Treatment Guidelines

Washington State Department of Labor and Industries

Work-Related Proximal Median Nerve Entrapment (PMNE) Diagnosis and Treatment

I. REVIEW CRITERIA

As request may be appropriate for	If the patient has	AND the diagnosis is supported by these clinical findings			AND this has been done (if recommended)
Surgical Procedure	**Diagnosis**	**Subjective**	**Objective**	**Diagnostic tests**	
Proximal Median Nerve Entrapment Release	Proximal Median Nerve Entrapment (PMNE)	Pain in the proximal volar area of the forearm (pain may be exacerbated with increased physical activity). **OR** Paresthesias in the first 3 digits (median distribution) of the affected arm.	Tenderness to palpation over pronator teres muscle. **OR** Weakness of deep flexor muscles supplied by the proximal median nerve [pronator teres, flexor carpi radialis, flexor digitorum superficialis, flexor digitorum profundus (radial half), flexor pollicis longus, pronator quadratus] as well as the muscles supplied by the distal median nerve (abductor pollicis brevis, flexor pollicis brevis, opponens pollicis). Continued on next page	Electrodiagnostic studies (EDS), i.e., nerve conduction velocity (NCV) and electromyography (EMG) are required to objectively confirm the diagnosis of PMNE. EDS are useful both to diagnose PMNE and to rule out other potential sites of median nerve compression, such as carpal tunnel syndrome (CTS). Positive EMG criteria are as follows: 1. Evidence of denervation in a muscle supported by the anterior interosseous nerve (flexor pollicis longus, pronator quadratus, or radial aspect of the flexor digitorum profundus).	Conservative care required for at least 6 weeks. Conservative care should include: rest, modified activities, splinting at wrist and elbow, physical therapy, anti-inflammatory drug therapy, corticosteroid injections if indicated.

				OR 2. Evidence of denervation in a median innervated muscle in the forearm (pronator teres, flexor carpi radialis, flexor digitorum superficialis). **AND** 3. Evidence of denervation in a median innervated muscle in the hand (abductor pollicis brevis, flexor pollicis brevis, opponens pollicis). **AND** 4. Needle EMG of at least one muscle supplied by the ulnar or radial nerve should be normal A pure Anterior Interosseous Syndrome (AIN) would only need to meet criteria 1 and 4.	

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II. INTRODUCTION

This guideline is to be used by physicians, claim managers, and utilization review staff. The emphasis is on accurate diagnosis and treatment that is curative or rehabilitative (see WAC 296-20-01002 for definitions). An electrodiagnostic worksheet and guideline summary are appended to the end of this document.

This guideline was developed in 2009, and reviewed and updated in 2014, by Washington State's Labor and Industries' Industrial Insurance Medical Advisory Committee (IIMAC) and its subcommittee on Upper Extremity Entrapment Neuropathies. It focuses on work-related medical conditions. One of the subcommittee's goals is to provide standards that ensure a uniformly high quality of care for injured workers in Washington State. The IIMAC unanimously approved this guideline.

The subcommittee is comprised of a group of physicians of various medical specialties, including rehabilitation medicine, occupational medicine, orthopedic surgery, plastic surgery, neurosurgery, neurology, pain medicine, and electrodiagnostic medicine. The subcommittee based its recommendations on the weight of the best available clinical and scientific evidence from a systematic review of the literature. PMNE is a rare entrapment neuropathy and there are no high quality clinical or scientific studies regarding this condition. Nonetheless, the subcommittee's consensus opinion is that objective confirmation of the PMNE diagnosis is critical to making the correct diagnosis and directing appropriate treatment.

Compression near the antecubital fossa can occur as the nerve traverses any of the following anatomic structures: the ligament of Struthers/supracondylar process, the lacertus fibrosis (bicipital aponeurosis), the fascia of the pronator teres, or the fibrous arch formed by fascia of the flexor digitorum superficialis. Entrapment of the median nerve in the proximal forearm must be distinguished from more distal sites of entrapment such as at the wrist (carpal tunnel) or at the anterior interosseous nerve branch (which supplies no cutaneous sensation).

In general, both work-relatedness and appropriate symptoms and signs must be present to accept proximal median nerve entrapment on a claim. Electrodiagnostic studies (EDS), including nerve conduction velocity studies (NCVs) and needle electromyography (EMG), should be scheduled immediately to corroborate the clinical diagnosis. Completion of EDS is required if time loss extends beyond two weeks or if surgery is requested.

III. MAKING THE DIAGNOSIS

A. SYMPTOMS AND SIGNS

Our case definition of confirmed PMNE includes appropriate symptoms, objective physical findings (signs), and abnormal electrodiagnostic studies. A provisional diagnosis of PMNE may be made based upon appropriate symptoms and objective signs, alone, but confirmation of the diagnosis requires

abnormal EDS. Non-surgical therapy may be considered in cases in which a provisional diagnosis has been made. Surgical treatment should be provided only in cases where the diagnosis of PMNE has been confirmed by abnormal EDS, as the potential benefits of surgery outweigh the risks only when the diagnosis of PMNE has been confirmed by abnormal EDS.

The **primary symptom** associated with PMNE is pain in the proximal volar area of the forearm. Many patients report an increase in pain severity with an increase in activity. Other symptoms may include weakness in the forearm and the hand (such as a decrease in grip strength), cramping in the hand (writer's cramp), and paresthesia or numbness in the first three digits. [1,3,6-9] Nocturnal symptoms are not as common for PMNE as they are for carpal tunnel syndrome (CTS).

Physical signs include tenderness in the forearm over the pronator teres muscle and along the median nerve distribution. Unlike median entrapment at the carpal tunnel, if weakness is present, it should involve muscles supplied by the median nerve both above and below the wrist. Tinel's sign (paresthesias radiating in a median nerve distribution with pressure or tapping over the median nerve in the forearm) may be present, but by itself is not specifically diagnostic of PMNE. A positive Phalen's sign (paresthesias radiating in a median nerve distribution with sustained flexion of the wrist) or Tinel's sign with tapping over the wrist more likely indicates CTS rather than PMNE.

Three provocative tests have been described to help corroborate the site of compression for PMNE. These provocative tests do not replace the objective signs discussed below. Sensitivity and specificity of these provocative tests have not been established. The tests are based on creating maximal tension on the anatomical sites that can contribute to PMNE:

1. The pronator teres muscle is implicated if symptoms are reproduced upon resisted pronation of the forearm in neutral position with the elbow extended.
2. The lacertus fibrosis (bicipital aponeurosis) is implicated if symptoms are reproduced upon resisted elbow flexion at 120-130 degrees flexion with the forearm in maximal supination.
3. The flexor digitorum superficialis is implicated if symptoms are reproduced upon resisted flexion of the proximal interphalangeal joint to the long finger ("middle finger flexion test"). [8-10]

Every effort should be made to objectively verify the diagnosis of PMNE before considering surgery. One potentially competing diagnosis is a non-traumatic inflammatory neuritis- Parsonage-Turner Syndrome- which may produce dysfunction in a median nerve distribution that can mimic PMNE. This condition often produces more widespread abnormalities affecting multiple upper extremity nerves. Also, it is usually accompanied by proximal pain around the shoulder girdle, rather than in the forearm. This condition usually improves spontaneously in six to twelve months. This idiopathic condition would not normally be considered a work-related condition.

B. ELECTRODIAGNOSTIC STUDIES (EDS)

Electrodiagnostic studies (NCVs and EMG) are required to objectively confirm the diagnosis of PMNE. EDS are useful both to diagnose PMNE and to rule out other potential sites of median nerve compression, such as CTS. Unlike the distal median nerve entrapment within the carpal tunnel, NCVs in proximal median nerve entrapment are often normal.[1,2,6] Short segment nerve conduction studies have not been demonstrated to reliably diagnose this entity. However, EMG studies may show an abnormality in the distribution of the proximal median nerve of the forearm. The diagnosis is specifically confirmed by EMG demonstrating membrane instability (e.g. increased insertional activity,

fibrillation potentials, positive sharp waves) of median innervated muscles both below and above the wrist in the forearm (unlike CTS which should only affect median innervated muscles below the wrist).[7]

C. OTHER DIAGNOSTIC TESTS

The scientific evidence is insufficient to support the use of magnetic resonance neurography (MRN) or MRI in the diagnosis of PMNE.[11,12]

IV. TREATMENT

A. CONSERVATIVE TREATMENT

Conservative treatment for PMNE has been described only in narrative reviews, case reports, and retrospective case series. Examples include rest, modification of activities that exacerbate symptoms, splinting at wrist and elbow, physical therapy, anti-inflammatory drug therapy, and corticosteroid injections.[2,4,5,6,8,9,13] Patients do not usually need time off from work activities prior to surgery unless they present with objective weakness or sensory loss in the distribution of the proximal median nerve that limits work activities or poses a substantial safety risk.

B. SURGICAL TREATMENT

Without confirmation of nerve compression **by both objective clinical findings and abnormal EDS**, surgery will not be authorized.

Surgical treatment for PMNE has been described only in narrative reviews, case reports, and retrospective case series. Surgical treatment should only be considered if the condition does not improve despite conservative treatment, or if the condition interferes with work or activities of daily living. Surgical treatment is only indicated in patients who have appropriate symptoms and one or more of the objective clinical findings described above in addition to abnormal EDS. Surgery should include exploration of the median nerve throughout its proximal course and release of all compressive structures, which may include the ligament of Struthers (if it is present), the lacertus fibrosis (bicipital aponeurosis), the fascia of the pronator teres (PT), and the fascia of the flexor digitorum superficialis (FDS).[14,15] Although complete release may require nerve decompression at multiple sites, this is considered a single procedure.

In rare cases with long standing motor palsy of part or all of the median nerve, tendon transfers may be considered to hasten return to function. When a complete palsy has been present for one or more muscles for three or more months, the patient and the surgeon should consider the options for tendon transfers. In patients who have already had a decompression of the proximal median nerve six months or more previously with incomplete return of motor function, repeat EDS are recommended. If the EDS show no improvement or worse neurologic function, a re-exploration may be necessary.

Patients with PMNE rarely present with prominent sensory symptoms. For patients with a preoperative loss of sensation who do not have recovery of sensation six months or more after surgical treatment,

repeat EDS are recommended. If the EDS show no improvement or worse neurologic function, a re-exploration may be necessary.

V. RETURN TO WORK (RTW)

A. EARLY ASSESSMENT

Among workers with upper extremity disorders, 7% of workers account for 75% of the long-term disability.[16] A large prospective study in the Washington State workers' compensation system identified several important predictors of long-term disability: low expectations of return to work (RTW), no offer of a job accommodation, and high physical demands on the job.[17] Identifying and attending to these risk factors when patients have not returned to work within 2-3 weeks of the initial clinical presentation may improve their chances of RTW.

Timeliness of the diagnosis can be a critical factor influencing RTW. Washington State workers diagnosed accurately and early were far more likely to RTW than workers whose condition was diagnosed weeks or months later. Early coordination of care with improved timeliness and effective communication with the workplace is also likely to help prevent long-term disability.

A Washington State quality improvement project has demonstrated that organized delivery of occupational health best practices similar to those in Table 1 can substantially prevent long-term disability.[18] See also the Centers of Occupational Health and Education (COHE): https://www.lni.wa.gov/patient-care/provider-partnership-best-practices/centers-of-occupational-health-education-cohe

Requirements for filing a claim for an occupational disease can be found in the Attending Provider's Resource Center: https://lni.wa.gov/patient-care/workshops-training/attending-provider-resource-center/.

See next page for Table 1

Table 1. Occupational Health Quality Indicators for Proximal Median Nerve Entrapment

Clinical care action	Time-frame*
1. Identify physical stressors from both work and non-work activities; 2. Screen for presence of PMNE 3. Determine work-relatedness 4. Recommend ergonomic improvements	1st health care visit
Communicate with employer regarding RTW using 1. Activity Prescription Form (or comparable RTW form) and/or 2. Phone call to employer	Each visit while work restrictions exist
1. Assess impediments for RTW 2. Request specialist consultation	If > 2 weeks of time-loss occurs or if there is no clinical improvement within 6 weeks
Specialist consultation	Performed ASAP, within 3 weeks of request
Electrodiagnostic studies	If the diagnosis of PMNE is being considered, schedule studies immediately. These tests are required if time-loss extends beyond 2 weeks, or if surgery is requested.
Surgical decompression	Performed ASAP, within 4 weeks of determining need for surgery

*"Time-frame" is anchored in time from 1st provider visit related to PMNE complaints.

B. RETURNING TO WORK FOLLOWING SURGERY

Most patients requiring a PMNE release alone can return to light duty work in approximately 3 weeks and regular duty work in approximately 6 weeks. A course of hand therapy may help functional recovery and is particularly important for patients requiring tendon transfers or for patients with residual weakness. These patients may return to light duty work in approximately 6-8 weeks and regular duty work in approximately 10-12 weeks.

VI. ELECTRODIAGNOSTIC WORKSHEET

PURPOSE AND INSTRUCTIONS

The purpose of this worksheet is to help medical and nursing staff interpret electrodiagnostic studies (EDS) that are done for injured workers. The worksheet should be used only when the main purpose of the study is to evaluate a patient for PMNE. It should accompany but not replace the detailed report normally submitted to the insurer. We encourage you to use the electrodiagnostic worksheet below to report EMG results, but we will accept the results on a report generated by your office system.

Worksheet for Proximal Median Nerve Electromyography

Electromyography criteria that confirm the diagnosis of PMNE include evidence of denervation (e.g. increased insertional activity, fibrillation potentials, positive sharp waves) in the following:	**Abnormal muscles**
1. A muscle supported by the anterior interosseous nerve (flexor pollicis longus, pronator quadratus, or radial aspect of the flexor digitorum profundus)	
OR	
2. A median innervated muscle in the forearm (pronator teres, flexor carpi radialis, flexor digitorum superficialis)	
AND	
3. A median innervated muscle in the hand (abductor pollicis brevis, flexor pollicis brevis, or opponens pollicis)	
AND	
4. Needle EMG of at least one muscle supplied by the ulnar or radial nerve should be normal.	

*A true AIN syndrome would only need to meet criteria 1 and 4.

Claim Number: _____

Claimant Name: _____

Additional Comments:

_____

_____

_____

_____

_____ _____

Signed **Date**

VII. REFERENCES

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