

YouTube as an information source for intra-articular knee injection

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Abstract

Aim: Intra-articular knee injections are frequently applied interventions in clinical practice. YouTube is the most popular video-sharing Web site that can be accessed as an information source. In this study, we aim to examine the educational value of the videos about intra-articular knee injections on YouTube.

Material and Methods: The YouTube database was searched using the "intra-articular knee injection" keyword. A total of 55 videos having the inclusion criteria, were analyzed. Four independent reviewers assessed videos for procedural technique and educational quality using a 5-point Global Quality Scale (GQS). To evaluate the reliability the 5-point Discern scale was used.

Results: The mean duration of the videos was 3.9 (\pm 3.8) minutes. Approximately 236.2 (\pm 231.3) people watched each video. The mean number of daily views was 58.6 (\pm 130.5). The most common indication was osteoarthritis (43.6%) and the most common injection material were corticosteroids (40%). The most popular approaches were superolateral (27.3%) and anterolateral (25.5%). 43.6% of the patients underwent complete sterile injection. The mean reliability score was 1.58 (\pm 1.1) and the mean GQS score was 2.47 (\pm 1.0).

Conclusions: Web-based learning applications related to intra-articular knee injections are becoming increasingly common. Unfortunately, we thought that YouTube content had an insufficient and inconsistent educational quality even though when it was published by healthcare professionals. Therefore, it is very important to examine these videos in terms of reliability and GQS before using them for educational purposes. Creating high-quality videos that meet these criteria seems to be a necessity of modern medical education.

Keywords: Youtube; Video; Intra-Articular Knee Injection; Education.

INTRODUCTION

Among entire intra-articular injections, knee injections are most performed. In the treatment of many diseases affecting the knee joint, intra-articular injection can be performed in cases where systemic and local drug treatments are insufficient. The main indications for knee joint injections include osteoarthritis and inflammatory arthritis such as peripheral spondyloarthropathies, crystal arthropathies, rheumatoid arthritis and psoriatic arthritis (1). Aspiration of synovial fluid for diagnostic purposes in patients with effusions, who are thought to have septic arthritis, is also another cause of knee joint intervention.

Once the risk of septic arthritis has been ruled out, glucocorticoids, hyaluronic acids, local analgesics, ozone and plasma-rich protein (PRP), the popularity of which has increased in the treatment of osteoarthritis in the recent period, can be injected into the joint (2).

Injection Technique

Six intervention points are mainly defined for the injections being performed blindly to tibiofemoral joint. These are lateral midpatellar, anterolateral, anteromedial, medial midpatellar, superolateral and superomedial. The success rates of these implementations vary between 43-100% (3). According to a study, the rate of treatment failure in

Received: 27.02.2019 Accepted: 28.03.2019 Available online: 03.04.2019

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blind interventions is about one-fifth (4). Image-guided injections have been shown to provide more accurate intervention than those performed blindly. The highest accuracy rate in blinding interventions is achieved by superolateral patellar intervention. With this approach, it is possible to get through to suprapatellar bursa in knee joint and inject safely. However, it should be kept in mind that the lateral tibiofemoral compartment will be safer and more easily accessible, especially in the case of advanced osteoarthritis along with medial tibiofemoral compartment narrowing (5). At the success rate of injection in the blinding technique, the experience of the clinician comes into prominence.

Education Process

Intra-articular knee injections are considered as a routine and relatively non-invasive intervention but it is essential to perform correctly to minimize the risk of tissue damage, bleeding and infection (6). In traditional teaching model, intervention is performed in company with direct tutorial and under supervised guidance. Apart from this, learning can be achieved by making trials on cadaver and/or model in various instructional courses. Practical studies with cadavers have been shown to be superior to those of synthetic model joints alone. However, cadavers are often available in tertiary centers because of their high costs and limited availability. As a result, other methods have been sought to provide adequate medical knowledge and procedural experience to the trainees. Web-based learning has emerged as an increasingly important tool not only in obtaining the necessary theoretical background, but also for learning practical procedural skills. To teach ultrasound-guided vascular access, a Web-based tutorial has proven to be as efficient as traditional trainings (7). Because of its rich sources of information, as a video sharing website, YouTube's medical content sharings attract both patients and clinicians. Even so, the quality of many YouTube content is controversial as only a small percentage of videos are reviewed by experienced observers (8). Analysis of YouTube content about rheumatoid arthritis revealed that one third of the videos contain misleading information about the pathogenesis and treatment approaches (9). Nevertheless, it has been shown that carefully selected YouTube contents improve the teaching of anatomy and procedure in otorhinolaryngology, neurology and dermatology (8).

In this study, we aimed to examine YouTube content created for intra-articular knee injection by health institutions or professionals in terms of technical and educational aspects.

MATERIAL and METHODS

Selection of Videos

The YouTube database was searched using the "intra-articular knee injection" keyword on September 25, 2018. It was showed that more than 90% of Internet users

clicked the first three pages of the query results (10). Therefore, top 100 videos, uploaded between 11/03/2009-22/08/2018 listed at the end of the search were evaluated. While searching for the videos, Youtube search settings were adjusted as follows: upload date; a special time interval was not specified, type; video, duration; video time restriction is not done, sorting criteria; starting from most relevant. This search strategy has been used in many other studies on YouTube in medical literature (9, 11,12). Only the videos uploaded by health professionals, universities, pharmaceutical companies and private clinics were analyzed. Unrelated videos to intra-articular knee injection, non-English and veterinary videos are excluded. Multi-part videos and the same videos were counted as one.

Technical Review

To define the properties of each video, the following parameters are recorded: uploader type, length of video, upload date, total number of views, number of daily views, number of likes-dislikes, injection material, injection method, knee position, sterilization technique, antiseptic type used and indication.

Evaluation of Educational Quality

Included videos were evaluated by 2 physical medicine and rehabilitation physicians. Both clinicians had at least 5 years of experience in terms of intra-articular knee injections. In case of a dispute, opinion of a third clinician was obtained. The technical quality assessment was performed according to the Swiss Society of Rheumatology's intra-articular puncture and injection guidelines (8). After the disinfection, the skin is not touched until the needle enters the skin, disposable materials such as non-sterile gloves and masks are preferred, care is taken to keep the patient properly informed and record-keeping in the recommended no-touch technique. In the sterile method, which is another technique, all the materials is used as sterile after disinfection and the injection area can be controlled with sterile gloves. Educational value and the overall quality of the video was evaluated using a 5-point scale, a global quality score (GQS), where it scored the quality of the information and how the reviewer thought a particular video would be useful (9) (Table 1). The videos were evaluated in terms of appropriate informing of the patient, proper room conditions, disinfection method, bleeding control and precautions, providing anatomical information sufficiently, showing and palpating the landmarks, indications and contraindications, supporting the information given with additional materials (animation, graphics, figures, drawings, texts, etc.) and using the ancillary imaging techniques (US, fluoroscopy, etc.).

Evaluation of Reliability

Video reliability was evaluated by a modified version of 5-points scale Discern tool which is adapted to YouTube videos by Singh et al. and developed in order to evaluate written medical information (9) (Table 1).

Table 1. Global Quality Scale (GQS) and Reliability Score**Global Quality Scale (GQS)**

1	Poor quality, information missing, technique misleading, not useful
2	Generally sparse quality, some information provided but majority lacking, technique poor, very limitedly use
3	Moderate quality, important information provided but some lacking, technique mostly ade-quate, limitedly useful
4	Good quality, majority of information provided but some information lacking, technique ade-quate, useful
5	Excellent quality, full information provided, technique adequate, very useful

Reliability Score (1 point per question answered yes)

1	Is the video clear, concise, and understandable?
2	Are valid sources cited? (from valid studies, physiatrists or rheumatologists)
3	Is the information provided balanced and unbiased?
4	Are additional sources of information listed for patient reference?
5	Does the video address areas of controversy/uncertainty?

Statistical Analysis

The demographic data and the variables of the statistical analysis were expressed as means \pm standard deviation (SD). The ordinal and nominal data were expressed as numbers and percentages. The level of inter-rater agreement was measured with Cohen's kappa coefficient for GQS and reliability scores. The data were analyzed with the IBM SPSS Statistics 24 (IBM Corp., Armonk, NY).

RESULTS**Characteristic of Videos**

A total of 55 videos, uploaded between 16/08/2009-11/08/2018 and having the inclusion criteria, were analyzed. The Cohen's kappa score for the inter-rater agreement was 0.79 (0.63-0.91 CI). The duration of the videos ranged from 15 seconds to 25.2 minutes. The highest viewed video was the one which had been viewed 1,519,532 times and was created for hyaluronic acid preparation by a private pharmaceutical company. This video also had the highest number of daily views with 739. The most liked video was the one which was about knee injections in osteoarthritis and prepared by an orthopedic surgeon with a number of likes over 3600 and a total views of 1.437.456. In addition to the knee injection techniques, information about knee pain, arthritis and cartilage damage were provided with accompanying animation. The image quality was evaluated at the maximum value that can be selected in the quality sub-title in the video from settings tab. This value was determined by the pixel value which can be valued between 240p-1080p and which is the smallest unit than can be controlled and used to obtain the image in the digital indicators (13). The average image quality of the videos was calculated as 641p. The technical parametric average characteristics are given in Table 2.

Table 2. Technical characteristics of videos

Duration (minute)	3.9 (\pm 3.8)
Number of total views	236.2 (\pm 231.3)
Number of daily views	58.6 (\pm 130.5)
Image quality (pixel)	641.4 (\pm 270.5)
Likes	232.2 (\pm 615.9)
Dislikes	43.5 (\pm 149.9)

Analysis of Technical Procedures and Educational Value

When analyzed in terms of publishers, 78.2% of the videos were uploaded by doctors. The most common indication was osteoarthritis (43.6%). Corticosteroids (40%) and hyaluronic acid derivatives (30.9%) were the most common injection materials. Although the superomedial approach was found to be safer in the literature [5], the most common approaches were observed superolateral (27.3%) and anterolateral (25.5%). In 43.6% of the injections, procedure was shown in seated position with knee flexion. The most commonly used antiseptic was povidone-iodine (50.9%). In 43.6% of the patients, injection performed under complete sterile conditions. In 47.3% of the videos, additional materials (such as graphics, animations, text, figures etc.) used to enhance intelligibility. Ultrasonography was used in 14.5% of patients and fluoroscopy was used in 5.5% of patients as an assistive device. Detailed information about the video contents is given in Table 3.

Anatomical landmarks were both described and palpated in 13 videos, while no information was given in 33 videos (Table 4).

The mean reliability score was detected 1.58 (\pm 1.1) and the mean GQS scores was observed 2.47 (\pm 1.0). No video met all of the reliability criteria and got 5 points, and only two videos received 4 points. In the GQS, only one video received 5 points. Reliability and distribution of GQS scores were given in Table 5, and detailed review of the reliability scores in Table 6.

Table 3. Analysis of video content							
Video Quality	240p	360p	480p	720p	1080p		
	n 5	7	14	18	11		
	% 9.1	12.7	25.5	32.7	20.0		
Uploader	Physician	Pharmaceutical company	University	Private clinics			
	n 43	5	2	5			
	% 78.2	9.1	3.6	9.1			
Indication	Unclear	OA	IA	OA+IA	Other		
	n 15	24	3	3	10		
	% 27.3	43.6	5.5	5.5	18.2		
Injection materials	Unclear	Corticosteroids	Hyaluronic acid	PRP	Ozone	other	
	n 8	22	17	2	2	4	
	% 14.5	40.0	30.9	3.6	3.6	7.3	
Injection point	Unclear	Superomedial	Superolateral	Lateral midpatellar	Medial midpatellar	Anteromedial	Anterolateral
	n 6	7	15	2	3	5	14
	% 10.9	12.7	27.3	3.6	5.5	9.1	25.5
Knee position	Unclear	Flexion	Extension	Multipl			
	n 9	24	20	2			
	% 16.4	43.6	36.4	3.6			
Antiseptic	Unclear	Povidone-iodine	Alcohol	Chlorhexidine gluconate	Multipl		
	n 14	28	7	4	2		
	% 25.5	50.9	12.7	7.3	3.6		
Sterilisation technique	Unclear	No-touch	Sterile				
	n 13	18	24				
	% 23.6	32.7	43.6				
Additional materials	None	Animations	Shapes	Drawings	Writings	Multipl	Other
	n 29	10	2	1	6	5	2
	% 52.7	18.2	3.6	1.8	10.9	9.1	3.6
Monitoring device	None	US	Fluoroscopy				
	n 44	8	3				
	% 80	14.5	5.5				

OA;osteoarthritis, IA; inflammatory arthritis, PRP; platelet rich plasma, US; ultrasound

Table 4. Anatomical landmarks		
	Landmark Palpation (+)	Landmark palpation (-)
Landmark showed (+)	13 (23.6%)	3 (1.65%)
Landmark showed (-)	6 (3.3%)	33 (60%)

Table 5. Distrubition of Reliability and Global Quality Scores		
Total Score	Reliability score n (%)	Global Quality Score n (%)
0	13 (23.6)	-
1	12 (21.8)	10 (18.2)
2	17 (30.9)	21 (38.2)
3	11 (20.0)	13 (23.6)
4	2 (3.6)	10 (18.2)
5	0	1 (1.8)

Table 6. Analysis of Reliability Scores

	Reliability score	n
1. Is the video clear, concise, and understandable?	37	37
2. Are valid sources cited? (from valid studies, physiatrists or rheumatologists)	7	7
3. Is the information provided balanced and unbiased?	35	35
4. Are additional sources of information listed for patient reference?	2	2
5. Does the video address areas of controversy/uncertainty?	5	5

DISCUSSION

In our study, we aimed to investigate the educational quality and general technical characteristics of intra-articular knee injection videos on YouTube. We analyzed 55 videos where the vast majority were uploaded by doctors. In terms of the GQS, 43.6% of the videos were moderately or better and considered useful, but only one video could get 5 points. While the majority of the videos were found to be adequate in terms of 1st and 3rd criteria in reliability examination, the other criteria could not be achieved by majority of the videos.

The level of education quality has also been studied in many other studies about other clinical procedures on YouTube. In a study evaluating videos about knee arthrocentesis on YouTube (8), 13 videos were taken to evaluation, while the average GQS scores was evaluated 3.1, 61.5% of the videos were educationally useful (score 3-5), 38.5% were useless (score 1-2). In another study in which a total of 51 methotrexate self-injection educational videos were examined (11), while 10 videos (19.6%) were found to be useful, the remaining videos were evaluated under misguidance and patient opinion. In another study in which videos of lumbar puncture and neuro-axial block techniques were evaluated, it was found that more than 50% of the videos did not have basic information about the procedure and sterility (14). Similarly, according to the results of another study examining YouTube content on basic life support and cardiopulmonary resuscitation, the information given was evaluated as incompatible with the American Heart Association's revised guidelines (15).

The definition of optimal intra-articular knee injection technique is constantly developing. A recent study has shown that total knee drainage can be achieved in patients with knee extension in lying position compared to patients with knee flexion in seated position (16). However, the majority of the videos (43.6%) in our study represented the injection on knee-flexion position. It has been found that ultrasound-guided arthrocentesis is superior to anatomic landmark-guided arthrocentesis, resulting in less operative pain, better drainage and improved clinical outcomes (17), but in our study only 14.5% of the videos were performed under US guidance. Inevitably, YouTube content must change and adapt to changes in existing guidelines.

Through developing technological infrastructure, information sources are now diversified in such a way

that monitoring and controlling them are not possible. YouTube is one of the leading sources of information for academics because of its easy access, free and no registration requisite characteristics. It contains many theoretical and practical data related to intra-articular knee injection. However, the majority of these videos are technically insufficient and their educational level is poor as seen in our study. Especially the possible risks, indications, contraindications and the source of the information provided are not available in many videos. Apart from these, a large number of videos, which are excluded from the study, were either created by patients, were veterinary-related or related to different body regions. Attention-grabbing warnings should necessarily be added in these type of videos, especially since these videos may be able to trigger non-medical health personnel and even patients to intervene to knee joints on their own.

The biggest obstacle for YouTube to become an excellent source of information is that it contains many unchecked and low-quality data (9). In fact, videos uploaded on many headings such as violence, racism, sexuality and copyrights are subject to a specific audit process. However, many videos, especially including medical information, are available without such an analysis. If a careful review environment is created and medical videos can be added regarding the criterion of reliability and GQS scores, YouTube can become a more effective and useful source of information.

With the increasing use of YouTube by health institutions, it will be increasingly important to properly label high-quality content to deliver to the target audience (medical students, assistants, etc.) (18). In modern medical education, Web-based teaching was preferred over traditional course-based courses due to its ease of use and accessibility, high medical image quality and the advantage of repeated applications (19). In a study comparing the different educational methods for arthrocentesis, it was stated by medical students that the practice performed on the cadaver in company with a supervisor had the greatest importance (20). Given both our study and the aforementioned studies, it seems unlikely that YouTube content will replace clinical practice training. However, the higher quality videos identified in our study, and in particular the new educational videos that can be prepared with quality parameters, can enable the development of a Web-based training program for intra-articular knee injection.

CONCLUSION

In conclusion, we have identified a large number of YouTube videos suitable for use in Web-based learning applications for medical students, assistants, and other clinicians with regard to intra-articular knee injections. Unfortunately, we thought that YouTube content had an insufficient and inconsistent educational quality even though when it was published by healthcare professionals. Increasing the quality of educational materials, search engine optimization, and adaptation to changing rules

remain major challenges for healthcare professionals who want to use unreviewed Web-based resources in the future.

Competing interests: The authors declare that they have no competing interest.

Financial Disclosure: There are no financial supports

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