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Guideline for diagnosis and treatment of subacromial pain syndrome

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Guideline for di… syndrome

A multidisciplinary review by the Dutch Orthopaedic Association

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Treatment of "subacromial impingement syndrome" of the shoulder has changed drastically in the past decade. The anatomical explanation as "impingement" of the rotator cuff is not sufficient to cover the pathology. "Subacromial pain syndrome", SAPS, describes the condition better. A working group formed from a number of Dutch specialist societies, joined by the Dutch Orthopedic Association, has produced a guideline based on the available scientific evidence. This resulted in a new outlook for the treatment of subacromial pain syndrome. The important conclusions and advice from this work are as follows:

(1) The diagnosis SAPS can only be made using a combination of clinical tests. (2) SAPS should preferably be treated non-operatively. (3) Acute pain should be treated with analgetics if necessary. (4) Subacromial injection with corticosteroids is indicated for persistent or recurrent symptoms. (5) Diagnostic imaging is useful after 6 weeks of symptoms. Ultrasound examination is the recommended imaging, to exclude a rotator cuff rupture. (6) Occupational interventions are useful when complaints persist for longer than 6 weeks. (7) Exercise therapy should be specific and should be of low intensity and high frequency, combining eccentric training, attention to relaxation and posture, and treatment of myofascial trigger points (including stretching of the muscles) may be considered. (8) Strict immobilization and mobilization techniques are not recommended. (9) Tendinosis calcarea can be treated by shockwave (ESWT) or needling under ultrasound guidance (barbotage). (10) Rehabilitation in a specialized unit can be considered in chronic, treatment resistant SAPS, with pain perpetuating behavior. (11) There is no convincing evidence that surgical treatment for SAPS is more effective than conservature management. (12) There is no indication for the surgical treatment of asymptomatic rotator cuff tears.

Shoulder problems are common. Between 7% and 34% of adults have shoulder pain at times (Reilingh et al. 2008). The incidence of shoulder pain in primary care in the Netherlands is estimated to be 19 per 1,000 person-years—highest in women over 45 years and lower in young adults (Greving et al. 2012). In the Netherlands, the orthopedic diagnosis of "supraspinatus tendinitis" is made 50,000–60,000 times a year (source Prismant). The course, independent of the chosen therapy, appears to be unfavorable in terms of resumption of previous work, and after 1 year, a third of the patients still have some kind of restriction and/or pain (Reilingh et al. 2008, Greving et al. 2012). Neer (1983) developed the concept of "impingement syndrome". This can be caused or aggravated by contact between the acromion and the rotator cuff while lifting the arm. However, this hypothesis cannot be substantiated with improved imaging and arthroscopic techniques. More value is placed nowadays on the role of degeneration of the rotator cuff tendons, eventually giving rise to the development of tears (Papadonikolakis et al. 2011). A direct relationship between the anatomical substrate, functional load and pain is not always explicitly present. Naming this condition "subacromial pain syndrome", abbreviated to SAPS, describes the condition better.

SAPS is defined as all non-traumatic, usually unilateral, shoulder problems that cause pain, localized around the acromion, often worsening during or subsequent to lifting of the arm. The different clinical and/or radiological names, such as bursitis, tendinosis calcarea, supraspinatus tendinopathy, partial tear of the rotator cuff, biceps tendinitis, or tendon cuff degeneration are all part of SAPS.

As patients come into contact with various healthcare providers, it was deemed necessary—following the Dutch General practitioners guideline for shoulder complaints (Winters

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Table 1. GRADE evidence levels of intervention studies

Evidence level of intervention study (examples)	
High	RCTs without severe limitations. Observational studies with very large effects and without severe limitations.
Moderate	RCTs with severe limitations. Observational studies with large effects and without severe limitations.
Low	RCTs with extremely severe limitations. Observational studies without severe limitations.
Very low	RCTs with extremely severe limitations and inconsistent results. Observational studies with severe limitations. Non-systematic clinical observations (e.g. case series and case reports).

Table 2. EBRO evidence levels of diagnostic accuracy research or research into etiology and prognosis

Evidence level	Diagnostic accuracy research	Etiology, prognosis
A1	Meta-analysis of at least 2 independently conducted studies at the A2 level	
A2	Research compared to a reference test (gold standard) with previously defined cutoff values and independent evaluation of results, with a sufficiently large series of consecutive patients who have only had the index and reference test.	Prospective cohort study with sufficient size and follow-up and with adequate controlling for "confounding", and where selective follow-up has been sufficiently ruled out.
B	Research compared to a reference test, but not with all the features listed under A2.	Prospective cohort study but not with all the features listed under A2, retrospective cohort study, or patient-controlled study.
C	Non-comparative study.	

et al. 2008), and to supplement the Dutch Physical Therapists Guideline for aspecific complaints of arm, neck and shoulder (KNGF 2012) and the KNGF Evidence Statement for subacromial shoulder pain (Jansen et al. 2011)—to create a guideline for the treatment of SAPS.

Methods

A working group was formed by the Netherlands Orthopedic Society (NOV), consisting of representatives from the Orthopedic Society, the Netherlands Association of Physical Therapy, the Netherlands Association of General Practitioners, the Netherlands Society of Rehabilitation Medicine, the Netherlands Association of Occupational Medicine, and the Netherlands Society of Radiology, who all have interest and expertise in clinical shoulder problems. This group formulated 8 clinical questions relevant to SAPS:

1. What is known about the prognosis of SAPS?
2. What measures are effective in preventing SAPS?
3. Which physical diagnostic tests are most accurate, sensitive, and specific for SAPS?
4. What is the added value of imaging for diagnosis of SAPS?
5. Which instruments are most suitable for measurement of outcomes in SAPS?
6. Which conservative treatment is the most effective for patients with SAPS?
7. When is surgical treatment for SAPS indicated, and which technique is preferred?
8. What advice can be given to patients with SAPS, argued from the patient's point of view?

Literature search

The group conducted an exploratory search for existing international guidelines in Medline (OVID), the databases of the Guidelines International Network (GIN), the Quality Dome and Artsennet, and systematic reviews in Medline (OVID) and the Cochrane Library. Next, for each clinical question based on specific search terms, a search was conducted for published scientific studies in electronic databases. The searches were limited to literature in English, Dutch, French, and German. Additional studies were searched for on the basis of the reference lists of the articles selected. Search filters were used based on the filters used by the Scottish Intercollegiate Guideline Network (SIGN) to identify possible systematic reviews and randomized clinical trials.

Grading of study quality

The working group members selected articles based on criteria established in advance (Tables 1 and 2). From these data, the level of the recommendations was defined (Table 3). In general, the studies showed great heterogeneity in study populations, factors examined, duration of follow-up, and outcome measures. There were also confounders due to the definition

Table 3. Level-of-evidence strength of the conclusion, based on the literature underlying the conclusion

Level	Conclusion based on
1	For therapeutic intervention studies: high-quality studies. For diagnostic accuracy research or prognosis, etiology or side effects: A1-level study or at least 2 independently conducted A-2 level studies.
2	For therapeutic intervention studies: moderate-quality studies. For diagnostic accuracy research or prognosis, etiology or side effects: one A2-level study or at least 2 independently conducted B-level studies.
3	For therapeutic intervention studies: low-quality studies. For diagnostic accuracy research or prognosis, etiology or side effects: one B-level study or at least 2 independently conducted C-level studies.
4	For therapeutic intervention studies: very low-quality studies. For diagnostic accuracy research or prognosis, etiology or side effects: one C-level study.

of shoulder complaints, as the difference between subacromial complaints and general pain in the shoulder and/or neck was not always clear. The working group formulated recommendations on each of the questions following the highest level of evidence. When a scientific basis was not possible, consensus of the working group was obtained on the recommendation.

Results

Clinical Question 1: What is known about the prognosis of SAPS?

Scientific evidence level 1: There is an association between a longer duration of shoulder pain (> 3 months) and poorer outcome (Kuijpers et al. 2004, Bot et al. 2005, Thomas et al. 2005, Reilingh et al. 2008). There is an association between being middle-aged (45–54 years) and worse outcome (Kuijpers et al. 2004).

Level 2: Psychosocial factors appear to have a greater association with the course and prognosis of chronic shoulder pain (> 3 months) than with that of shorter-term shoulder pain (< 6 weeks) (Reilingh et al. 2008).

Level 3: There are indications that a worse outcome is associated with a worse score at the start, longer duration of symptoms, and type II or III acromion morphology (Taheriazam et al. 2005).

Considerations

There is consistent evidence that a longer duration of symptoms (> 3 months) is a poor prognostic factor. There is evidence that psychosocial factors play a role in chronic complaints.

Recommendation

The working group recommends being aware of the effect of symptom duration on prognosis (> 3 months) and distinguishing between acute symptoms and chronic symptoms when deciding on interventions for SAPS.

Clinical Question 2: What measures are effective in preventing SAPS?

Scientific evidence level 1: There are associations between the occurrence of SAPS and (1) repetitive movements of the shoulder or hand/wrist during work, (2) work that requires much or prolonged strength of the upper arms, (3) hand-arm vibration (high vibration and/or prolonged exposure) at work, (4) working with a poor ergonomic shoulder posture, and (5) a high psychosocial workload. Psychosocial factors associated with prolonged shoulder complaints are high psychological demands, low control, low social support, low job satisfaction, and high pressure to perform (van Rijn et al. 2010).

Level 2: There is evidence that regular sporting activities (> 3 h per week for at least 10 months a year) have a preventive effect on the risk of neck and shoulder complaints and (long-term) illness (van den Heuvel et al. 2005).

Considerations

There were fewer modifiable factors found in studies on psychosocial risks than in studies on physical factors. In one study (Kennedy et al. 2009), influencing the entire kinematic chain is mentioned as the starting point for prevention and treatment of sports-related shoulder pain. However, there have been no studies on the effects of these interventions.

Recommendations

The working group recommends early intervention to modify repetitive movements of the shoulder or hand/wrist during work, work that demands much or prolonged power of the upper arms, hand-arm vibration (high vibration and/or prolonged exposure) during work, and work in a non-ergonomic shoulder position. An approach based on the "biopsychosocial model", focusing on early return to work, has the best chance of success (Shanahan and Sladek 2011).

Clinical Question 3: Which physical diagnostic tests are most accurate, sensitive and specific for subacromial pain syndrome of the shoulder?

Scientific evidence level 1: No single test is sufficiently accurate to diagnose SAPS (Hegedus et al. 2008, Hughes et al. 2008). The inter-rater reliability of the most common tests varies greatly. Inter-rater reliability of active abduction and abduction trajectory pain is moderate (May et al. 2010).

Level 2: The combination of a number of tests increases the post-test probability of the diagnosis of SAPS. (Murrell and Walton 2001, Park et al. 2005, Michener et al. 2009).

Considerations

As one physical sign cannot sufficiently differentiate between the various shoulder disorders, or give a clear distinction regarding the status of the rotator cuff, a combination of multiple tests increases post-test probability of a diagnosis of SAPS.

Recommendations

To determine SAPS, a combination of the Hawkins-Kennedy test, the painful arc test, and the infraspinatus muscle strength test should be used; and for a rotator cuff tear, the drop-arm test and the infraspinatus and supraspinatus muscle strength tests should be used.

Clinical Question 4: What is the added value of imaging tests for diagnosis of SAPS?

Scientific evidence level 1: The sensitivity and specificity of ultrasound and conventional MRI are not significantly different in the detection of partial- or full-thickness rotator cuff tears (Dinnes et al. 2003). MR arthrography is an accurate method to rule out partial rotator cuff injuries (de Jesus et al. 2009, Ottenheijm et al. 2010).

Level 2: It is likely that ultrasound is an accurate method for the detection or exclusion of rotator cuff tendinopathy, subacromial bursitis, biceps tendon rupture, and tendinosis calcarea (Ottenheijm et al. 2010). The interobserver variability of ultrasound with respect to detection of rotator cuff injuries is low, as the results are very similar (Rutten et al. 2010, Sipola et al. 2010).

Level 3: There is evidence that ultrasound is not sufficiently reliable to differentiate between an intact rotator cuff and partial lesions (Sipola et al. 2010).

Considerations

Ultrasound of the shoulder is a sensitive and specific method. The diagnostic accuracy is good and comparable to that of conventional MRI for identification and quantification of complete (full-thickness) rotator cuff injuries. There are conflicting results about the value of ultrasonography in partial rotator cuff tears and tendinopathies. For optimal sonographic analysis of the shoulder, standardized examination and expertise as well as high-quality equipment (7.5- to 20-MHz linear transducers) should be available. When repair of a rotator cuff tear is intended, MRI provides useful information on size, retraction, and matching atrophy and fatty infiltration. For the detection of partial articular side cuff injuries (PASTA lesions), MR arthrography may be considered because of its high sensitivity and specificity. It is preferable to perform a series in abduction/external rotation position (ABER). Although a correlation has been described between the shape of the acromion (type III, angled) and the presence of rotator cuff injuries (Toivonen et al. 1995), this association is not significant in patients over 50 (Gill et al. 2002, Oh et al. 2010).

Recommendations

Ultrasound is advised as the most valuable and cost-effective diagnostic imaging if a first period of non-operative treatment fails. This can be combined with conventional radiography of the shoulder to determine osteoarthritis, osseous abnormalities, and presence/absence of calcium deposits. MRI of the shoulder is indicated when reliable ultrasound is not at hand or inconclusive, and should be used in patients who are eligible for surgical repair of a cuff tear to assess the degree of retraction and atrophied fatty infiltration. An MRI study with intra-articular contrast can be considered if any intra-articular abnormality or a partial rotator cuff injury have to be ruled out. It is preferable for a study in abduction and external rotation (ABER) to be part of an MR arthrography protocol.

Clinical Question 5: Which instruments are most suitable for measuring the outcome of treatment of SAPS?

Scientific evidence level 2: Measurements of ROM using instruments (in goniometry and inclinometry) are more reliable than those based on visual assessment (van de Pol et al. 2010). The Dutch Shoulder Disability Questionnaire seems to be responsive (van der Windt et al. 1998, van der Heijden et al. 2000).

Levels 2/3: The internal consistency and test-retest reliability of the Dutch Simple Shoulder Test seem high and the construct validity moderate to good (van Kampen et al. 2012).

Level 3: There is insufficient inter-rater reliability of visual estimation of ROM (Terwee et al. 2011). There are indications that the inter-rater reliability of ROM measured using a digital inclinometer for individual patients is poor, with differences in ROM of less than 20–25 degrees being indistinguishable from measurement error (de Winter et al. 2004). The DASH-DLV has excellent internal consistency, reasonable test-retest reliability, and reasonable criterion validity (Veehof et al. 2002). The English Oxford Shoulder Score has a high test-retest reliability, high internal consistency, and a weak-to-moderate criterion validity (Berendes et al. 2010). The Dutch Shoulder Rating Questionnaire has high internal consistency, high test-retest reliability, moderate-to-good criterion validity, and is an appropriate instrument to demonstrate clinical differences (Vermeulen et al. 2005).