claims on the benefits or performance of specific, skills/ behaviours, interventions, treatments, products, and so on must be supported by evidence through references or HTML links.6(23.1%)

6 The video must provide the viewer with contact information, or a Web site link to more information.23(88.5%)

7 Any individual or organization that contributes funds, services, or material in the posted video must be clearly identified in the video or video description.8 (30.8%)

8 If advertisement supports funding to the video or the video's developers, it must be clearly stated. Included advertising must be clearly differentiable to the viewer: There should be a clear difference between the advertising material and the educational material in the video 26(100%)

JAMA Benchmark (1 point for every Yes, 0 points for No)

Authorship Authors and contributors, their affiliations, and relevant credentials should be provided 23(88.5%)

Attribution References and sources for all content should be listed clearly, and all relevant copyright information should be noted7(26.9%) B

Disclosure Website "ownership" should be prominently and fully disclosed, as should any sponsorship, advertising, underwriting, commercial funding arrangements or support, or potential conflicts of interest26(100%)

Currency Dates when content was posted and updated should be indicated 26(100%)

Modified-Discern (1 point for every Yes, 0 points for No) C

1. Are the aims clear and achieved? 23(88.5%)
2. Are reliable sources of information used? (i.e., publication cited, speaker is board-certified rheumatologist) 21(80.8%)
3. Is the information presented balanced and unbiased? 26(100%)
4. Are additional sources of information listed for patient reference? 2(7.7%)
5. Are areas of uncertainty mentioned? 18(69.2%)

Table 4. Correlation analysis with Spearmen's rho test

variables	DK crush step	HONcode	JAMA benchmark
HONcode	-0.043 p:0.83	-	-
JAMA benchmark	-0.088 p:0.67	0.906 p<0.001	-
ModDISCERN	0.32 p:0.10	0.66 p<0.001	0.61 p<0.001

ModDISCERN: modified DISCERN

Table 5. Comparison between the videos presented by academics and non-academics

variable	Academic	Non-academic	p value
likes	49 (10.5-104)	2 (2-4.5)	0.004
dislikes	1 (0-4)	0 (0-1)	0.21
views	2936 (666-8894)	197 (118-766)	0.02
Video duration (min)	9.37 (7.67-15.3)	1.16 (0.82-9.38)	0.02
Reference concordance	12 (12-12)	9 (8-12)	0.03
JAMA benchmark	3 (3-4)	3 (3-3)	0.24
Mod-DISCERN	4 (3.5-4)	3 (2.5-3)	0.02
HONcode	6 (5-7)	5 (5-5)	0.06

Min: minutes; Mod-DISCERN: modified DISCERN

scoring system; ''The information in the video maintains the right to confidentiality and respect of the individual patient featured '', ''the information provided in the videos must be designed to support the patients self-management but is not meant to replace a patient-physician relationship.'' Detailed information is given in table 3.

JAMA score was 3 (3-3.75 IQR) (table 1). All 26 videos achieved the last two parameters; ''disclosure'' and ''currency''. Detailed information is given in table 3.

Modified Discern score was 3.5 (3-4 IQR) (table1). The parameter which received the highest positive rate was the parameter; 'Is the information presented balanced and unbiased?' which was available in all videos (100%). Detailed information is given in table 3.

The most skipped step was the 9th step of DK-crush, demonstration of step 1 was achieved in all videos. Yet 9th step (rewiring the SB through the MV) was missing in 8 videos.

The mean TDCS was found to be 12(9.25-12 IQR), and the most commonly shown DK-crush stages were demonstrated to be main vessel and side branch wiring (26 videos 100%), the least shown step was re-wiring the side branch through the main vessel and side branch stent (18 videos 69.2%) (Table 2).

Cronbach's α method was used for demonstrating interrater reliability analysis. The p values for modDISCERN, JAMA, HONcode and TDCS were found as follows; p: 0.935, p: 0.893, p: 0.917, p: 0.953 respectively.

As a result of correlation analysis; there was no correlation between TDCS and HONcode

(r:-0.043 p:0.83). Likewise there was no correlation between TDCS and JAMA (r:-0.088 p:0.67) however mild correlation was demonstrated between TDCS and modDISCERN (r:0.32 p:0.010 respectively). There was also positive correlation between JAMA and HONcode and between JAMA and modDISCERN (r: 0.409, p <0.001 and r: 0.535, p <0.001, respectively) (Table 4). When comparing the number of likes, views, duration of videos, HONcode score and the consistency between the TDCS with the reference source were likely to be higher in the videos presented by academician.(p:0.004, p:0.02, p:0.02, p:0.02, p:0.03 respectively) (Table 5). The relation between modDISCERN and TDCS is demonstrated by scatterplot (Figure 1). Figure 2 demonstrates the error plot for TDCS in those videos presented by those with academic features and those without academic features were demonstrated by bar-plot.

Discussion

Increasing number of investigations indicates that two-stent approach is associated with better clinical outcomes compared to provisional stenting for convenient bifurcation lesions. DK-Crush technique is one of the most promising 2 stent techniques in terms of decreasing TLF (19). Our study demonstrated that YouTube videos on DK-Crush are highly instructional concerning their consistency with the reference article TDCS 12 (9.25-12 IQR). Besides, the videos presented by academicians compared to

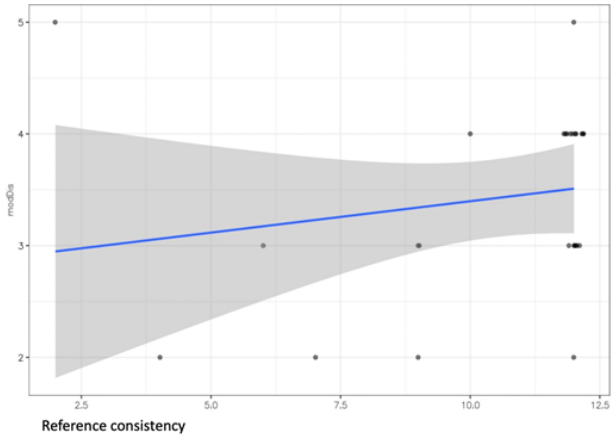

Fig. 1. Relation between modified DISCERN and Total DK-crush score

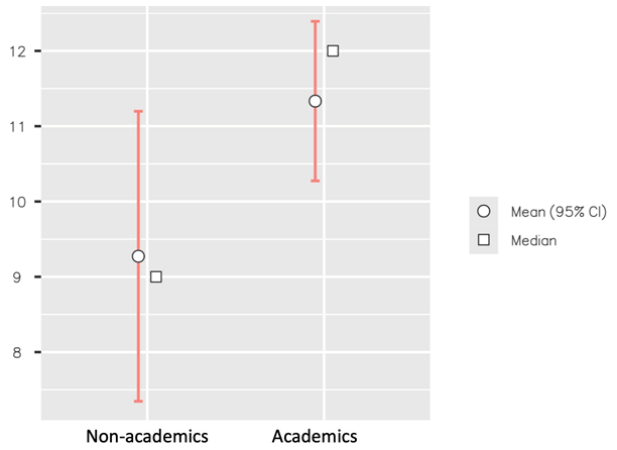

Fig. 2. Error plot for Total DK-crush score according to the academic status of the presenter

non-academicians, the consistency to the reference article (in terms of TDCS) was more considerable (p: 0.03).

Although clinical practice is essential for learning invasive procedures, the impact of online sources is undeniable. Online materials are not alternatives of classical learning methods, but they are complementary tools for life-long learning process. In Covid-19 pandemics we have realised the importance and necessity of online learning tools considering the decreased number of interventional cases. Therefore, continuum of the education for medical residents, online education has grown in importance (20).

Considering the free access and the diversity of videos uploaded, YouTube is the mainstay video portal among these online sources. In this study, we aimed to determine whether the videos uploaded to YouTube regarding DK-Crush technique are compatible with the reference literature. We also aimed to evaluate the quality and credibility of relevant videos according to online information assessment instruments such as JAMA, HONcode and modDISCERN score.

In the study we tried to determine the accuracy and credibility of the videos shared on YouTube about the DK-crush technique. With this present study, we have demonstrated that the DK-Crush videos uploaded to YouTube is compatible with the reference article and achieves the educational purposes, yet they do not fully meet the criteria for those instruments (HONcode, JAMA, modDISCERN) evaluating the information provided via online platforms(13-18). Nevertheless, we demonstrated weak correlation between TDCS and modDISCERN.

The lack of association between TDCS and HONcode score, and between TDCS and JAMA score, may be explained by the limited number of videos included to the study. Lower sample size reduces the power of the study and increases the likelihood of type 2 error. HONcode, JAMA benchmark and modDISCERN instruments are not designed specifically for YouTube platform, but for general assessment of the credibility, reliability and quality of online sources.

Besides the number of likes and dislikes, the number of subscribers to the channel and the profession of the subscribers may also be important indicators for defining a video's credibility, quality and reliability on YouTube platform. In the future alternative instruments may be developed for evaluating the information served on YouTube platform. Additionlay, modDISCERN, HONcode score was also likely to be higher in those videos presented by academician. Most of the videos' TDCS was consistent with the reference article's score. This result may be a consequence of the fact that 5 of the videos were prepared by one of the reference article's co-authors; Emmanouil Brilakis referring the techniques given in his own book "Manuel of percutaneous coronary intervention" (https://www.elsevier.com/books/manual-of-percutaneous-coronary-interventions/brilakis/978-0-12-819367-9). Most uploaders may have been inspired by his former publications. Such as videos uploaded by Kardiopedi. Furthermore, DK-Crush approach is a systematic technique which could only be performed by experienced interventional cardiologists and accepted as "DK-Crush" when all the steps are applied accurately, this may be one of the reasons that most broadcasted videos achieved to demonstrate most of the steps in DK-Crush technique.

The procedure is an advanced technical procedure which is recorded and uploaded to websites

generally for educational purposes rather than advertisement. We believe; certain amount of medical knowledge is needed in terms of understanding the concerning videos therefore the target audience are mostly health professionals. The lack of consistency with HONcode and JAMA benchmark may be attributed to the small sample size. However, some new instruments may be developed for assessment of online videos on YouTube in terms of their educational features, and credibility besides their quality.

Limitations: There are several limitations in our study. First there were limited number of videos meeting our inclusion criteria. Therefore, we have a small sample size which decreases the power of our study and increased likelihood of type 2 error. Second; specific instruments for scoring YouTube platform is lacking therefore, we have applied HONcode, JAMA and modified-Discern systems for interpreting the educational credibility of relevant videos. In the future, other methods can be developed in terms of evaluating YouTube platform. Third; websites such as Dailymotion, Incathlab videos were not considered for evaluation.

The videos demonstrating dk-crush technique on YouTube were found to be compatible with the reference article. Additionally according to the academical status of the presenters, reference concordance was higher in the academician. which may encourage viewers to prefer the videos presented by academician. Among all videos weak correlation was demonstrated with modified Discern. Furthermore, videos presented by academician had higher scores of HONcode and mod DISCERN. Further studies are needed for assessing the videos credibility or quality on YouTube. Moreover, alternative scoring instruments should be developed specifically for evaluation the videos on YouTube with medical content.

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