Adductor co-contraction during abduction: a friend or foe

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Reduced psychosocial functioning in Subacromial Pain Syndrome is associated with persistence of complaints after 4 years.

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ABSTRACT

Background

Patients with Subacromial Pain Syndrome (SAPS) frequently present with co-existing psychosocial problems, however, whether this also associates with long-term outcome is currently unknown. We assessed whether psychosocial functioning in patients with SAPS is associated with persistence of complaints after 4 years of routine care.

Methods

In a longitudinal study, 34 patients with SAPS were selected after clinical and radiological evaluation and assessed at baseline and after 4 years. For the assessment of psychosocial functioning, the RAND-36 domains of social functioning, role limitations due to emotional problems, mental health, vitality and general health were evaluated. Complaints persistence at follow-up was assessed by (1) an anchor question (reduced, persistent or increased symptoms), (2) change in pain (change in visual analog scale), and (3) change in quality of life (change in Western Ontario Rotator Cuff index score).

Results

Lower baseline mental health (odds ratio [OR] 0.92, 95% CI: 0.85 – 0.98, p=0.013), vitality (OR 0.90, 95% CI: 0.83 – 0.98, p=0.011), and general health (OR 0.93, 95% CI: 0.88 – 0.98, p=0.009) were associated with persistent complaints as reported by the anchor question, change in visual analog scale score, and change in Western Ontario Rotator Cuff index score.

Conclusions

Evaluating psychosocial functioning parallel to physical complaints is currently not standard procedure in the treatment of SAPS. In this study, we showed that factors related to psychosocial functioning are associated with long-term persistence of complaints in SAPS. Future studies may investigate whether a multimodal treatment with assessment of psychosocial functioning may facilitate pain relief and recovery in SAPS.

INTRODUCTION

Shoulder pain affects 70% of the general population at some point in life[1]. Most frequently, shoulder pain is attributed to irritation of subacromial tissues and is accordingly called subacromial pain (or impingement) syndrome[2]. Subacromial Pain Syndrome (SAPS) is associated with significant individual and socioeconomic consequences as it compromises the ability to perform daily activities owing to related pain and disability[1-6]. Current treatments focus primarily on symptom relief of the shoulder. Such treatments include physical therapy to improve neuromuscular control and subacromial clearance, as well as the use of subacromial corticosteroid injections to reduce subacromial inflammation. Failure to respond to these usually reliable treatments suggest a nonorganic chronic condition in up to 40% of all patients with SAPS[1,2,7,8].

In various musculoskeletal pain disorders, a close relation between pain and psychosocial functioning (e.g. depression, anxiety or social support) is documented[9,10]. Impaired psychosocial functioning is frequently viewed to be a result of pain; however, it may also enhance the perception of pain[11]. In the knee and hip, it has repetitively been observed that patients who have depressive feelings tend to respond poorly to interventions targeting the painful joint[12,13]. Furthermore, treating concurrent depression in patients with chronic low back pain has been shown to result in pain-relief in nearly 25% of patients[14]. These studies show the importance of psychosocial functioning in the treatment of musculoskeletal pain[15].

Regarding research on SAPS, there has been a focus on peripheral pathology of the shoulder whereas psychosocial factors have received less attention[16-22]. It has been established that patients with SAPS frequently present with coexisting psychosocial problems; however, whether this also associates with long-term outcome is unknown[20-22]. Therefore, we assessed whether psychosocial functioning in patients with SAPS is associated with persistence of complaints after 4 years of routine care.

MATERIAL AND METHODS

For this longitudinal prognostic analysis, eligible patients were recruited between April 2010 and December 2012 at the Leiden University Medical Centre, Haaglanden Medical Centre and Alrijne Hospital, under a previously registered and published study protocol (Trial register no. NTR2283)[23]. Consecutive patients with SAPS were selected through physical examination, shoulder radiographs and magnetic resonance arthrography by dedicated shoulder surgeons. The inclusion criteria

were patients who were aged 35-60 years, who had unilateral shoulder complaints for >3 months and who received a clinical diagnosis of SAPS based on a positive Hawkins test and Neer impingement test with lidocaine[23]. The exclusion criteria were insufficient language skills, inflammatory glenohumeral (GH) arthritis, clinical signs of GH or acromioclavicular osteoarthritis, previous shoulder surgery, fracture or dislocation, cervical radiculopathy, GH instability, decreased passive GH mobility (e.g. frozen shoulder), and presence of electronic implants (e.g. pacemaker). Additionally, patients were excluded in case other specific conditions were diagnosed on radiographs or magnetic resonance arthrography such as calcific tendinitis, full-thickness rotator cuff tear, and labral or ligament pathology[23]. Patients who provided written informed consent were included and contacted for a follow-up visit between June 2014 and September 2015 (i.e., 3-4 years later).

Psychosocial functioning

At baseline and follow-up, psychosocial functioning was assessed by means of the Research And Development questionnaire (RAND-36)[24-26]. The RAND-36 questionnaire is a widely used and validated survey for the evaluation of health-related quality of life in 8 domains: physical functioning, social functioning, role limitations due to physical problems, role limitations due to emotional problems, mental health, vitality, bodily pain and general health[24-26]. The reliability of these individual domains ranges between an α of 0.78 and an α of 0.93[27]. Each domain is separately scored by standardisation of scales, aggregation of scale scores and transformation to summary scores, ranging between 0 and 100. Higher scores represent better function[24-26]. The RAND-36 scores on the domains of social functioning, role limitations due to emotional problems, mental health, vitality and general health were evaluated to assess psychosocial functioning[26].

Persistence of complaints

- At follow-up, an anchor question was used to assess whether patients experienced persistent, reduced or increased complaints compared to the first visit.
- At baseline and follow-up, a visual analogue scale (VAS) for pain during movement was assessed using a 100mm VAS scale (on which 0 indicated no pain and 100 indicated maximal pain). Changes in pain over time were expressed as Δ VAS score.
- At baseline and follow-up, the Western Ontario Rotator Cuff (WORC) index was used to assess quality of life through 5 domains on a scale from 0 (worst possible) to 100 (best possible)[28,29]. Changes in WORC scores were expressed as Δ WORC index score.

Statistical analysis

We first determined whether there were baseline differences in psychosocial functioning (RAND-36 score) and other characteristics (e.g., age, sex, or treatment) between patients who had increased, persistent, and reduced complaints at follow-up by use of the independent samples t-test, Wilcoxon rank sum test or χ^2 test depending on the type and distribution of data. Subsequently, logistic and linear regression analyses were performed to assess whether baseline psychosocial functioning (RAND-36 score) was associated with complaint persistence (anchor question, Δ VAS score, and Δ WORC index score). For this, the dependent variables (Δ VAS score and Δ WORC index score) were checked for a normal distribution. Additionally, we determined from scatter plots that the relations between the RAND-36 domains and the Δ VAS score and Δ WORC index score were linear and the residual errors had a normal distribution. The analyses were also performed with inclusion of age and sex to assess the influence of these factors on the estimated groups differences[30]. Results from logistic and linear regression analyses were presented as odds ratios (ORs) and unstandardised β values, respectively.

The data was stored in a Microsoft Access 2010 database (version 14.0.7195.5000; Microsoft, Redmond, WA, USA) with SP2 MSO (Service Pack 2, Microsoft Office, version 14.0.7214.5000; Microsoft). For statistical analyses, SPSS software (version 20; IBM, Armonk, NY, USA) was used. A 2-sided p-value of ≤0.05 was considered statistically significant.

RESULTS

Thirty-four patients fulfilled our eligibility criteria. After a follow-up period of 3.8 years (standard deviation [SD], 0.5 years), 3 patients declined to participate, 1 patient had died, and 2 patients could not to be contacted. The 6 patients lost to follow-up were aged 53 years (SD, 4.6 years), with 50% (n=3) being women; the median complaint duration was 12 months (25^{th} quartile – 75^{th} quartile, 12 – 30 months) at baseline. The eventual study cohort of 28 patients (82%) had a mean age of 50 years (SD, 6.5 years), with 61% (n=17) being women; the median complaint duration was 17 months (25^{th} quartile – 75^{th} quartile, 12-26 months). All these patients were treated conservatively with physical therapy (n=21, 75%) and/or subacromial infiltrations (n=17, 61%). Two patients were treated operatively after failed conservative management by Neer acromioplasty (n=1) and distal clavicle resection (n=1).

Table 1 | Baseline characteristics of patients with persistent or reduced shoulder complaints at follow-up

	SAPS-complaints at follow-up		Group difference	
	Persistent (n=9)	Reduced (n=19)	95% CI or statistic*	p-value
Demographic characteristics				
Age, mean (SD), yr	47 (4.7)	52 (6.8)	-0.3 to 10	0.063
Female, n (%)	6 (67)	11 (58)	0.2	0.657
Right side dominance, n (%)	9 (100)	15 (79)	2.2	0.137
Dominant side affected, n (%)	7 (78)	10 (53)	1.6	0.203
Duration of complaints, median (quartiles), mo	30 (20 to 69)	12 (9.3 to 24)	-2.6	0.009†
Therapy, n (%)				
Physiotherapy	7 (78)	14 (74)	0.1	0.815
Subacromial infiltration	7 (78)	10 (53)	1.6	0.203
Operation	1 (11)	1 (5.3)	0.3	0.575
Pain and disability				
VAS score during movement, median (quartiles)	44 (25 to 62)	32 (18 to 62)	-0.4	0.681
WORC index score, mean (SD)	59 (15)	58 (19)	-16 to 14	0.864
RAND-36 score				
Physical Functioning, median (quartiles)	75 (90 to 100)	80 (75 to 90)	-2.6 to 20	0.127
Social Functioning, median (quartiles)	75 (56 to 81)	88 (75 to 100)	-1.7	0.099
Role-Physical, median (quartiles)	0 (0 to 63)	75 (50 to 100)	-2.3	0.023†
Role-Emotional, median (quartiles)	100 (67 to 100)	100 (100 to 100)	-0.1	0.918
Mental Health, mean (SD)	65 (14)	82 (12)	5.9 to 27	0.003†
Vitality, median (quartiles)	50 (45 to 60)	70 (60 to 80)	-2.9	0.004†
Bodily Pain, mean (SD)	56 (15)	58 (16)	-11 to 14	0.793
General Health, median (quartiles)	45 (25 to 63)	75 (65 to 85)	-2.7	0.008†

Complaints persistence was assessed with an anchor question at 4 years' follow-up. Depending on the type and distribution of data (histograms), data were analysed with the independent samples t-test, Wilcoxon rank sum test or χ^2 test. SAPS, subacromial pain syndrome; CI, confidence interval; SD, standard deviation; VAS, visual analogue scale; WORC, Western Ontario Rotator Cuff.

* χ^2 Value or *z* score

† Statistically significant (P<0.05)

Compared with the first visit, none of the patients reported increased complaints on the anchor question at follow-up, whereas 9 patients (32%) reported persistent complaints and 19 (68%) reported reduced complaints. There were no differences in the received treatment between the 2 subgroups (**Table 1**). Patients with persistent complaints at follow-up had a significantly longer median duration of complaints at presentation (30 months; quartiles, 20 – 69 months), than patients with reduced complaints at follow-up (12 months; quartiles, 9 – 24 months). There were no baseline differences in physical functioning and pain (RAND-36, VAS score or WORC index score) between patients with persistent complaints and those with reduced complaints at follow-up (**Table 1**). The patients who reported persistent complaints at follow-up did have lower baseline scores on the psychosocial functioning domains of the RAND-36 (i.e., role limitations due to physical problems, mental health, vitality and general health) than patients who reported reduced complaints.

Table 2 | Baseline psychosocial functioning associated with complaints at follow-up

	Persistent complaints at follow-up		Δ VAS score		Δ WORC index score	
RAND-36	*OR (95% CI)*	*p-value*	β *(95% CI)*	*p-value*	β *(95% CI)*	*p-value*
Social Functioning	0.97 [0.93 to 1.01]	0.152	-0.39 [-0.99 to 0.20]	0.183	0.08 [-0.45 to 0.61]	0.755
Role limitations due to emotional problems	1.00 [0.98 to 1.02]	0.843	-0.11 [-0.46 to 0.24]	0.513	-0.07 [-0.38 to 0.24]	0.627
Mental Health	0.92 [0.85 to 0.98]	0.013*	-0.90 [-1.65 to -0.16]	0.020*	0.84 [0.19 to 1.48]	0.013*
Vitality	0.90 [0.83 to 0.98]	0.011*	-1.03 [-1.72 to -0.33]	0.006*	0.88 [0.26 to 1.50]	0.008*
General Health	0.93 [0.88 to 0.98]	0.009*	-0.79 [-1.27 to -0.31]	0.002*	0.57 [0.11 to 1.02]	0.017*

Logistic regression was performed with complaint persistence as the dependent variable (with reduced complaints as the reference value), whereas linear regression was performed with the following dependent variable: change in visual analogue scale for pain during movement over time (Δ VAS score) and change in WORC index score over time (Δ WORC index score). The independent variables are the RAND-36 domains related to psychosocial functioning. VAS, visual analogue scale; WORC, Western Ontario Rotator Cuff; OR, odds ratio; CI, confidence interval.
* Statistically significant (P<0.05)

Lower baseline levels of mental health (OR, 0.92; 95% confidence interval [CI], 0.85 to 0.98; p=0.013), vitality (OR, 0.90; 95% CI, 0.83 to 0.98; p=0.011) and general health (OR, 0.93; 95% CI, 0.88 to 0.98; p=0.009) were associated with persistence of complaints as indicated on the anchor question (**Table 2**). In accordance, baseline mental health (β, -0.90; 95% CI, -1.65 to -0.16), vitality (β, -1.03; 95% CI, -1.72 to -0.33) and general health (β, -0.79; 95% CI: -1.27 to -0.31) were negatively associated with Δ VAS score (**Table 2**). Moreover, baseline mental health (β, 0.84; 95% CI, 0.19 to 1.48), vitality (β, 0.88; 95% CI, 0.26 to 1.50), and general health (β, 0.57; 95% CI, 0.11 to 1.02) were associated with Δ WORC index score (**Table 2**). The association between baseline psychosocial functioning and persistence of complaints at follow-up was not affected by inclusion of sex and age in the analysis, as described in **Appendix 1**.

DISCUSSION

In this longitudinal study, we showed that lower baseline levels of mental health, vitality and general health (RAND-36) are associated with persistence of complaints after approximately 4 years of routine care in patients with SAPS. The baseline scores of patients with persistent complaints in these RAND-36 domains were 12, 17 and 24 points lower, respectively, than those in the Dutch population and comparable to those obtained from patients with depression[25,31,32].

In SAPS, few studies have been conducted on the association between shoulder complaints and psychosocial functioning[18,19]. In confirmation with our study, depressive symptoms have been associated with recurring shoulder symptoms in a community-based sample from the general population.[33] Furthermore, pain self-

efficacy, expectations and pain catastrophising have been associated with chronic shoulder symptoms[8,19,34]. In this longitudinal study, we showed that there is an association between lower levels of mental health, vitality and general health and long-term persistence of complaints in SAPS, which emphasises the role of psychosocial factors in SAPS.

Our study has some limitations. First, the calculations were performed on a small sample size. Because of limited power, we could not control for various factors such as the type of treatment received. However, because there were no differences in received treatment between the 2 subgroups with persistent vs. reduced complaints, we do not think that this introduced bias. Second, we did not assess all psychosocial constructs that may determine the course of complaints. Baseline psychosocial variables such as anxiety or catastrophising may have an effect on long-term pain and function as well and should be evaluated in future studies[10,35]. Third, there was a longer baseline duration of complaints in patients with persistent complaints at follow-up than in those with reduced complaints at follow-up. We therefore could not clarify cause-and-effect relationships, but this was also out of the scope of this study.

In SAPS, complaints become chronic in up to 40% of all patients[1,2,7,8]. Clinicians generally focus on anatomical deformities and damaged subacromial tissues, whereas complaints do not correspond with magnetic resonance imaging pathologies in nearly half of all patients[36,37]. Conditions external to the shoulder, for example, psychosocial functioning, may contribute to the perception of pain as well, and studies in other pain conditions have shown that addressing these factors results in quicker relief of pain and recovery[14,37-40]. Future studies may investigate whether such a multimodal treatment may also benefit patients with SAPS[14].

CONCLUSION

In this prospective longitudinal study with nearly 4 years' follow-up, we showed that reduced psychosocial functioning in patients with SAPS is associated with long-term persistence of complaints. In other musculoskeletal pain conditions, it has been suggested that addressing coexisting psychosocial problems may enhance treatment outcome[14,38-40]. Future studies may investigate whether a multimodal treatment with assessment of psychosocial functioning may also facilitate pain relief and recovery in SAPS.

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Appendix

Appendix 1 | Baseline psychosocial functioning associated with complaints at follow-up, adjusted for sex and age.

	Persistent complaints at follow-up		**Δ VAS score**		**Δ WORC index score**	
RAND-36	*OR (95% CI)*	*p-value*	β *(95% CI)*	*p-value*	β *(95% CI)*	*p-value*
Social Functioning	0.97 [0.93 to 1.0]	0.179	-0.22 [-0.86 to 0.21]	0.223	0.023 [-0.49 to 0.55]	0.907
Role limitations due to emotional problems	1.0 [0.98 to 1.0]	0.782	0.043 [-0.31 to 0.38]	0.830	-0.21 [-0.48 to 0.15]	0.300
Mental Health	0.91 [0.84 to 0.99]	**0.020***	-0.39 [-1.5 to -0.090]	0.028*	0.42 [0.12 to 1.4]	0.022*
Vitality	0.90 [0.82 to 0.99]	**0.025***	-0.39 [-1.5 to -0.035]	0.041*	0.42 [0.065 to 1.4]	0.033*
General Health	0.90 [0.83 to 0.98]	**0.015***	-0.55 [-1.2 to -0.35]	0.001*	0.45 [0.12 to 1.0]	0.015*

Logistic regression was performed with complaint persistence as the dependent variable (with reduced complaints as the reference value), whereas linear regression was performed with the following dependent variable: change in visual analogue scale for pain during movement over time (Δ VAS score) and change in WORC index score over time (Δ WORC index score). The independent variables are the RAND-36 domains related to psychosocial functioning, sex and age. VAS, visual analogue scale; WORC, Western Ontario Rotator Cuff; OR, odds ratio; CI, confidence interval.

* Statistically significant (P<0.05)