Subcoracoid Impingement is a Variant of Thoracic Outlet Syndrome Found in Neonatal Brachial Plexus Palsy

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Introduction
Thoracic outlet syndrome consists of a constellation of symptoms due to compression of upper extremity neurovascular structures as they exit the neck. The most common level of compression is proximally at the root and trunk level of the brachial plexus at the same level where the subclavian artery exits the thorax between the anterior and middle scalene muscles.

The other common site of compression is distally as the branches of the brachial plexus traverse under the Pectoralis minor tendon as it attaches to the coracoid process of the scapula. Compression at this level has been called subcoracoid impingement, subcoracoid pressure syndrome, Pectoralis minor syndrome, or distal thoracic outlet syndrome. Thoracic outlet syndrome has not previously been linked to neonatal brachial plexus palsy.

Aim
We describe 9 patients with neonatal brachial plexus palsy (NBPP) who had chronic discomfort around the shoulder with variable neurologic symptoms. All 9 patients were diagnosed with subcoracoid impingement due to clinical symptoms, examination consistent with Pectoralis Minor tightness and subcoracoid impingement, and radiographic findings of coracoid hooking and elevation of the superior angle of the scapula. All 9 patients underwent surgical release of the Pectoralis Minor tendon. We describe the clinical course, radiographic findings, and surgical outcomes from these patients.

Methods
- Retrospective review of patients with NBPP and subcoracoid impingement
- 9 patients with minimum 6 month (average 17.3) follow-up identified
- All patients had signs of Pectoralis minor tightness with positive Putti sign and evocative impingement
- All patients underwent surgical release of Pectoralis minor tendon, often in conjunction with shoulder reconstructive surgery consistent with their underlying shoulder dysfunction from NBPP
- Demographic and radiographic data, and pre- and post-operative VAS pain scores, Mallet sales, Narakas Class and active/passive range of motion about the shoulder were recorded

Results
Average Age 10.3 years at surgery (range 6.6 – 15.6).

Most Common Presenting Complaints
1. Generalized shoulder aching pain (7/9)
2. Numbness and tingling down arm (6/9)
3. Pain worse with carrying heavy objects (5/9)
4. Early shoulder fatigue (1/9)

Pectoralis Minor release from the coracoid was performed through a 1 cm anterior incision. This was created as an inferior extension of the anterior arthroscopic portal when arthroscopy was performed.

Pectoralis Minor release was performed alone in 1/9 patients or combined with:
- Arthroscopic shoulder capsular release (2/9)
- Arthroscopic shoulder capsular release and Latissimus Dorsi and/or Teres Major tendon transfer (4/9)
- Humeral external rotation osteotomy (2/9)

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AP radiograph of bilateral shoulders demonstrating scapular protraction and elevation of the superior angle of the scapula.

Conclusion
Shoulder pain in NBPP should be carefully evaluated and treated as a part of the global management for these patients. Subcoracoid impingement is a variation of thoracic outlet syndrome that can be seen in patients with NBPP and is diagnosed based on history and physical examination findings. Abnormal pressure from the coracoid can be alleviated with release of the Pectoralis Minor tendon through a 1 cm anterior incision without apparent loss of shoulder function.

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