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Brief Report

Use of Ultrasound-Guided Tendon Fenestration and Injection Procedures for Treatment of Tendinosis

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ABSTRACT

Introduction. Overuse injuries such as tendinosis are a common complaint at sports medicine clinics. When conservative management for tendinosis has failed, ultrasound-guided tendon fenestration and injection procedures, such as dry needling, needling tenotomy, autologous whole blood injections, and prolotherapy, can be utilized for treatment. This study examined the effectiveness of these procedures for pain improvement and ability to return to activity for patients with tendinosis.

Methods. This study involved a chart review of patients 15 years or older who underwent at least one treatment for tendinosis at a sports medicine clinic between January 1, 2014 and April 17, 2019. Eligible patients had at least one of the following procedures: 1) percutaneous dry needling, 2) percutaneous needle tenotomy, 3) autologous whole blood injection, and/or 4) prolotherapy. A Current Procedural Terminology (CPT) code query was used to screen patient charts for study inclusion.

Results. In total, 680 patients' data were reviewed, and 343 patients met inclusion criteria. Patients underwent a total of 598 unique procedures. Dry needling represented most procedures (62.8%, n = 375). Most patients reported diminished pain at follow up (73.0%, n = 268). Prolotherapy had the highest percentage among the follow up patients reporting diminished pain (81.0%, n = 17). Most patients were able to return to activity at follow-up (47.4%, n = 172). A greater proportion of patients with autologous whole blood injection were able to return to activity (60.7%, n = 85).

Conclusions. Most patients with tendinosis who underwent tendon fenestration or injection procedures reported diminished pain at follow-up. Autologous whole blood injection may be more likely to diminish patient pain and allow return to activity than other procedure types. More research is needed across all anatomical sites to compare the generalized effectiveness of these procedures.

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INTRODUCTION

It is recommended that American adults participate in at least 150 minutes per week of moderate-intensity aerobic physical activity for health benefits, such as decreased risk of chronic disease and mortality.[1] Despite these benefits, physical activity increases the risk of injury to muscles and tendons due to increased mechanical stress, especially during times of increasing intensity, frequency, and duration.[2-4] Patients present to sports medicine clinics with overuse injuries at twice the frequency of acute injuries and make up nearly 50% of all sports injuries.[5,6]

Tendinosis is an overuse injury of tendon degeneration without clinical or histologic signs of an inflammatory response.[2] Tendinosis causes chronic pain and dysfunction that can prevent afflicted individuals from participating in physical activity, occupation-related activities, and even activities of daily living.[2]

Treatment for tendinosis consists of conservative management, followed by ultrasound-guided needling and injection procedures, and lastly surgery for intractable cases.[7] Conservative management consists of activity modifications, physical therapy, and/or home therapy with a focus on eccentric strengthening, and instrument assisted soft tissue massage.[2] Conservative management does not always provide long-term relief, sometimes requiring further interventions.[8]

Second-line treatment of tendinosis can consist of a variety of ultrasound-guided, minimally invasive procedures. These procedures can focus on percutaneous tendon fenestration alone (e.g., dry needling, tenotomy) or be coupled with injections of corticosteroids, hyperosmolar dextrose (prolotherapy), autologous whole blood, or autologous platelet-rich plasma (PRP).[2,8] Injection therapies utilizing prolotherapy, autologous whole blood, or PRP yield better long-term pain and functional improvement outcomes than corticosteroids.[7,9] Autologous whole blood and PRP have comparable efficacy, and some practices use autologous whole blood instead of PRP due to the decreased pre-procedural processing of patient blood.[10,11]

Although prior projects have compared pain improvement at certain anatomical sites, more research is needed to compare the generalized effectiveness of these procedure subtypes across all anatomical sites.[12-15] This project investigated the effectiveness of percutaneous dry needling, percutaneous needle tenotomy, autologous whole blood injection, and/or prolotherapy for tendinosis treatment at a primary care sports medicine clinic. Primary outcomes included pain improvement and ability to return to prior or desired activity following treatment.

METHODS

Participants. Patients included in the study were 15 years or older and treated for tendinosis at a local sports medicine clinic, from January 1, 2014 through April 17, 2019. Eligible patients had at least one of the following procedures: 1) percutaneous dry needling, 2) percutaneous needle tenotomy, 3) autologous whole blood injection, and/or 4) prolotherapy. Patients unable to adhere to the post-procedural therapy regimen due to physical disabilities outside of the injury of interest were excluded from the study.

Instrument. Multiple variables were abstracted from patient medical records to conduct this study. The primary outcomes were: 1) percent of pain reduction, 2) percent of functional improvement, and 3) the time required (i.e., weeks) to return to prior or desired activity

following treatment. Other variables included tendinosis site, patient demographics (e.g., age, gender), competitive or recreational athlete status, adherence to post-procedural therapy regimen, comorbid conditions (e.g., diabetes mellitus, heart failure), and tobacco/nicotine usage. Procedure variables included utilization of prolotherapy, autologous whole blood, percutaneous needle tenotomy, or percutaneous dry needling, length and gauge of needle used, and total procedural fenestration count.

Procedures. This study was approved by the Human Subjects Committee at the University of Kansas School of Medicine-Wichita and the Institutional Review Board at Ascension Via Christi. All patients meeting inclusion criteria were identified by clinical staff using CPT® codes for ultrasound guided needle placement (76942) and other relevant codes (20552, 20553, 27605, 27306, 27307, 27000, 24357, 28008, 27306). Patient name, medical record number, date of birth, and dates of relevant patient encounters were provided to identify patients whose data would be abstracted. Study data were managed using Research Electronic Data Capture (REDCap®) electronic data capture tools hosted by the University of Kansas Medical Center.[12]

Analysis. Data were analyzed using SAS version 9.4 (SAS Institute, Cary, NC). Frequencies, proportions, means, and standard deviations were generated. For testing the associations between two nominal or categorical variables in contingency tables, either Pearson's chi-square results (when the expected frequency is five or more in cells) or likelihood ratio chi-square results (when the expected frequency is less than five in some cells) were reported. On the other hand, Fisher's exact test results were reported to test the associations between two nominal or categorical variables for 2*2 crosstabs. Prior to data analysis, Shapiro-Wilks was used to test the normality distribution of outcome variables. A multiple logistic regression model was conducted to test the association between ability to return to activity, needle length, needle gauge, fenestration count, age, procedure type, gender, and if the patient was an athlete or not. In addition, nonparametric ANOVA (to compare groups without adjusting for confounding variables) and ANCOVA (to compare groups while adjusting for confounding variables) tested differences between procedure types for functional change after controlling for needle length, needle gauge, fenestration count, age, gender, and if the patient was an athlete or not. The rank transform approach to nonparametric methods was used as a combination of PROC RANK and PROC GLM in SAS. Several longstanding nonparametric tests including Kruskal-Wallis are either exactly equivalent to rank transform tests or are nearly equivalent to them (https://www.lexjansen.com/wuss/2009/anl/ANL-Hobbs.pdf). Nonparametric ANCOVA was conducted to test group differences while controlling for confounding factors in cases with the assumption of no interaction between groups and confounding factors. The Wilcoxon test was used for the marginal models to test differences between procedure types for pain change and function change. All statistical tests at $p \leq 0.05$ were considered significant.

RESULTS

A total of 680 patients met the requirements of the initial CPT code query; of these, 343 patients met inclusion criteria. Most patients were female (64.7%, n = 222), did not have diabetes (96.5%, n = 331), and had a mean age of 36 years (SD = 16.7).

The total number of unique procedures was 598. Dry needling represented 62.8% (n = 375) of all procedures, followed by autologous whole blood injections (30.3%, n = 181), prolotherapy (5.0%, n = 30), and needle tenotomy (1.8%, n = 11). The mean fenestration count per procedure was 44.7 (SD = 25.8). For those undergoing autologous whole blood injections or prolotherapy, the mean injectate amount was 14.83 mL (SD = 8.86). Most procedures were performed on nonsmokers (86.9%, n = 520) and non-competitive athletes (65.0%, n = 388).

Most procedures that had follow-up visits (61.3%, n = 367) resulted in the patient reporting their most recent treatment was associated with diminished pain (73.0%, n = 268); 16.6% (n = 61) reported no change, 1.3% (n = 5) reported increased pain, and 9.0% (n = 33) did not have a response recorded. Amongst those who had a follow-up after prolotherapy, 81.0% (n = 17) reported diminished pain and 19.0% (n = 4) did not have a response recorded. Amongst those who had a follow-up after autologous whole blood injections, 79.6% (n = 113) reported diminished pain, 0.7% (n = 1) reported increased pain, 15.5% (n = 22) reported no change, and 4.2% (n = 6) did not have a response recorded. Amongst those who had a follow-up after needle tenotomy, 42.9% (n = 3) reported diminished pain, 42.9% (n = 3) reported no change, and 14.3% (n = 1) did not have a response recorded. Amongst those who had a follow-up after dry needling, 68.5% (n = 135) reported diminished pain, 2.0% (n = 4) reported increased pain, 18.3% (n = 36) reported no change, and 11.2% (n = 22) did not have a response recorded.

Of those who reported diminished pain amongst all procedures, 51.9% (n = 139) reported a percentage of pain improvement and 3.7% (n = 10) reported improvement in functionality. The mean decrease in pain was 63.0% (SD = 27.11). The mean increase in functionality was 57.5% (SD = 32.43).

Most patients were able to return to activity by follow-up (47.4%, n = 172), with 9.1% (n = 33) having not yet returned to activity and 43.5% (n = 158) without a response documented. Of those who returned to activity, the time to return was documented for 26.9% (n = 46) with a mean return to activity of five weeks (SD = 2.43). Amongst procedure types, those that underwent autologous whole blood injection had the highest proportion able to return to activity (60.7%, n = 85), with 7.86% (n = 11) having not yet returned to activity and 31.4% (n = 44) without a status documented. Of those that underwent dry needling, 40.5% (n = 79) had returned to activity, 10.7% (n = 11) had not yet returned to activity, and 48.7% (n = 95) did not have a status documented. Of those that underwent prolotherapy, 38.1% (n = 8) had returned to activity, 4.8% (n = 1) had not yet returned to activity, and 57.1% (n = 12) did not have a status documented. Of those that underwent needle tenotomy, 100% (n = 7) did not have a status documented. Amongst those who commented on adherence to post-procedural therapy regimen at follow-up (63.2%, n = 232), 85.8% (n = 199) were compliant, 11.2% (n = 26) were semi-compliant, and 3.0% (n = 7) were noncompliant.

DISCUSSION

This study was unique in that it investigated the effectiveness of tendon fenestration and injection procedures for treatment of tendinosis treated at a sports medicine clinic. Prior studies investigated their use at specific anatomic locations.[12-15] As 73% of patients reported their most recent treatment was associated with diminished pain, this study suggested that ultrasound-guided tendon fenestration and injection procedures can be effective at diminishing pain caused by tendinosis with a low likelihood of worsening patient pain. This was particularly common among patients with prolotherapy or autologous whole blood injections, 81.0% and 79.6% of whom reported diminished pain, respectively. This was consistent with previous studies of specific anatomic locations.[12-15] Utilization of standardized pain measurement scales, such as the visual analog scale, during documentation would allow future studies to compare response to treatment amongst procedure types. While this study lacked long-term follow-up data, clinic physicians' discussions with patients led them to believe there may be benefit up to a year after these procedures, especially if post-procedural therapy regimens are continued during this time.

This study suggested that ultrasound-guided tendon fenestration and injection procedures, particularly autologous whole blood injection, were effective at allowing patients to return to activity by follow-up; however, inconsistent documentation of return to activity status in this study warranted further investigation on this topic.

Once conservative management failed, no practice guidelines existed for determining when it is appropriate to use percutaneous dry needling, needle tenotomy, autologous whole blood injection, or prolotherapy. Providers at the clinic in which the study was conducted would recommend these procedures based on a patient's history of failed conservative management, evidence of calcification demonstrated on ultrasound, and timeline for recovery (e.g., "in-season" for competitive athletes). Patient variables such as degree of pain, function loss, and religious beliefs against the use of blood products also were considered before a physician recommended a specific procedure. These factors led to small sample sizes for those undergoing prolotherapy and needle tenotomy and limited bivariate and multivariate analyses of patient and procedure variables.

Based on these findings, future research should investigate the cause of loss to follow up and response to treatment of those undergoing these procedures. Contributing to this problem, patients at the sports medicine clinic at which the study was conducted were instructed that they did not need a follow-up if their symptoms were resolved after some of the procedures. Other known reasons for loss to follow up included patients following up with the orthopedic specialist that referred them to the clinic, or being a member of a local sports team that was covered already by the clinic physicians and having their response to treatment observed but undocumented.

Regarding those referred by orthopedic specialists, a future study of interest would be to investigate the proportion of patients that avoided surgical intervention. Surgery commonly is reserved for cases of tendinosis that have failed minimally invasive interventional procedures.[2,8] Surgery for tendinosis focuses on reestablishing tendon vascularity and excision of fibrotic adhesions and areas of failed healing.[13] Surgical interventions for tendinosis require a period of 4 to 12 months before patients can return to activities, depending on the tendon repaired.[14,16-17] Other areas of interest for future studies include investigating response to treatment by pre-procedural pain severity and time elapsed from symptoms onset to undergoing a procedure.

CONCLUSIONS

Most patients who underwent a tendon fenestration or injection procedure reported diminished pain and a return to activities at follow-up. Autologous whole blood injection may have a better likelihood of decreasing patient pain and allowing patients to return to activity by follow-up than dry needling, prolotherapy, or needle tenotomy.

REFERENCES

1 2018 Physical Activity Guidelines Advisory Committee. 2018 Physical Activity Guidelines Advisory Committee Scientific Report. Washington, DC: US Department of Health and Human Services, 2018.
2 Rodenberg RE, Bowman E, Ravindran R. Overuse injuries. Prim Care 2013; 40(2):453-473. PMID: 23668653.
3 Maffulli N, Wong J, Almekinders LC. Types and epidemiology of tendinopathy. Clin Sports Med 2003; 22(4):675-692. PMID: 14560540.
4 Leadbetter WB. Cell-matrix response in tendon injury. Clin Sports Med 1992; 11(3):533-578. PMID: 1638640.
5 Baquie P, Brukner P. Injuries presenting to an Australian sports medicine centre: A 12-month study. Clin J Sport Med 1997; 7(1):28-31. PMID: 9117522.
6 Herring SA, Nilson KL. Introduction to overuse injuries. Clin Sports Med 1987; 6(2):225-239. PMID: 3319201.
7 Rabago D, Best TM, Zgierska AE, Zeisig E, Ryan M, Crane D. A systematic review of four injection therapies for lateral epicondylosis: Prolotherapy, polidocanol, whole blood and platelet-rich plasma. Br J Sports Med 2009; 43(7):471-481. PMID: 19028733.
8 Chiavaras MM, Jacobson JA. Ultrasound-guided tendon fenestration. Semin Musculoskelet Radiol 2013; 17(1):85-90. PMID: 23487340.
9 Lin MT, Chiang CF, Wu CH, Huang YT, Tu YK, Wang TG. Comparative effectiveness of injection therapies in rotator cuff tendinopathy: A systematic review, pairwise and network meta-analysis of randomized controlled trials. Arch Phys Med Rehabil 2019; 100(2):336-349 PMID: 30076801.
10 Creaney L, Wallace A, Curtis M, Connell D. Growth factor-based therapies provide additional benefit beyond physical therapy in resistant elbow tendinopathy: A prospective, single-blind, randomised trial of autologous blood injections versus platelet-rich plasma injections. Br J Sports Med 2011; 45(12):966-971. PMID: 21406450.
11 Amable PR, Carias RBV, Teixeira MVT, et al. Platelet-rich plasma preparation for regenerative medicine: Optimization and quantification of cytokines and growth factors. Stem Cell Res Ther 2013; 4(3):67. PMID: 23759113.
12 Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform 2009; 42(2):377-381. PMID: 1829686.
13 Longo UG, Ronga M, Maffulli N. Achilles Tendinopathy. Sports Med Arthrosc Rev 2018; 26(1):16-30. PMID: 19440139.
14 Anderson D, Taunton J, Davidson R. Surgical management of chronic Achilles tendinitis. Clin J Sport Med 1992; 2:38-42.
15 Stoychev V, Finestone AS, Kalichman L. Dry needling as a treatment modality for tendinopathy: A narrative review. Curr Rev Musculoskelet Med 2020; 13(1):133-140. PMID: 31942676.
16 Khan KM, Visentini PJ, Kiss ZS, et al. Correlation of ultrasound and magnetic resonance imaging with clinical outcome after patellar tenotomy: prospective and retrospective studies. Victorian Institute of Sport Tendon Study Group. Clin J Sport Med 1999; 9(3):129-137. PMID: 10512340.
17 Nirschl RP, Pettrone FA. Tennis elbow. The surgical treatment of lateral epicondylitis. J Bone Joint Surg Am 1979; 61(6A):832-839. PMID: 479229.

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Brief Report

Most Online Resources for Home Suture Removal are Poor in Quality

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ABSTRACT

Introduction. At home suture or staple removal can be stressful for patients and may lead some to seek out additional instruction via online resources as an adjunct to what was explained to them by their provider. The purpose of this study was to examine the existing online resources available to patients who may be interested in or have been instructed to remove sutures at home after a simple procedure, such as a skin biopsy or excision.

Methods. A systematic search was conducted using internet search engines to identify videos and webpages targeting at home suture removal instruction. The DISCERN instrument was used to evaluate the information quality of each included resource.

Results. There was no statistically significant difference between average DISCERN scores for videos and webpage resources, and the majority were rated poor in quality.

Conclusions. The online resources for at home suture and staple removal were often not comprehensive and were below the standard quality for written information. Health care providers should consider referring their patients to validated online sources for suture removal to prevent misinformation and improve patient safety.

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INTRODUCTION

Many in-office dermatological procedures use sutures, such as biopsies, small excisions, and cyst removals. Given the COVID-19 pandemic, at home suture removal for small procedures or those with few sutures may potentially be beneficial for patient and provider safety. A study done by Brown et al.[1] concluded that most patients are willing and able to remove their own sutures when provided with a suture removal kit following a simple laceration repair. Additional studies also support that with proper instruction, suture and staple removal can be successfully completed at home, which can reduce the demand for in-clinic removal, including potential lost wages and transportation costs.[2-4] Patients may want additional resources to supplement their knowledge of how to remove sutures at home, even when provided instructions, and may often turn to online resources. Therefore, health care professionals should be more aware of the health-related information available online and should guide patients to reliable sources. Authors of several studies have previously analyzed YouTube as an educational source for patients seeking health-related content on common dermatologic conditions, treatments, and procedures.[5-7] However, the content and quality of at home suture removal has not been fully characterized. The objectives of this study were to analyze the content and quality of online YouTube videos and webpage sources on at home suture removal. Because there is no comprehensive guide aimed at patients, the authors hypothesized that the content and quality of health-related information would often be incomplete and of poor quality.

METHODS

A systematic search was conducted in October 2021 and utilized internet searches to identify online video and webpage resources using search terms related to suture removal. Search terms included: "suture removal procedure," "how to remove sutures," "removing skin staples," "how to take out stitches," and "at home suture removal." The first 20 videos and 20 webpages based on search engine "most relevant" criteria were retrieved for each query, resulting in a total of 100 videos and 100 webpages for initial assessment. Resources were included in the study if content delivery was mainly informational. Duplicated resources were removed, and resources categorized as advertisement, as well as those not providing education on suture removal, were excluded from the analysis (Figure 1).

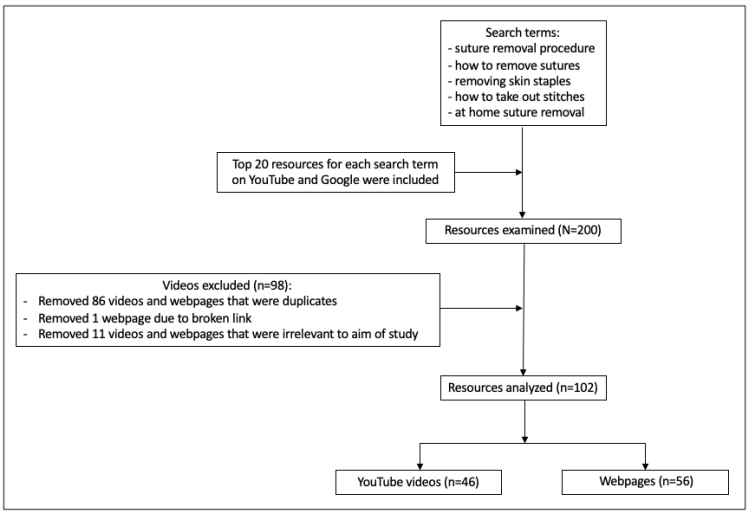

Figure 1. Visual representation of online resource selection process.

Resource characteristics were collected and graded using the DISCERN instrument,[8] a standardized 15-question screening tool designed to assess the quality of information on treatment choices. Each question is graded on a five-point scale relating to reliability of the resource and the content discussed. The DISCERN instrument is a validated screening tool that is designed to assist consumers of health information in judging the quality of information regarding treatment choices without need for specialist knowledge. Reliability of a source of information is determined using 15 standardized questions, graded on a five-point scale from No (1), Partially (2-4), to Yes (5). Each question represents a separate criterion of information quality. The first eight questions address reliability of the source while questions 9-15 examine the specific details presented on treatment choices. The overall DISCERN score is calculated based on the sum of each five-point criterion, which produces scores ranging from a minimum of 15 to a maximum of 75. The overall DISCERN scores for each individual resource then correlate to information quality, ranging from very poor (15-26),

poor (27-38), fair (39-50), very good (51-62), to excellent (63-75).[8]

Each resource was independently scored by two authors (E.H.F. and B.V.H.), with a Cohen κ interrater reliability coefficient of 0.663, indicating a substantial agreement.[9] Statistical analysis was performed using Fisher's exact tests to determine differences between groups. A two-sample t-test was used to compare DISCERN scores between video and webpage resources. A p-value of <0.05 was considered statistically significant.

RESULTS

Of the 200 resources retrieved in the initial search, 98 resources were removed for the following reasons: 86 were duplicates, 9 were unrelated to the research question, 2 were advertisements, and 1 was a non-functional web page. A total of 46 video and 56 webpage resources (n = 102) met inclusion criteria for further analysis (Figure 1). The overall mean DISCERN score for videos was 38±8.5 (poor quality), compared to 40±10.0 for webpage resources (fair quality; Figure 2). There was no significant difference in average DISCERN score (Table 1). Video resources were more geared toward providers than were webpage resources (54% vs. 30%; $p < 0.05$), more likely to demonstrate instruction on real patients (55% vs. 13%; $p < 0.05$), and more likely to exhibit instruction overall (91% vs. 41%; $p < 0.05$). Timing for suture removal by body region was discussed more often in webpage resources compared to video resources (45% vs. 2%; $p < 0.05$; Table 1).

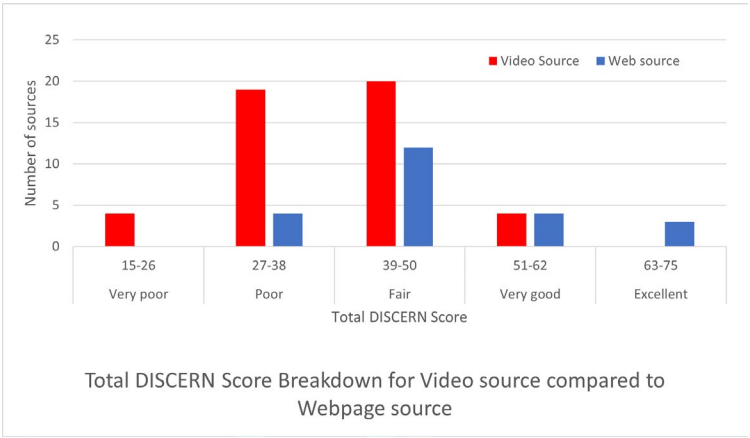

Figure 2. Total DISCERN score breakdown for video source compared to webpage source.

Table 1. Characteristics of included videos and webpage resources on suture removal.

	Video (n = 46)	Webpage (n = 56)	p Value
Mean upload year (SD)	2017 (2.6)	2014 (15.2)	
Mean video length, min (SD)	4.6 (3.5)	-	
Source (%)			
Organization	19	50	0.0018
Academic center	7	12	0.5063
Individual healthcare provider	48	24	0.1631
Independent user	26	4	0.0012
Information geared towards (%)			
Patients	46	70	0.7113
Providers	54	30	0.0165
Mean DISCERN score (SD)	38 (8.5)	40 (10.0)	0.4320
Resources mentions (%)			
Sterile technique	46	54	0.5508
Different types of sutures	8	37	0.5318
Post-procedure care	4	50	0.2307
Timing for suture removal by body region	2	45	< 0.0001
Provided instruction (%)	91	41	< 0.0001
Removal supplies (%)			
Kits/clinic supplies	62	65	1
Home supplies	38	35	1
Demonstrated on (%)			
Live patient	45	39	0.7941
Models/diagrams	55	13	0.0013
None	0	48	< 0.0001

DISCUSSION

To our knowledge, this may be the first in-depth published study to objectively assess the quality and content of video and webpage resources pertaining to at home suture removal. The average videos investigated in this study were classified as poor in quality, while the average webpages were classified fair in quality; however, these differences were not statistically significant. This small discrepancy may be due to the fact that a majority of the video resources were created by an individual healthcare provider, which included physicians and nurses. Because the video resources were created by individuals, there was no standardization. Half of the webpage resources were created by organizations, which may have lead to a higher DISCERN rating due to multiple creators being involved. Most resources in both categories were geared more toward providers rather than to patients. There is a need for more patient-directed sources, especially YouTube videos, which are more likely to show live demonstrations that may be useful to patients seeking this information. Webpages may be a more reliable source for suture removal than videos if patients are asking for recommended resources, as evidenced by a higher overall mean DISCERN score in this study.

CONCLUSIONS

While in certain situations home suture removal may be preferred by patients or recommended by health care providers, such as during the COVID-19 pandemic, our results suggested that there is a paucity of comprehensive and accurate online resources for patients to access. Healthcare providers should consider referring their patients to specific validated online resources when they seek to educate them on suture removal. This likely will maximize patient education and confidence in the process, as well as improve outcomes and patient safety.

REFERENCES

[1] Brown A, Nikroo N, Yassin S, et al. Can emergency department patients safely remove their own sutures at home? Am J Emerg Med 2021; 46:718-719. PMID: 33082064.
[2] Macdonald P, Primiani N, Lund A. Are patients willing to remove, and capable of removing, their own nonabsorbable sutures? CJEM 2012; 14(4):218-223. PMID: 22813395.
[3] Seger EW, Neill BC, Patel S, Siscos SM, Hocker TLH. Patients are willing and successful with home suture removal after mohs surgical procedures. Dermatol Surg 2022; 48(7):720-725. PMID: 35451375.
[4] Quinn BJ, Mancinelli A, Rooney-Otero K, et al. Scalp staples placed in a pediatric emergency department: Feasibility and benefits of home removal. Pediatr Emerg Care 2022; 38(3):e1143-e1146. PMID: 32842133.
[5] Guzman AK, Wang RH, Nazarian RS, Barbieri JS. Evaluation of YouTube as an educational resource for treatment options of common dermatologic conditions. Int J Dermatol 2020; 59(3):e65-e67. PMID: 31631334.
[6] Seger EW, Ho BV, Neill BC, et al. Most patient-oriented videos do not comprehensively explain mohs micrographic surgery. J Drugs Dermatol 2022; 21(2):204-205. PMID: 35133111.
[7] Gorrepati PL, Smith GP. DISCERN scores of YouTube information on eczema treatments. J Am Acad Dermatol 2021; 85(5):1354-1355. PMID: 33181240.
[8] Charnock D, Shepperd S. Learning to DISCERN online: Applying an appraisal tool to health websites in a workshop setting. Health Educ Res 2004; 19(4):440-446. PMID: 15155597.
[9] McHugh ML. Interrater reliability: The kappa statistic. Biochem Med 2012; 22(3):276-282. PMID: 23092060.

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