Bilateral reduction of sternocleidomastoid motor unit discharge rate during acute unilateral noxious stimulation

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1. OBJECTIVE

- A decrease of single motor unit discharge rates have been observed following experimentally induced muscle pain (1,2). This has been attributed to either a reduction in the descending drive to the muscle during pain or a reflex inhibition mediated by small diameter muscle afferents.

- In order to further investigate the potential mechanisms underlying a pain-induced decrease of motor unit discharge rate, this study evaluated the effect of acute unilateral painful stimulation of the sternocleidomastoid muscle on the discharge rate of sternocleidomastoid motor units bilaterally during isometric neck flexion and rotation.

2. METHODS

- 12 healthy volunteers
- Intramuscular EMG signals (iEMG) detected from the sternocleidomastoid (SCM) muscle bilaterally; surface EMG signals (sEMG) SCM muscle bilaterally
- Visual feedback of force produced during isometric cervical flexion and rotation
- 3 Contractions: Flexion, Rotation Left and Rotation Right (@10% and 20% MVC)
- 4 Conditions: Baseline, Isotonic saline solution (0.5 cc; 0.9%) on left side, Hypertonic saline solution (0.5 cc; 5.8%) (Experimental Pain) on left side, Recovery after 15 min.

3. RESULTS

- RMS of sEMG signals detected on SCM muscle bilaterally
- Discharge rate of MUs identified after decomposition of iEMG signals detected from the SCM muscle bilaterally

4. CONCLUSIONS

- Stimulation of nociceptive afferents by injection of hypertonic saline into the left sternocleidomastoid muscle resulted in reduced discharge rate of left sternocleidomastoid motor units during ipsilateral and contralateral cervical rotation.

- Although the inhibitory effect of pain-inducing substances on motor unit discharges has been proven in previous work (1,2), this is the first study to show that this inhibitory effect is dependent on the direction of force.

- In addition, the discharge rate of motor units in the contralateral, non-painful sternocleidomastoid muscle was reduced during ipsilateral cervical flexion.

- Taken together, these findings suggest that the decreased discharge rate of single motor units observed following experimentally induced muscle pain reflects a pain-induced reduction in the descending drive to the muscle rather than a reflex inhibition mediated by small diameter muscle afferents.

5. REFERENCES


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