When the Shoulder Inspires: A Case of Breathing Arm

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A 6 month-old presented with left arm weakness dating from birth. She had significant elbow flexion and shoulder abduction weakness and mild finger, wrist, and arm extension weakness. EMG/NCS was pursued to evaluate extent of injury and demonstrated panplexus injury. Median, lateral antebrachial cutaneous, and radial sensory responses were abnormal, and EMG showed
evidence of reinnervation in C5-T1 innervated muscles with ongoing denervation in C5-6 innervated muscles. Spontaneous deltoid firing coincident with inspiration was observed on EMG (video 1). This phenomenon, “breathing arm”, occurs in obstetrical and non-obstetrical plexopathies when the C5 nerve root is injured proximal to the phrenic nerve origin. In “breathing arm”, aberrant regeneration of fibers originally supplying the phrenic nerve supply upper trunk muscles results in synkinesis with contraction of upper trunk muscles with inspiration. An alternative explanation is that this represents a compensatory response to diaphragmatic inadequacy. However, with no clinical evidence of respiratory insufficiency, aberrant reinnervation is favored. Respiratory synkinesis is significant when considering surgery as this indicates severe proximal root or trunk injury. 1-2

**Appendix 1: Authors**

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<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Contribution</th>
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<tbody>
<tr>
<td>Jennifer L. McKinney, MD, FACNS</td>
<td>Nationwide Children's Hospital/The Ohio State University College of Medicine</td>
<td>Design and conceptualized study; drafted and edited the manuscript</td>
</tr>
</tbody>
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References:


**Video 1.** Concentric needle electrode EMG recording from the deltoid muscle showing spontaneous, rhythmic firing of motor unit potentials time locked with inspiration (based on visual inspection) starting at the 0.01 second mark. Intermittent fibrillation potentials are also present. Recording gain is 50 µV/Div with a sweep of 10 ms/Div.
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