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ORIGINAL ARTICLE

The effect of pain catastrophizing and kinesiophobia on the result of shoulder arthroscopy

Ağrıyı felaketleştirmenin ve kinezyofobinin omuz artroskopisi sonuçları üzerine etkisi

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Summary

Objectives: Emotional and cognitive factors have been shown to affect pain, and one of the main factors in the development of this effect is pain catastrophizing. The present study aims to determine the effect and frequency of the pain catastrophizing in shoulder lesions and to examine the association between pain catastrophizing and to assess the pre-operative and post-operative functional outcomes.

Methods: A total of 114 patients who underwent shoulder arthroscopy were included study. Pain catastrophizing scale, Tampa kinesiophobia scale, visual analog scale, and University of California at Los Angeles shoulder scale were used for evaluating patients' pre- and post-operative pain and functional situation.

Results: Pain catastrophizing was detected 42 of 114 patients (37%). Kinesiophobia was higher in patients who catastrophized shoulder pain (p<0.0001). If participant had a labrum (p=0.038), supraspinatus (p=0.043), or biceps pathology (p=0.032), catastrophization was determined more often. There was catastrophization in 50% of patients with post-operative University of California at Los Angeles score which was evaluated as fair/poor (p=0.039).

Conclusion: Pre- and post-operative results of the current study strengthened the data about importance of catastrophization. Catastrophization (+) patient group had lower functional capacity outcomes than that of the catastrophization (–) patient group. Decreased levels of pain catastrophizing and kinesiophobia in surgically and conservatively treated patients will result in more satisfactory clinical outcomes.

Keywords: Arthroscopic shoulder surgery; catastrophization; rotator cuff; shoulder pain.

Özet

Amaç: Duygusal ve bilişsel faktörlerin ağrıyı etkilediği gösterilmiştir ve bu etkinin gelişimindeki ana faktörlerden biri ağrıyı felaketleştirme durumudur. Bu çalışmada, omuz lezyonlarında ki ağrıyı felaketleştirme durumunun ve sıklığının belirlenmesi, ağrıyı felaketleştirme durumu ile ameliyat öncesi ve ameliyat sonrası fonksiyonel sonuçları değerlendirmeyi amaçladık.

Gereç ve Yöntem: Omuz artroskopisi yapılan toplam 114 hasta çalışmaya dahil edildi. Hastaların ameliyat öncesi ve sonrası ağrı ve fonksiyonel durumlarını değerlendirmek için ağrı felaketleştirme ölçeği, Tampa kinezyofobi ölçeği, görsel analog skala ve Los Angeles California Üniversitesi omuz skalası kullanıldı.

Bulgular: Katastrofizasyon, 114 hastanın 42'sinde (% 37) saptandı. Kinezyofobi ağrıyı felaketleştiren hastalarda daha yüksekti (p<0.0001). Hastaların labrum (p=0,038), supraspinatus (p=0,043) veya biseps patolojisi (p=0,032) varsa, ağrıyı felaketleştirme daha sık belirlendi. postoperatif Los Angeles Kaliforniya Üniversitesi skoru orta/zayıf olan hastaların % 50'sinde katastrofizasyon mevcuttu (p=0,039).

Sonuç: Bu çalışmanın ameliyat öncesi ve sonrası sonuçları felaketleştirmenin önemi hakkındaki verileri güçlendirmiştir. Felaketleştirme (+) hasta grubu Felaket (-) hasta grubundan daha düşük fonksiyonel kapasite sonuçlarına sahipti. Cerrahi ve konservatif tedavi edilen hastalarda ağrıyı felaketleştirmenin azalması ve kinezyofobi düzeylerinde azalma, daha tatmin edici klinik sonuçlara yol açacaktır.

Anahtar sözcükler: Artroskopik omuz cerrahi; katastrofizasyon; rotator manşon; omuz ağrısı.

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Introduction

Sixty million people worldwide suffer from chronic pain, which is a gradually growing problem all over the world. One-third of adults reported having joint pain in the past 30 days and required medical examination, more than a quarter of these adults suffer from shoulder pain.[1] Furthermore, a comprehensive survey reported that neck and shoulder pain were the most common subjective symptoms in the respective countries.[2]

Shoulder pain may occur due to trauma and also degenerative processes such as rotator cuff rupture and biceps tendinitis. The mechanisms that lead to the development of pain are various; however, the effect of these mechanisms in the human body is similar. Pain signals are transmitted to the central nervous system through released pain mediators with the stimulation of the free nerve endings; in other words, pain receptors. The central nervous system evaluates the location, duration, and intensity of the stimulus, but previous experiences and environmental and social factors affect the outcomes differently.[3,4]

Consequently, treating the underlying factor is essential for pain management but not enough for the complete treatment of the patient. If the pain is out of proportion to physical examination, the patient's perception of pain must be evaluated. Emotional and cognitive factors are proven to have an impact on the experience of pain, and pain catastrophizing is characterized as one of the main factors in the development of this impact.[5] Catastrophizing has been described as a negative cognitive-affective response to pain or pain expectancy and has been associated with several critical pain-related outcomes[6,7] such as emotional stress, anxiety, depression, analgesic intake, hospital stay, and occupational injuries.[8] In chronic pain patients with depressive disorder, concurrent treatment of the primary disease and depression was shown to affect the outcome of the treatment positively.[9]

The present study aims to determine the effect and frequency of the pain catastrophizing in shoulder lesions and to examine the association between preoperative and post-operative pain catastrophizing and to assess the functional outcomes.

Material and Methods

Ethical approval was obtained for the study protocol from the ethical committee. Written informed consent was obtained from each patient. The study was conducted in accordance with the principles of the Declaration of Helsinki. It was planned to collect the study data within 1 month. In the previous month, outpatient records were examined and it was found that 165 patients completed the 1 year follow-up examination. Based on the outpatient records and pain catastrophizing rate of 31% reported from the previous study,[6] we estimated a sample size 111 candidates to reach an estimate that was within a 5% confidence limit.

A total of 114 patients (52 males and 62 females), who underwent shoulder arthroscopy in our clinic between January 2015 and February 2016, were included in the study. Patients with fractures around the shoulder and patients with oncologic disorders were excluded from the study. The age of the participants ranged from 16 to 83 years, with a mean age of 48.5 years. Of all the participants, only 74 of them could be included in the assessment of the post-operative outcome as the remaining patients were unable or reluctant to participate in the assessment process.

As for the evaluation of the pain, the validity and reliability studies were conducted with pain catastrophizing scale (PCS),[10] the Tampa scale for kinesiophobia,[11] University of California-Los Angeles (UCLA) shoulder scale,[12] and visual analog scale (VAS)[13] and all the questionnaires were filled out by the patients without assistance.

PCS was developed by Sullivan et al.[14] in 1995 to identify negative thoughts and feelings of pain experienced by patients, and ineffective pain management strategies. The PCS is a Likert-type self-assessment scale consisting of 13 items, which evaluate between 0 and 4 points. The total score ranges from 0 to 52. It includes subscales of rumination, magnification, and helplessness. Higher scores on the scale indicate higher pain catastrophizing levels. A PCS score of over 30 points is considered positive for a clinically relevant outcome.

Tampa kinesiophobia scale consists of 17 questions and is used in diseases related to musculoskeletal injuries. The scale uses a 4-point Likert scoring system

Table 1. Baseline demographics and functional scores

	PCS (0–30)	PCS (31–52)	Total	p
Number of participant	72	42	114	–
Mean age	45.95	51.07	48.5	0.111
Male/female	39/33	13/29	52/62	0.020
Mean pre-operative visual analog scale	5.17 (68)	6.28 (39)	5.58 (107)	0.030
Mean post-operative visual analog scale	1.95 (49)	3 (25)	2.3 (74)	0.105
Mean pre-operative University of California-Los Angeles score	16.75 (53)	19.58 (34)	17.85 (87)	0.849
Mean post-operative University of California-Los Angeles score	28.57 (49)	27.04 (25)	28.05 (74)	0.065
Kinesiophobia**	59/72	40/42	99/114	<0.0001

PCS: Pain catastrophizing scale; *: The values in parentheses represent the number of patients surveyed; **: Kinesiophobia (+)/kinesiophobia (–).

(1=strongly disagree and 4=fully agree). The total score is calculated after the inversion of the 4, 8, 12, and 16 questions, and it ranges from 17 to 68. Higher scores on the scale indicate higher kinesiophobia levels. A TSK score of over 36 points is considered positive for a clinically relevant outcome.[11]

UCLA shoulder scale is a 35-point scale that measures the pain, function, patient satisfaction, active forward flexion, and strength of forward flexion. The scores that evaluate the pain and function range from 1 to 10, and the scores that evaluate active forward flexion, strength of forward flexion, and patient satisfaction range from 1 to 5 points. A total of 27 points and over in UCLA shoulder score indicate a good/excellent condition while a score of 27 points and below indicates a poor/fair condition.[12]

The VAS was used for evaluating the measurable and comparable amount of pain. The scale consists of a 10 cm line on which the patient can rate their own pain experience. A 10 cm line is drawn on a piece of paper, and the patient is asked to mark the point that fits best to their pain intensity. The length of the line from the beginning point to the patient's mark shows the intensity of the patient's pain.[13]

In the present study, we made a pre-operative and post-operative assessment of patients using the UCLA shoulder scale and VAS to determine the functional outcomes. All participants in the study were approved, and their rights were protected. Participants' identity information was kept confidential.

Statistics analysis

Participants' demographic information, anamnesis, diagnosis, and the procedures performed were all recorded before the study. Outcomes were analyzed with IBM SPSS statistics 23 (IBM, New York, United States) and descriptive statistics, t-test, and Mann–Whitney U-test (samples distributed normally) were conducted for continuous variables, and Chi-square analysis was conducted for categorical variables. $p<0.05$ ($p<0.05$) was considered statistically significant.

Results

Out of 114 patients (37%), 42 of them reported pain catastrophizing, and female participants reported higher levels of catastrophizing (39 out of 42, $p=0.013$). In light of this information, the participants were divided into two groups based on the presence and absence of pain catastrophizing as PCS (+) and PCS (–). These groups were subjected to all the statistical analyses.

When VAS scores were compared, the mean VAS score of the PCS (+) patient group was observed to be higher than the mean VAS score of the PCS (–) group, but the difference was not statistically significant. However, the kinesiophobia scores were higher in PCS (+) patient group compared to the scores of the PCS (–) group, and this result was statistically significant ($p=0.036$) (Table 1).

The separate examination of shoulder lesions revealed that the lesion type was also a critical factor in pain catastrophizing. Pain catastrophizing was reported more often in patients with labral lesions ($p=0.019$), pathologies of the supraspinatus ($p=0.043$), or biceps muscles ($p=0.016$) (Table 2).

Table 2. Diagnosis and number of patients

	PCS (0–30)	PCS (31–52)	Total	p
Labrum lesions	22	5	27	0.038
Slap lesion	23	20	43	0.112
Biceps pathology	30	27	57	0.032
Subscapularis pathology	13	8	21	0.604
Supraspinatus pathology	33	27	60	0.043
Shoulder impingement syndrome	39	29	68	0.165

PCS: Pain catastrophizing scale; *: Multiple pathologies in the same patient were calculated separately.

The mean period of follow-up of 74 patients was 16 months (12–28 months). Pain catastrophizing was reported in 50% of the patients with fair/poor UCLA scores during the post-operative period (p=0.039). On the contrary, there was no statistically significant difference between pre-operative and post-operative VAS scores.

Discussion

The main finding of this study is that the state of pain catastrophizing was determined in a significant amount in the patient group underwent shoulder arthroscopy, and its effect on functional outcomes was demonstrated. Another important finding is the detection of the effect of kinesiophobia in patients who have catastrophizing pain.

Pain catastrophizing has an immense effect on the success of the treatment. Surgeons should be aware of pain catastrophizing in painful soft-tissue pathologies like shoulder lesions before they conduct any surgical intervention.[15] According to the results of the present study, the frequency of pain catastrophizing increased in parallel to the severity of pain and the presence of kinesiophobia. Besides, pain catastrophizing was correlated with functional outcomes.

When the relationship between pain catastrophizing and shoulder lesions was examined, older woman with rotator cuff and biceps pathologies was more susceptible to pain catastrophizing. On the other hand, young male patients with isolated anterior labral lesions were thought to be at little risk of catastrophizing. Moreover, the concurrent occurrence of these lesions causes more pain, and this combined effect can lead to pain catastrophizing.

Many authors discussed the effect of catastrophizing and kinesiophobia on the severity of pain. Høvik's study indicated that there was no relation between post-operative and pre-operative pain catastrophizing.[16] On the contrary, Domenech's[17] study reported that catastrophizing and kinesiophobia were predictive in the post-treatment disability and pain changes in patients with anterior knee pain. The studies also showed that pain catastrophizing reduces activity tolerance and patient compliance during the rehabilitation programs.[18] Furthermore, the studies indicated that the function was restricted even in painless rotator cuff tears.[19] Besides, the results of the present study correlate with the literature indicating that patients with shoulder lesions, resulted after chronic and degenerative disorders with persistent pain and kinesiophobia, were more likely to experience pain catastrophizing.[20]

There were two major limitations of the study. First, pre-operative data were obtained from the archive and retrospective evaluation of patients was an important limitation, and second, the UCLA shoulder score used in this study is commonly used in our country, however, Turkish validation has not been performed yet. Another limitation was that an intervention for the pain catastrophizing had not done preoperatively.

The post-operative results of the present study confirmed the existing data on the importance of pain catastrophizing. To the best of our knowledge, this is the first study to make a pre-operative and post-operative evaluation of the relationship between PCS and shoulder lesions because the PCS (+) patients' reluctance to cooperate during the post-operative exercise programs might be a significant limitation of these kinds of studies.

Conclusion

In conclusion, PCS (+) patient group had lower functional capacity outcomes than that of the PCS (–) patient group. Decreased levels of pain catastrophizing and kinesiophobia in surgically and conservatively treated patients will result in more satisfactory clinical outcomes.

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References

1. Linaker CH, Walker-Bone K. Shoulder disorders and occupation. Best Pract Res Clin Rheumatol 2015;29(3):405–23.
2. Takasawa E, Yamamoto A, Kobayashi T, Tajika T, Shitara H, Ichinose T, et al. Characteristics of neck and shoulder pain in the Japanese general population. J Orthop Sci 2015;20(2):403–9.
3. Schaible HG, Schmelz M, Tegeder I. Pathophysiology and treatment of pain in joint disease. Adv Drug Deliv Rev 2006;58(2):323–42. [CrossRef]
4. Ağırman M, Leblebicier MA, Durmuş O, Saral İ, Gündüz OH. Should we continue to administer blind shoulder injections? Eklem Hastalik Cerrahisi 2016;27(1):29–33. [CrossRef]
5. Solé E, Tomé-Pires C, de la Vega R, Racine M, Castarlenas E, Jensen MP, et al. Cognitive fusion and pain experience in young people. Clin J Pain 2016;32(7):602–8. [CrossRef]
6. Quartana PJ, Campbell CM, Edwards RR. Pain catastrophizing: A critical review. Expert Rev Neurother 2009;9(5):745–58. [CrossRef]
7. Elvery N, Jensen MP, Ehde DM, Day MA. Pain catastrophizing, mindfulness, and pain acceptance: What's the difference? Clin J Pain 2017;33(6):485–95. [CrossRef]
8. Pavlin DJ, Sullivan MJ, Freund PR, Roesen K. Catastrophizing: A risk factor for postsurgical pain. Clin J Pain 2005;21(1):83–90. [CrossRef]
9. Karan A, Müslümanoğlu L, Aki S, Filiz M, Yildiz EÖ, Berker E. The comparison of the efficacy aerobic exercises versus strengthening, stretching and mobilization exercises in subacute and chronic low back pain. Turk J Med Sci 1999;29(4):475–80.
10. Süren M, Okan I, Gökbakan AM, Kaya Z, Erkorkmaz U, Arici S, et al. Factors associated with the pain catastrophizing scale and validation in a sample of the Turkish population. Turk J Med Sci 2014;44(1):104–8. [CrossRef]
11. Yılmaz T, Yakut Y, Uygur F, Uluğ N. Tampa Kinezyofobi Ölçeği'nin Türkçe versiyonu ve test-tekrar test güvenirliği. Turk J Physiother Rehabil 2011;22(1):44–9. (Turkish)
12. Roddey TS, Olson SL, Cook KF, Gartsman GM, Hanten W. Comparison of the University of California-Los Angeles shoulder scale and the simple shoulder Test with the shoulder pain and disability index: Single-administration reliability and validity. Phys Ther 2000;80(8):759–68. [CrossRef]
13. Yaray O, Akesen B, Ocaklioglu G, Aydinli U. Validation of the Turkish version of the visual analog scale spine score in patients with spinal fractures. Acta Orthop Traumatol Turc 2011;45(5):353–8.
14. Sullivan MJ, Bishop SR, Pivik J. The pain catastrophizing scale:development and validation. Psychol Assess 1995;7:524–32. [CrossRef]
15. Sullivan MJ, Stanish W, Waite H, Sullivan M, Tripp DA. Catastrophizing, pain, and disability in patients with soft-tissue injuries. Pain 1998;77(3):253–60. [CrossRef]
16. Høvik LH, Winther SB, Foss OA, Gjeilo KH. Preoperative pain catastrophizing and postoperative pain after total knee arthroplasty: A prospective cohort study with one year follow-up. BMC Musculoskelet Disord 2016;17:214. [CrossRef]
17. Doménech J, Sanchis-Alfonso V, Espejo B. Changes in catastrophizing and kinesiophobia are predictive of changes in disability and pain after treatment in patients with anterior knee pain. Knee Surg Sports Traumatol Arthrosc 2014;22(10):2295–300. [CrossRef]
18. Sullivan MJ, Rodgers WM, Wilson PM, Bell GJ, Murray TC, Fraser SN. An experimental investigation of the relation between catastrophizing and activity intolerance. Pain 2002;100(1–2):47–53. [CrossRef]
19. Nakajima D, Yamamoto A, Kobayashi T, Osawa T, Shitara H, Ichinose T, et al. The effects of rotator cuff tears, including shoulders without pain, on activities of daily living in the general population. J Orthop Sci. 2012;17(2):136–40. [CrossRef]
20. Andersen TE, Karstoft KI, Brink O, Elklit A. Pain-catastrophizing and fear-avoidance beliefs as mediators between post-traumatic stress symptoms and pain following whiplash injury a prospective cohort study. Eur J Pain 2016;20(8):1241–52. [CrossRef]