AAOS Clinical Guideline on Shoulder Pain
Support Document

OVERVIEW

Goals & Rationale

This clinical guideline has been created to improve patient care by outlining the appropriate information gathering and decision making processes involved in managing shoulder pain in adults. Musculoskeletal care is provided in many different settings by many different providers. This guideline has been created as an educational tool to guide qualified physicians through a series of diagnostic and treatment decisions in an effort to improve the quality and efficiency of care.

This guideline should not be construed as including all proper methods of care or excluding methods of care reasonably directed to obtaining the same results. The ultimate judgement regarding any specific procedure or treatment must be made by the treating physician after a full assessment of all circumstances presented by a patient, including the needs and resources of a particular locality or institution.

Scope & Organization

This document addresses the diagnosis and treatment of localized shoulder pain in skeletally mature individuals, not arising from acute trauma, infection or tumor. Shoulder pain is frequently associated with overuse, especially in athletes and adult patients. Shoulder pain is also many times attributable to complex syndromes, as opposed to a single injury or condition. The increasing elderly population and a more generally active society is responsible for a significant increase in the number of people suffering from localized shoulder pain.

This guideline is intended to address issues faced by first contact physicians only, and provide information through the patient's first six to eight weeks of treatment. This guideline does not address all possible conditions associated with localized shoulder pain, only those that account for the majority of initial visits to a physician. The guideline addresses the following conditions: rotator cuff disorders, frozen shoulder, glenohumeral instability, arthritis of the glenohumeral joint, acromioclavicular joint disorders, and fibromyalgia. The guideline provides the user with information used during the initial assessment of the patient, through several critical exclusionary diagnosis and then on to the determination of a differential diagnosis. Once a differential diagnosis is reached, the user continues on to a flow chart specific to that diagnosis. Each diagnosis-specific flow chart guides the user through the initial treatment and possible modified treatment. The flow charts end where referral to a musculoskeletal specialist is recommended.

Methodology

Panel: Original authors: Freddie Fu, MD, Chairman, Answorth Allen, MD, Clifford Colwell, MD, Evan Flatow, MD, Keith Watson, MD, John Brems, MD, W. Benjamin Kibler, MD, Jeffrey Saal, MD. Phase I revision panel: Edward Self, MD, Chairman,

John Brems, MD, Jeffrey Abrams, MD, Frank Cordasco, MD, Keith Watson, MD, Kenneth Butters, MD.

Process Overview: The guideline was originally developed by a multi-professional panel led by the American Academy of Orthopaedic Surgeons Task Force on Clinical Algorithms in cooperation with the AAOS Committee on Clinical Policies, the American Association of Neurological Surgeons, the American College of Physical Medicine and Rehabilitation, the American College of Rheumatology, as well as individuals in other medical specialties including family practice. The work group, with the assistance of the AAOS and various private and academic medical centers, completed a review of the relevant literature. The workgroup then participated in a series of meetings in which information from the literature was extracted and transformed into draft "decision trees." Information from the literature was supplemented by the consensus opinion of the workgroup when necessary. Multiple iterations of written review were then conducted by the participating individuals. Modifications, when supported by references from the literature were then incorporated by the workgroup chairman.

The workgroup, with the help of Value Health Sciences, performed a new literature search, reviewed and graded articles, incorporating information into the revised guideline as appropriate. Information from the literature was supplemented by consensus. The update of the guideline was completed by the AAOS workgroup with input from the American College of Emergency Physicians, the American Academy of Physical Medicine and Rehabilitation, and the American College of Rheumatology. In addition, individual physicians practicing in family medicine, emergency medicine, physical medicine and rehabilitation, rheumatology, and shoulder surgery were asked to participate in a field test of the revised guideline and to submit comments. The workgroup members and specialty society representatives completed an objective evaluation of the 1996 guideline. These evaluations assisted the workgroup in focusing on areas of the guideline that needed expansion or revision.

The revised guideline was reviewed and approved by various groups within the AAOS including the Evidence Analysis Work Group, Guidelines Committee, Council on Research, Board of Councilors, and Board of Directors.

In developing and revising this guideline the original task force and the work group made every effort to be consistent with the American Medical Association's Attribute of Practice Parameters. In brief, the guideline was developed by a physician's organization with scientific and clinical expertise and it is based on a reliable methodology that integrates science and consensus. It is comprehensive and specific, is based on current information, and will be widely disseminated.

Evaluation of Existing Guidelines: A search of MEDLINE, the National Guidelines Clearinghouse and the AMA's Clinical Practice Guidelines Directory (1999) was performed. Only one relevant guideline was located. The Washington State Medical Society published medical treatment guidelines for use in workers' compensation

situations. One guideline "Criteria for Shoulder Surgery" was reviewed by the workgroup.

Literature Review: A search of MEDLINE was performed in order to update the literature used to develop the original guideline. English language journals were searched from 1988 to 2000, human studies of adults over 19 years of age were included. Of the abstracts generated by the search one hundred and forty articles were graded by the workgroup and included in the bibliography.

Weighing the Evidence: All literature sited in the bibliography were reviewed and evaluated for quality according to the following categories:

Type I	Meta-analysis of multiple, well-designed controlled studies; or high-power randomized, controlled clinical trial.
Type II	Well-designed experimental study; or low-power randomized, controlled clinical trial.
Type III	Well-designed, non-experimental studies such as nonrandomized, controlled single-group, pre-post, cohort, time, or matched case-control series.
Type IV	Well-designed, non-experimental studies, such as comparative and correlational descriptive and case studies.
Type V	Case reports and clinical examples

Consensus/opinion as it is used in bibliography: Articles representing expert consensus and not meeting the rigid I – V measurement are noted to represent consensus/opinion

Consensus Development: The workgroup participated in a series of conference calls and meetings in which information from the literature search was extracted and incorporated into the original algorithm Information from the literature was supplemented by the consensus opinion of the workgroup when necessary. Multiple iterations of the guideline were then completed and reviewed by workgroup members, ASES leadership, and a multidisciplinary group of physicians selected by workgroup members. Modifications (when supported by references from the literature) were then incorporated by the workgroup chairman.

Strength of Recommendation: The strength of the guideline recommendations for or against an intervention was graded as follows:

A Type I evidence or consistent findings from multiple studies of types II, III, or IV
B Types II, III, or IV evidence and findings are generally consistent
C Types II, III, or IV evidence, but findings are inconsistent
D Little or no systematic empirical evidence

Revision Plans: The guideline will be reviewed in 2005.

Definition of Terms:
Musculoskeletal Specialist: Any licensed medical doctor who has completed a resident training program focused on the management of musculoskeletal conditions, including but not limited to orthopaedists, physiatrists and rheumatologists.

DIFFERENTIAL DIAGNOSES

Rotator Cuff Disorders
Definition of the problem
Rotator cuff disorders represent that spectrum of pathology (acute and chronic), which result in dysfunction of the rotator cuff. The acute manifestation (any age), may be represented by a painful condition or occasionally by a functional impairment, or both, representing the variances between soft tissue inflammation (minimal structural involvement) and irritation to the extreme of complete cuff avulsion (marked structural involvement). The chronic manifestation (more common over forty years of age), is often associated with a gradual increase in symptoms, especially in the face of repetitive activity at or above shoulder level. A precise precipitating event is identified by patients in only about one-half of the cases. Rotator cuff disease is a quite common cause of shoulder pain in patients over forty, and therefore a high index of suspicion will lead to appropriate evaluation.

Recommendations
The focus of initial evaluation should be determination of the structural integrity of the rotator cuff. Marked inability to raise the arm is an ominous sign and would lead to a high level of concern. However, many patients (even those with substantial structural deficits), will often demonstrate surprisingly good active range of motion. Closer examination is often needed to accurately assess rotator cuff function. Guarding (due to pain) may exaggerate the assessment of rotator cuff injury. Plain x-rays - while helpful in advanced stages - are often unrevealing (but are important to rule out reactive calcific tendinitis which can mimic an acute and severe rotator cuff process), and yet may reveal signs of chronic impingement - subacromial spurring, excrescences at the greater tuberosity. Strength testing of the rotator cuff - testing in active abduction and resisted external rotation (elbow flexed and at the side), will be helpful in assessing single tendon tears from larger tears. However, in the presence of guarding (due to pain), it may be necessary to block the pain (with an injection of local anesthetic into the subacromial space), in order to get a valid test of rotator cuff function.

Differential diagnosis would include calcific tendinitis, cervical radiculitis and viral plexopathy. (Parsonage Turner Syndrome). When clinical evaluation indicates rotator cuff integrity, treatment should employ (1) avoidance of irritating activity; (2) anti-inflammatory medications if tolerated; (3) exercises to recover and maintain passive range of motion; (4) exercises to strengthen the rotator cuff once acute symptoms are abated **("B" recommendation)**.

If there is minimal or only partial response to the above treatment regimen over several weeks, consideration should then be given to a subacromial injection including a mixture of local anesthetic and a short-acting corticosteroid preparation **("B" recommendation)**. The above regimen should then be reinstated.

Clinical Outcomes
The majority of patients presenting with rotator cuff disorders will respond favorably to the above program within several weeks. For those who do not respond, attention should be directed toward further accuracy of diagnosis and the possibility of such structural compromise that more specialized care is indicated.

Alternative Approaches
In the severely debilitated and fragile patient who cannot tolerate, nor participate, in the above regimen, it may be necessary to utilize alternative measures for pain control (such as TNS unit, analgesics, topicals, etc.), and increased activity modification.

Frozen Shoulder
Definition of the problem
Frozen shoulder (adhesive capsulitis) is a condition of uncertain etiology characterized by significant restriction of both active and passive shoulder motion that occurs in the absence of another known intrinsic shoulder disorder.

Recommendations
The initial goal in the treatment of patients with idiopathic frozen shoulder or adhesive capsulitis is to provide pain relief. Nonsteroidal anti-inflammatory medications and analgesics are useful for this purpose. Analgesic medications used prior to the therapy will facilitate the performance of these exercises **("B" recommendation)**. Patients with adhesive capsulitis or idiopathic frozen shoulder should be placed on a physician directed exercise program with the goal of maintaining and regaining range of motion. This program should initially focus on stretching; after motion is regained, strengthening should be instituted **("B" recommendation)**. Patients who do not respond to this initial treatment over an 8-week period, may be referred to an appropriate specialist, as indicated **("B" recommendation)**. Patients with diabetes and hypothyroidism may require a more prolonged treatment program.

Expected Clinical Results
This program will generally result in improvement in shoulder function and decrease in shoulder pain over time.

Alternative Approaches
No treatment is an alternative approach. There has been some evidence to suggest that at 18 months following the onset of adhesive capsulitis, many patients improve without treatment. However, there can be significant residual impairment even after this amount of time has elapsed.

Glenohumeral Instability

Definition of the problem

Glenohumeral instability is a common etiology of shoulder pain in the young active patient. Glenohumeral instability occurs when excessive glenohumeral translation produces pain, apprehension, or dysfunction. Pain can be episodic, intermittent, or prolonged. “Apprehension” indicates that the patient avoids positioning the arm in such a way that may reproduce a pain or a fear of dislocation. “Dysfunction” indicates the inability of playing a sport, vocational limitations, or even interference with activities of daily living. Although apprehension and dysfunction may result in the avoidance of pain, they may also result in more restrictive impairment.

Recommendations

Patients with shoulder-related pain are commonly evaluated by family physicians, emergency room staff, rheumatologists, therapists, and orthopedists. Once exclusionary diagnoses are eliminated – including fracture, tumor, infection, and pain radiating from another area – the shoulder can be further examined as a source of pain.

The first-contact physician should begin the evaluation with an appropriate history. Certain generalizations can be made, but exceptions are not uncommon. Patients are often less than 40 years old and often have had a prior injury. This may include a traumatic dislocation or subluxation. Some patients describe a subjective event that has caused the arm to suddenly “fall asleep,” usually not associated with objective neurological findings -- often described as dead arm syndrome (pain induced subjective paresis). Pain can be associated with arm positioning, sporting, or exertional activities, and may be related to overuse. Some patients will describe a painful click that can be reproduced with certain arm movements.

The physical examination is used to reproduce the provocative actions. Certain patients may be able to demonstrate the position that creates pain or apprehension. Patients with apprehension may be unwilling to place the arm in a provocative position. In this instance, if the physician places the arm in the provocative position, the patient will often make a facial grimace or a verbal warning (“apprehension”) to avoid this position. Translation testing can be performed in a relaxed patient by centering the humeral head on the glenoid and shifting the head in various directions (anterior, inferior, posterior) to see if it can sublux onto or over the edge. This should be compared to the contralateral extremity to identify discrepancies. Other joints can be briefly examined to determine a baseline laxity for an individual.

Radiographs can be helpful to identify glenohumeral instability. The initial imaging series (see text box C) may identify changes along the glenoid rim or an impression defect on the humeral head that may result due to instability.

There are several types (categories) of instability a patient may present with. For the purposes of a screening examination to provide initial treatment, the categories include:

- Anterior Instability
- Posterior Instability

- Multidirectional Instability
- Voluntary or Habitual Instability

- Anterior Instability

Anterior is the most common form of glenohumeral instability. This may be the most dramatic form when a patient has presented to an emergency room with the humeral head locked in an anteriorly displaced position in front of the glenoid. When an *acute* anterior dislocation is reduced, the arm should be placed in a simple sling and the patient should be referred to a specialist. Patients who did not require a reduction, do not demonstrate apprehension, and have minimal pain may proceed to an exercise approach to strengthen the rotators and scapular stabilizers **("B" recommendation)**. Poor response to this exercise program should result in referral to a specialist.

Should this patient *subsequently* present with continued symptoms of *recurrent* anterior glenohumeral instability, symptoms may include pain ('apprehension') when the arm is placed in the provocative "cocked" or throwing position.

- Posterior Instability

Patients are not always aware of posterior instability but can describe pain associated with activities. Some individuals can demonstrate the subluxation and/or the reduction which was once asymptomatic but now problematic. The provocative position of forward flexion and internal rotation may result in apprehension or pain. The humeral head can be displaced posterior to the glenoid in an acute posterior dislocation. Careful review of x-rays, particularly an axillary and trauma views, should avoid missing this diagnosis. Posterior dislocation should be referred to the specialist for reduction.

- Multidirectional Instability

Multidirectional instability of the glenohumeral joint occurs when the humeral head subluxes symptomatically in more than one direction (including inferiorly). It is associated with increased translation posterior, anterior, or inferior (creating a 'sulcus sign'). Many of these patients have an atraumatic onset, perform repetitive movements, and demonstrate a similar laxity in the nonpainful extremity. Certain sporting activities such as swimming, gymnastics, and overhead-throwing, may produce pain to the predisposed lax shoulder. Activity reduction, temporary sling use for support, and early rotator cuff strengthening may reduce discomfort. If muscular re-education can maintain stability, a long-term approach towards exercises should follow **("B" recommendation)**. If the response is poor, referral to a specialist is recommended.

- Voluntary, Habitual Instability

Certain patients voluntarily sublux or dislocate their shoulder. These patients have minimal pain and may have different motives for seeking medical aid, i.e., medications, attention, etc. These patients must be educated to avoid abnormal shoulder posturing. Patients may need additional consultation for behavior modification/psychological evaluation if condition becomes disabling. The major difference between a habitual subluxer and one who reluctantly demonstrates their abnormal subluxation is the motivation of the patient. There are individuals who have the ability to sublux their

shoulders, but once it becomes painful, wish it to stop. If they are unable to stop subluxing, and seek medical attention, they are not included in this habitual category. Early specialist referral may be warranted.

- Other diagnoses

There may be some overlap with other diagnoses for shoulder pain. Rotator cuff tears may result from a shoulder dislocation, especially in middle-age or older age groups. Patients may demonstrate symptoms of pain, weakness, and dysfunction as a result of a traumatic dislocation due to persisting rotator cuff pathology. In this case, symptoms from both impingement and instability may be evident on physical examination. Further imaging and referral to a specialist is suggested.

Certain patients with a long-standing history of instability may develop joint pain from arthritis. A small percentage of patients with a history of glenohumeral instability may have pain at rest, nighttime pain, and limits to terminal motion. Radiographs may not be diagnostic if early in the disease pattern. Further studies may or may not be of help. Gently stretching programs, non-steroidal anti-inflammatory medication, heat and/or ice is the initial approach **("B" recommendation)**. If unsuccessful, consultation with a specialist is recommended.

Expected Clinical Results

Results depend on the type of instability and the age of the patient. Patients with joint laxity and subluxation have a greater chance of success with a non-operative approach and exercise program, than the young athlete with an acute traumatic injury.

Alternative Approaches

Upon early consultation with a specialist, the patient may be allowed to complete the season possibly with bracing.

<u>Arthritis of the Glenohumeral Joint</u>

Definition of the problem

Multiple causes of glenohumeral arthritis exist and attempts should be made to secure a specific cause, i.e. cuff arthropathy, arthritis of dislocation, avascular necrosis, part of a systematic disease (rheumatoid arthritis or ankylosing spondylitis), and osteoarthritis.

The shoulder stiffness from arthritis should be separated from that of frozen shoulder by history and physical examination as well as x-ray, and evaluation of the contralateral shoulder. Definition of the problem using evaluation instruments such as SF36 and SST are especially important.

Patients with arthritis of the glenohumeral joint generally are over 50 years of age with progressive pain, crepitus, and decreased range of motion. X-rays may document head flattening, irregular or narrowed joint space, and bone cysts.

Recommendations
Initial treatment includes activity modification, NSAIDs and physical therapy to maintain motion and strength, but not to aggravate the problem **("B" recommendation)**. When considering long-term NSAIDs, appropriate lab tests and involvement of the primary care physician for overall medical treatment is indicated. Intraarticular corticosteroid injections are not recommended. No recommendation is made for glucosamine/chondroitin sulfate at this time.

On follow-up examination, other diagnoses are again ruled out, compliance reviewed, and the NSAID perhaps changed **("B" recommendation)**. Specialist referral is indicated if the patient is not improved or with progressive loss of motion.

Shoulder replacement may be indicated in advanced cases of painful glenohumeral arthritis with failed conservative management. Age, activity level, bone, muscles, and tendon quality, and type of arthritis are all factors in deciding whether humeral head alone or the humerus plus glenoid are replaced. Open debridement of the arthritic shoulder is not thought to be helpful.

Expected Clinical Results
Control of pain, maintenance of limited shoulder function and delay in the need for shoulder joint replacement are all expected results of initial treatment.

Alternative Approaches
Intraarticular corticosteroid injections are not recommended. No recommendation is made for glucosamine/chondroitin sulfate or vicsosupplementation.

<u>Acromioclavicular Joint Disorder</u>
Definition of the problem
Pain or injury involving the acromioclavicular joint or lateral clavicular region. Although the majority of problems related to this anatomic area are traumatic in origin, some painful conditions may be related to atraumatic diseases.

The skeletally mature patient who presents with an injury to the AC joint (superior shoulder pain) may be seen in an emergency room setting or in a practitioner's office. The individual may be seen by a wide variety of physicians including, family physician, internists, neurologists or orthopaedists. The first contact physician should begin the evaluation with a history and physical examination. Because the majority of injuries to the AC joint are traumatic, radiographic assessment of the shoulder girdle should be considered. What is more controversial is the question of whether weighted X-ray views are necessary or valuable in the diagnosis and treatment of injuries to the AC joint. The weight of the evidence (consensus) suggests such weighted radiographs are not necessary in initial evaluation except as specified below. Critical diagnoses are excluded including fractures or dislocation of the glenohumeral joint, vascular or neurologic injuries and gross deformities of the AC joint region which suggest a high grade injury.

Recommendations

- Isolated Osteoarthritis of the AC Joint

This clinical condition often manifests itself as a part of the impingement syndrome and rotator cuff disease. Isolated arthritis of this joint is commonly seen as a late sequella of Type II AC joint injuries many years in the past. Patients have difficulty rolling on to their affected shoulder while sleeping and have difficulty reaching across their chest such as is required to cleanse their opposite axilla. Radiographs will demonstrate sclerosis of the lateral aspect of the acromion and hypertrophic spurs on the superior and inferior aspects of both the acromial and clavicular sides of the joint. Treatment should consist of non-steroidal anti-inflammatory (NSAID's) and activity modification specifically diminishing repetitive activities **("B" recommendation)**. Perpetuation of symptoms should result in referral to a specialist for consideration of injection therapy of other surgical alternatives.

- Osteolysis of the Clavicle

Osteolysis is a relatively uncommon condition associated with the distal clavicle. Although it is seen in female, it is distinctly more common in males and most often associated with weight lifting activities. In fact it carries the eponym "Weight lifter's shoulder." Pain is of insidious onset, and typical of most AC joint pathology, patients complain of pain when rolling onto the affected shoulder while sleeping or when reaching across their body to reach their opposite axilla. Overhead lifting activities also provoke pain. There is tenderness to direct palpation over the joint and swelling is occasionally discernable. Radiographs are characteristic and usually diagnostic with resorption of the lateral clavicle, widening of the joint space and a tapered appearance of the lateral clavicle. This is a self-limiting condition and rarely if ever requires surgical treatment. Cessation of offending activities, NSAID's and patient education provide adequate treatment **("B" recommendation)**. Rarely intra-articular steroids may provide benefit. If symptoms persist beyond three months, referral to the specialist is indicated.

Expected Clinical Results

Many patients who rest the affected arm for two to three weeks and are dedicated to a rehabilitation program which emphasizes recovery of shoulder range of motion and strength can anticipate near full painless function of the limb. Occasionally type II injuries may have residual pain with activity but only very few AC joint injuries find need for surgical intervention. For painful osteoarthritis of the AC joint unresponsive to medical management, surgical excision of the lateral clavicle may be indicated.

Alternative Approaches

Some physicians may recommend earlier arthroscopic management of AC joint injuries. Joint debridement, lateral clavicle excision and open reduction of the chronic AC joint separation remain alternate treatment options. However the long history of satisfactory outcomes from a non-surgical approach to treatment of AC injuries suggests that the vast majority of these conditions can be successfully treated by the first contact physician.

Fibromyalgia

Definition of the problem

Fibromyalgia is characterized by the diffuse musculoskeletal pain, often presenting in the shoulder girdle. The definition from a multi-center criteria committee includes widespread pain of at least three months duration, including areas about the shoulder, i.e., trapezius at the mid-point of upper border and supraspinatus at origins above the scapular spine near the medial border. Multiple trigger points are also present usually with guarded cervical spine motion and fatigue with sleep disturbances. These trigger points are often over the trapezius muscle and near ligament or muscular attachments to the bone. Induration may be present, localized to the tender areas. Muscle strength studies have not shown weakness to conform to the patient's perceived fatigue. Laboratory and x-ray testing are characteristically negative. The cause of fibromyalgia is unknown, but may be related to chronic muscular tension or sleep disturbance, causing chemical abnormalities. Fibromyalgia patients may have clinical depression and may require mental health consultation.

Recommendations

The focus of initial treatment should be on the sleep disturbance with bedtime low-dose tricyclic antidepressants. Suspension of caffeine use has been suggested **("B" recommendation)**. In addition, activity modification (aerobic exercise) and NSAIDs are advised **("B" recommendation)**. A follow-up visit at four weeks to allow patient reassessment, review the diagnosis, and evaluate patient compliance is necessary. Appropriate specialist care may then be indicated.

Expected Clinical Results

The discomfort associated with fibromyalgia is generally chronic, with waxing and waning symptoms which may be affected by mood changes. Some improvement is expected following explanation of the problem to the patient, and initial treatment.

Alternative Approaches

Naturopathic medicines, DMSO, massage, or chiropractic care may be chosen by the patient for this disease which is often poorly understood by the treating physician.

Rehabilitation

Aerobic exercise may be considered. Ultrasound, electrical stimulation and other modalities are commonly used by therapists but have not been proven to be beneficial.

FUTURE RESEARCH RECOMMENDATIONS

The Revision Panel for the Clinical Guideline on Shoulder Pain believes that additional outcome studies, which assess outcomes resulting from the use of specific guidelines are necessary and beneficial. The further refinement and defining of "best practice patterns" – improving the evidence upon which guideline recommendations are based – may then serve as an improved model for further guideline revision and improvement.

The Revision Panel recommends the following three additional studies be designed and initiated at this time, to be designed utilizing best scientific methodology:

1.) Indications and Efficacy for Shoulder Rehabilitation (Rotator Cuff and Scapular Stabilizer Strengthening with Restoration of Range of Motion) as Initial Treatment of Shoulder Impingement Syndrome.
2.) Indications and Efficacy for Steroid Injection to Treat Patients Presenting with Shoulder Pain.
3.) Evaluation and Critique of the AAOS Clinical Guideline of Shoulder Pain – Methods of Dissemination, Application, and Efficacy.

The Revision Panel recommends that the AAOS develop a clinical guideline on acute shoulder injury to address issues related to acute shoulder trauma.

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