

Median Nerve Compression at Pronator Teres

Surgical Indications and Considerations

Anatomical Considerations: The median nerve and brachial artery travel together down the arm. Therefore, one must be very careful not to interfere with either the median nerve or the brachial artery, especially when conducting surgical procedures. In the area of the pronator teres, there are many tendons as well. It is important to identify, as much as possible, the correct site of compression.

Pathogenesis: The median nerve can get entrapped or compressed by several structures in the arm. The pronator teres muscle is the most common. Others entrapment sites include the flexor digitorum superficialis arch, the lacertus fibrosis (bicipital aponeurosis), and ligament of Struthers (frequency occurs in that order). For compression of the median nerve at the pronator teres and flexor digitorum superficialis, the cause is almost always due to hypertrophy of the respected muscle. This hypertrophy is from quick, forceful and repeated movements to the involved muscle. Examples include a carpenter or a baseball batter. As the muscle hypertrophies, the signal from the median nerve is diminished resulting in paresthesias in the median nerve distribution (lateral arm and hand) distal to the site of compression. Pain in the volar part of the forearm, often aggravated by repetitive supination and pronation, is a common symptom of pronator involvement. Another indicator is forearm pain with the compression of muscle such as pain in the volar part of the forearm implicating pronator teres. Onset is typically insidious and diagnosis is usually delayed 9 months to 2 years.

Epidemiology: Pronator teres syndrome is the second most common cause of median nerve compression behind carpal tunnel syndrome. It tends to occur in athletics (especially those with rapid, exertional supination and pronation) and in occupations where the forearm may be hypertrophied. In addition, anomalies involving the ligament of Struthers and the course of the median nerve may contribute to median nerve entrapment.

Diagnosis

- Aching discomfort and easy fatigability of the muscle of the forearm
- Numbness and paresthesia in median nerve distribution and palmer cutaneous branch in hand
- Absence of nocturnal symptoms
- Direct compression of the pronator teres muscle resulting in symptom reproduction
- Electromyographic studies of muscles innervated by the median nerve are considered mildly reliable (confirms diagnosis of AIN syndrome in 80-90% of cases)
- Can occur with a sudden increase in use of pronation or supination muscles.

Nonoperative Versus Operative Management: Conservative management is almost always attempted prior to surgery and can often result in positive results. With conservative treatment, 50% of patients report recovery within 4 months. Other reports say improvement can be seen

from 18 months to 2.5 years after conservative treatment. Conservative treatment involves rest and casting early, modalities and nerve gliding next, followed by return to modified duties and full work/recreation. Cortisone injections could be attempted after conservative treatment is deemed not successful. Surgery is the next option when both of the previous attempts were not able to improve the patient's symptoms. Some literature says the decision to have surgery may be determined as early as 8 weeks or as long as 6 months after initiating conservative treatment. In general, median nerve decompression has an 85 to 90% good to excellent outcome.

Surgical Procedure: Decompression is performed with an anterior approach and uses a longitudinal incision along the arm. If it is determined the patient has a supracondylar process (ligament of Struthers) and requires decompression, the incision will start several centimeters above this site. Otherwise, the incision is made just above or at the elbow crease. It is then carried to the midforearm. Due to difficulty in differentiation, the surgery involves decompressing all possible sites along the course of the nerve. This can include several sites that may not be entrapping the nerve and may result in longer recovery and rehabilitation due to several sites of injury. In instances such as high-level athletes, careful identification of the site of entrapment is performed and only that site is decompressed. As stated earlier, median nerve decompression has an 85 to 90% good to excellent outcome.

Conservative Rehabilitation (Preoperative Rehabilitation):

Phase I: Weeks 1-2

Goals: Control edema
Pain reduction

Intervention:

- Protect elbow from further entrapments with use of splinting the elbow at 90 degrees flexion and neutral supination/pronation
- Gentle passive range of motion activities
- Elevation, ice and compression
- Modalities and medications for inflammation, pain, and swelling
- Gentle median nerve gliding
- Soft tissue mobilization and massage
- Maintain physical fitness and conditioning

Phase II: Weeks 3-4

Goals: Improve Flexibility
Strengthening
(Caution is exhibited in this phase to prevent recurrence of overuse syndrome)

Intervention:

- Modalities may be used to help reduce inflammatory and pain
- Wrist flexion and extension exercises are initiated.
- Once this is tolerated well, the patient may begin with elbow flexion and extension exercises and gentle supination and pronation.
- Soft tissue mobilization/massage to forearm may be used to areas when entrapment is suspected
- Begin to address work or sport related activities
- Progress with physical fitness and conditioning
- Provide nerve mobility “gliding” exercises to address nerve mobility impairments and prevent recurrence

Phase III: Weeks 5-8

Goals: Progress to independent home program

Return to occupational, recreational, or sport activities

Prevent recurrence of injury

For non-dominant arm, progress patient to 90% strength of opposite arm. For dominant arm, progress patient to 100% strength

Intervention:

- Education to patient regarding prevention and management
- Nerve gliding to prevent recurrence
- Strengthening and flexibility is large component for the athlete to return to sports
- Focus on tasks that simulate the patient’s sport or work or both

POSTOPERATIVE REHABILITATION

Phase I: Days 1-21

Goals: Control edema and pain

Prevent infection of wound site

Maintain AROM of surrounding joints

Decrease sensitivity at incision site and increase scar mobility

Intervention:

- Instruct on surgical site protection and monitor drainage
- Rest, ice, and elevate arm
- Elbow splinted for 7 to 10 days in slight flexion
- Active finger, wrist, and shoulder movement – later in Phase I include elbow and forearm

motions

- Painfree, gentle nerve mobility exercises
- Iontophoresis and modalities as needed to reduce inflammation and control pain
- Gentle soft tissue mobilization and massage to decrease swelling and maintain tissue mobility

Phase II: Weeks 4-6

Goals: Grip and elbow strength 30-50% of uninvolved hand
 Increase forearm and elbow AROM to greater than 50% of normal.
 Continue to prevent scar adhesions and sensitivity
 Independence with activities of daily living
 Assess ergonomics at work or sport activity

Intervention:

- Passive stretches to elbow, forearm, wrist and shoulder
- Patient education regarding prevention of recurrence
- Isotonic exercises for elbow, wrist, forearm, and shoulder
- Begin work and sport simulated exercises

Phase III: Weeks 6-12

Goals: Adequate strength to return to full work duties or sport activities
 Self-management of symptoms

Intervention:

- Work or sport simulated activities
- Progress upper extremity exercises emphasizing endurance for return to work or sport
- Continue exercises and stretches from Phase I and II as indicated

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