

# Teaching Video NeuroImages:

## The breathing arm

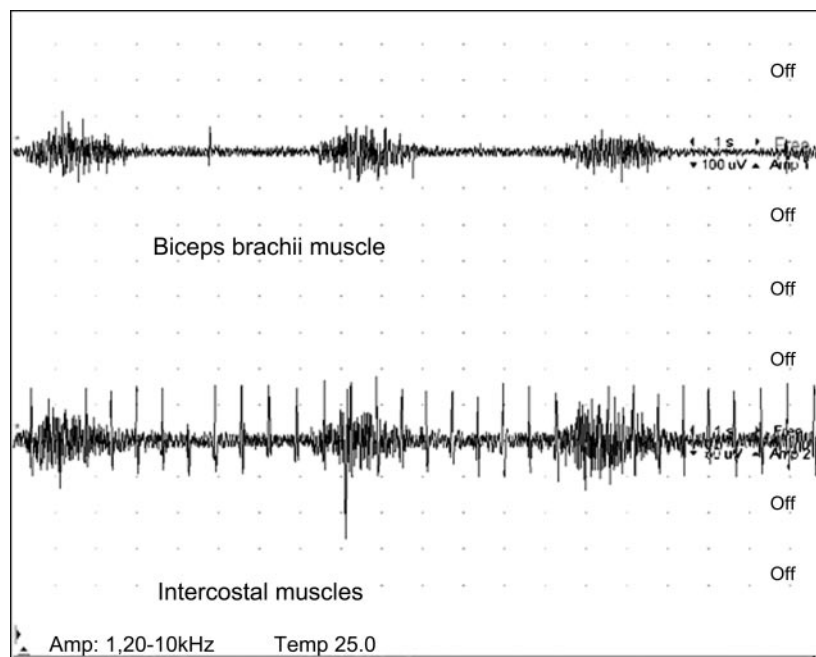
### Respiratory brachial synkinesis



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Figure EMG recording of biceps and intercostal muscles



Multichannel surface recording of the right biceps brachii muscle and fifth intercostal muscles demonstrates synkinesis of the biceps brachii muscle associated with normal burst activity from the intercostal muscles during inspiration. No motor units were present when the patient stopped breathing.

A 19-year-old man sustained a right upper trunk brachial plexopathy from a stab wound and became paralyzed in the right proximal arm. Twelve months later, he underwent microsurgical anastomosis of injured C5 and C6 nerve roots to the more distal C5 nerve root. At 14 months postoperatively, there were involuntary movements of his right biceps and deltoid muscles time-locked to inspiration (see video on the *Neurology*<sup>®</sup> Web site at [www.neurology.org](http://www.neurology.org); see figure).

The diaphragm receives innervation from C3–C5 nerve roots via the phrenic nerve. During regeneration of motor neurons originally destined for the phrenic nerve, aberrant regrowth into the upper trunk of the brachial plexus resulted in reinnervation of the biceps brachii and deltoid (via musculocutaneous and axillary nerves), rather than the phrenic nerve. The result is in-

voluntary contraction of the biceps and deltoid muscles time-locked to breathing or the “breathing arm” syndrome. This phenomenon has been observed after surgery or trauma, including obstetric brachial plexus injuries. Congenital variants also exist, including trigemino-abducens synkinesis.<sup>1-3</sup>

#### REFERENCES

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Supplemental data at  
[www.neurology.org](http://www.neurology.org)

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Disclosure: Dr. Lam reports no disclosures. Dr. Engstrom receives research support from the NIH (2 RO1 HL062235-06 [Co-I]).

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## Teaching Video *NeuroImages*: The breathing arm: Respiratory brachial synkinesis

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*Neurology* 2010;74:e69

DOI 10.1212/WNL.0b013e3181d9ed1e

This information is current as of April 19, 2010

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