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Instagram and Anterior Cervical Discectomy and Fusion Surgery: An Analysis of Social Media and Its Relationship to Patient Perception of Surgery

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ABSTRACT

Background: Multiple studies have utilized social media to evaluate patient-perceived outcomes after surgery. To the authors knowledge, no published studies have evaluated patient-perceived outcomes after ACDF surgery through social media analysis.

Objective: To analyze posts shared on Instagram referencing anterior cervical discectomy and fusion (ACDF) for tone, gender, activities of daily living (ADLs), rehabilitation, incision, pain, neurological injury, complications, and content of post.

Study Design: Cross-sectional study.

Methods: Public instragram posts were isolated and evaluated using the hashtag "#ACDF." Each individual post was analyzed by the authors for the variables previously listed. In total, 529 posts were included for investigation and analysis of patient perception of ACDF through social media.

Results: Of all included posts, approximately 95% of posts had a positive tone. There was statistical significance between positive tone and ADLs ($P = 0.0379$) and rehabilitation ($P = 0.0118$), as well as negative tone with persistent pain ($P \leq 0.001$), incision/scar ($P = .0143$), and surgical complications (need for reoperation/nonunion/infection) ($P = 0.0259$).

Conclusions: Reported outcomes after ACDF have not been evaluated through social media avenues. This analysis of patients sharing their experiences on social media after ACDF demonstrates that returning to ADL, rehabilitation, pain, and incisions are of the utmost importance to patients.

Level of Evidence: 3.

Other & Special Categories

Keywords: ACDF, social media, spine, outcomes, Instagram

INTRODUCTION

Social media's rise in popularity began with platforms such as MySpace and Friendster, which made their appearances in the early 2000s.[1] Although MySpace became the first social media platform to surpass 1 million monthly users, Facebook, YouTube, WeChat, Instagram, and Tumblr are now the top 5 most utilized social media platforms in the world.[1] The evolution of social media over the past 2 decades has been marked by increased ability to share words, videos, photographs, diagrams, and interactive quizzes and polls.[1] As a result, social media has become a space not only for interpersonal communication, but also for running organizations, building businesses, and disseminating information. Social media platforms have additionally become a widely accessed source of news information, with 23% of Americans stating that they often obtain news from social media,[2] whereas 28% of Instagram users, 32% of YouTube users, 54% of Facebook users, and 59% of Twitter users regularly obtain news from these sites.[2] As popular sources of information, social media platforms may be an invaluable tool for dissemination of health care–related content.

A poll conducted by Pew Research Center found that 80% of internet users have used online sources for health-related information.[3] This poll also demonstrated that 25% of adults have read about other's experiences with the health care system or with their own medical issues.[3] The internet has also been used to find other individuals with health concerns similar to those of the searcher, to review rankings of health care providers and facilities, or to research drugs and treatments.[3] Health care providers and other members of the health care industry can also harness the popularity of social media for their own purposes, such as professional networking or patient education.[4]

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Previous publications have evaluated patient's use of social media following orthopedic procedures.[5–10] These studies evaluated patient-perceived outcomes through focus on "hashtags," which are search terms specific to certain social media sites that allow for focused searches or filtration of specific content.[11] "Hashtags" begin with a pound, or hash, sign (#) and are followed by a phrase for the relevant tagged topic. For instance, a hashtag for orthopedic surgery may appear as "#orthopedicsurgery." Hashtags allow for easy, accessible searches on platforms such as Instagram.[11] This interface creates an ideal avenue not only for prospective patients to search for content relevant to their condition, but also for conduction of analyses of patient perceptions following specific procedures.

Despite a growing body of literature examining the influence of social media posts on patient-perceived outcomes, limited literature exists examining patient-perceived outcomes following anterior cervical discectomy and fusion (ACDF), a procedure performed nearly 137,000 times in the United States each year.[12] ACDF is most commonly performed for patients with symptomatic cervical disc herniation or spondylosis that has failed conservative treatment.[13–15] Patient-reported success of ACDF can range from 85% to 95%; however, estimated morbidity rates range from 13.2% to 19.3%.[12,14]

The purpose of the present study is to evaluate the content posted on Instagram by patients who have undergone ACDF to determine their likely perceived outcomes. This method has been successfully utilized in previous studies examining hip arthroscopy, pediatric scoliosis treatment, anterior cruciate ligament surgery, shoulder and elbow surgery, total joint arthroplasty, and spinal fusion.[5–10] It was hypothesized that the majority of posts pertaining to ACDF would display a positive tone regarding patient outcomes based on previously reported patient-perceived success rates.[14]

MATERIALS AND METHODS

Picodash (San Francisco, CA), a third-party application, was used to search Instagram for relevant posts containing "#ACDF" within the associated text. No ethical approval was necessary for this study as there was no identifying information and the accessed posts were publicly available. Two reviewers (J.M.R. and B.M.H.) evaluated all posts and determined tone positivity/negativity. Prior to statistical analysis, all posts were agreed upon by the reviewers. Disagreements between reviewers were resolved through formal discussion with the remaining authors.

Inclusion and Exclusion Criteria

Third-party application use identified 1006 posts that met the original search criteria. We excluded 477 posts due to their association with personal physician accounts, health accounts, or industry accounts intended for advertisement. Among the remaining 529 posts, we assessed the following variables: gender, tone, timing of the post relative to surgery, traumatic injury, post of medical imaging, reference of surgical incision/scar, surgical complication reference, resulting neurological deficits, discussion of rehabilitation, pain, and activities of daily living (ADL).

Statistical Analysis

Data were entered into Microsoft Excel 2011 (Microsoft Corporation, Redmond, WA). Statistical analyses were performed using SAS 9.4 software (SAS Institute, Cary, NC). X^2 testing was used for categorical variables. To identify independent predictors for positive post tone, we conducted data analysis in 2 phases. First, individual covariates were assessed using X^2 testing for positive tone. Second, parameters independently predictive of positive tone ($P < 0.05$) on bivariate analysis were combined into a multivariable logistic regression model generating relevant OR and 95% CIs. Model calibration was assessed using the Hosmer-Lemeshow test (with $P > 0.05$ indicating adequate calibration).

RESULTS

Among the 529 reviewed posts, 405 (77%) were posted by women and 503 (95%) contained positive tone. The majority of posts (504, 95%) were posted after surgery and few (60, 11%) contained radiographic imaging. Only 10 (2%) posts referenced surgical complications, 20 (4%) referenced trauma, and 31 (6%) referenced ensuing neurological deficits. References to a surgical incision/scar were found in 90 (17%) posts and to pain in 112 (21%) posts. Discussions of rehabilitation and ADLs were found in 130 (25%) and 157 (30%) posts, respectively. Group characteristics are depicted in Table 1.

In comparative analysis, postoperative posts ($P < 0.001$) and posts referencing rehabilitation ($P = 0.0118$) or ADLs ($P = 0.0379$) were more likely to be positive. In contrast, posts referencing surgical complications ($P = 0.0259$), incision/scar ($P = 0.0143$), and pain ($P < 0.0001$) were more likely to contain negative overall tone. References to trauma, neurological deficit, and inclusion of medical imaging were not significantly associated with tone. Multivariable analysis identified postoperative timing (OR

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Table 1. Patient characteristics.

Variables Evaluated on Social Media Posts	Tone of Instagram Post (N = 529)		
	Positive (n = 503)	Negative (n = 26)	P
Gender			0.8585
Male	118 (23)	5 (19)	
Female	384 (76)	21 (81)	
Timing of post			<0.001
Preoperative	19 (4)	6 (23)	
Postoperative	484 (96)	20 (77)	
Surgical complication	8 (2)	2 (8)	0.0259
Rehabilitation	129 (26)	1 (4)	0.0118
Activities of daily living	154 (31)	3 (12)	0.0379
Incision/scar	81 (16)	9 (34)	0.0143
Pain	93 (18)	19 (73)	<0.001
Imaging	59 (12)	1 (4)	0.2164
Trauma	20 (4)	0 (0)	0.2999
Neurological deficit	29 (6)	2 (8)	0.6833

Note: Data presented as *n* (%).

18.055, $P < 0.0001$), posts referencing ADLs (OR 4.610, $P = 0.0263$), and posts referencing rehabilitation (OR 6.620, $P = 0.0480$) to be strongly associated with positive tone. Posts referencing surgical incisions/scars (OR 0.242, $P = 0.0061$), pain (OR 0.058, $P < 0.001$), and complications (OR 0.117, $P = 0.0322$) were associated with a decreased likelihood of positive tone. Hosmer-Lemeshow testing of this logistic regression model revealed adequate calibration ($P = 0.3138$) (Table 2).

DISCUSSION

As westernized medicine transitions to identifying "patient-centric" issues and becoming more value-based, clinicians must identify which variables are important to patients to improve outcomes after surgery. Social media continues to become a popular avenue to distribute information and presents an opportunity to identify areas of improvement in the perioperative and postoperative periods. Our analysis of social media posts after ACDF revealed statistical significance between positive tone of post and ADLs and improvement in rehabilitation. In contrast, negative tone was evident with continued postoperative pain, complications (nonunion/infection/need for reoperation), and dissatisfaction with surgical incision. Other social media analyses of perceived outcomes after spine surgery also demonstrated the importance of returning patients to ADLs and improving rehabilitation; however, patients are much more cognizant of their surgical incisions after ACDF in contrast to lumbar spinal fusion.[16]

Overall, this social media analysis shows a large positive tone when describing ACDF surgery in patients. More specifically, patients had a positive tone when making progress in their ADLs and rehabilitation. They had a negative tone when they described persistent pain, dissatisfaction with their surgical incision, or complications (infection/repeat surgery/nonunion). These data indicate that patients feel their surgery was a success when these variables are optimized. Physicians should utilize this information to be aggressive with rehabilitation, emphasize ADLs early in postoperative phase, spend time with cosmetic closure, and continue to utilize sound indications leading to positive perceived outcomes of ACDF surgery.

Limitations

Social media studies require some degree of subjective evaluation, thus opening the possibility for selective bias within the post analyses.[17] To mitigate the degree of bias, posts in which the tone was difficult to discern were evaluated by multiple authors and agreed upon as a team. This was felt to be the most reasonable approach to resolving this issue. The authors recognize that "tone" is a spectrum, with differing degrees of positivity/negativity. However, to allow for statistical analysis and a simpler approach to obtain clarity within the manuscript, we attempted to define the *overall* tone of the post as positive or negative. This was based on the patient's satisfaction within the post.

Additionally, social media users are not likely to be representative of the entire population. Social media users are generally younger, while patients who routinely undergo ACDF surgery are frequently older than

Table 2. Bivariate and multivariable logistic regression analysis of positive tone.

Variables Evaluated on Social Media Posts	Univariate Logistic Regression			Multivariable Logistic Regression		
	OR	95% CI	P	OR	95% CI	P
Gender, female vs male	0.777	0.287–2.105	0.6197	-	-	-
Timing of post, post- vs preoperative	7.634	2.754–21.276	<0.001	18.055	4.569–71.349	<0.0001
Incision/scar, yes vs no	0.363	0.156–0.842	0.0182	0.242	0.088–0.668	0.0061
Pain, yes vs no	0.084	0.034–0.205	<0.001	0.058	0.021–0.162	<0.0001
Complications, yes vs no	0.194	0.039–0.963	0.0449	0.117	0.017–0.833	0.0322
Neurological deficits, yes vs no	0.734	0.165–3.255	0.6837	-	-	-
Activities of daily living, yes vs no	3.383	1.001–11.436	0.0499	4.610	1.198–17.750	0.0263
Rehabilitation, yes vs no	8.623	1.157–64.277	0.0355	6.620	1.005–55.780	0.0480

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65 years. Nonetheless, the authors still believed there was valuable information to ascertain from the social media posts for physicians to utilize in patient care. Additionally, we did not stratify the indications for the surgery or the levels of ACDF included. This information was not routinely included in posts. While we hoped to include this information, it was not an option with the data we were able to obtain. Therefore, given the limited or lack of radiographic images, it was not possible to subcategorize spine fusions based on levels, pathology, or quality of fusion accurately.

CONCLUSION

This social media analysis of patients sharing their experience after ACDF surgery demonstrates a positive attitude toward this specific surgical procedure. Positive tone was associated with ADLs and rehabilitation postoperatively. In contrast, a negative tone was associated with incision/scar and postoperative pain. Understanding the variables that are important to ACDF patients may assist surgeons in managing expectations and improving outcomes after ACDF.

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