Use of Deep Cervical Flexor Exercises in Reducing Cervical Spine Pain

Sarah Pawlowsky, PT, DPT, OCS
Assistant Clinical Professor UCSF
Core Faculty UCSF/SFSU Graduate Program in PT
UCSF Spine Symposium 2013

Objectives
• Describe two clinical tests for deep cervical flexors.
• Describe exercises to strengthen deep cervical flexors.
• Summarize the current evidence pertaining to how deep cervical flexor exercises can be used to treat cervical spine pain.

Disclosures
• I have nothing to disclose.

Background
• Exercise therapy effective for neck pain. (Kay et al. 2005)
• Local cervical segments may be vulnerable to instability in the absence of deep muscle activation. (Falla 2011)
Deep Cervical Flexors (DCF)
- Longus Colli & Longus Capitis
- Craniocervical flexion, counter lordosis
- Actions of sternocleidomastoid (SCM) & anterior scalene (AS)

Potential Ways to Test DCF
- Cervical Flexion
  - SCM and AS provide 83% cervical flexion capacity (Vasavada 1998)
- Craniocervical Flexion Test
- Craniocervical Flexion with Cervical Flexion

fMRI Results
- Cervical Flexion: Higher SCM activity
- Craniocervical Flexion: Higher Longus Capitis activity
- Craniocervical Flexion with Cervical Flexion: Maximal recruitment of Longus Colli, Longus Capitis, & SCM

Craniocervical Flexion Test (CCFT)
- Use of Stabilizer pressure biofeedback cuff
- Head nod action from 20 to 22 mmHg, 2-3 s hold
- Repeated through each 2 mmHg to 30 mmHg
- Clinician monitors for substitution
- SCM and AS should not be active
- 10 sec hold, 3 times each target level

Results and Pictures from Cognie et al. 2008.
Craniocervical Flexion Test

- Reduced performance of CCFT is associated with DCF dysfunction.  *(Falla et al 2004)*
- Excellent intratester reliability. Excellent repeatability between test and re-test.  *(James 2010)*
- Patients with neck pain demonstrate inferior performance on CCFT *(Jull et al 1999 and Jull et al 2000)*

DCF Endurance Test (Craniocervical Flexion with Cervical Flexion)

- Chin tuck and lifted head 2.5 cm
- Line drawn across 2 anterior-lateral skin folds
- Hand with stacked fingers under occiput
- Test repeated, maintaining contact with tester’s stacked fingers

*ICC: 0.6. Confidence Interval: 0.34-0.86 (Domenech et al 2011)*

Treatment: What is Best Type of Training for DCF?

- Low-load training increased DCF EMG amplitude and decreased amplitude for SCM and anterior scalene.
- No change in DCF amplitude for high-load training group. *(Jull et al 2009)*

*Domenech et al 2011*

- Men: 39.1 ± 20.0 seconds
- Women: 29.3 ± 13.7 seconds
- Activity level and age not correlated with endurance
Treatment: Activation of DCF in Sitting

- EMG of DCF higher when facilitated into upright posture versus unfacilitated spontaneous upright sitting. (Falla et al. 2004)
- 2 weeks of treatment improved pattern of cervical muscle activity in CCFT. (Beer et al. 2012)

(Photograph from Beer et al. 2012)

Strengthening DCF and Pain Reduction (Falla et al. 2012)

- 14 women, >6 months neck pain
- Treatment by a PT 1x/week x 6 weeks. HEP: BID for 10-20 mins
- After 6 weeks of training, patients with greatest percent change in activation of DCF showed greatest pain relief from training.
- Patients with least activation of DCF at baseline showed greatest change in activation post-training.

Other Studies That Support DCF Strengthening to Manage Pain

- Manipulative therapy, exercise, and combination equally effective in reducing symptoms of HA and neck pain. Results maintained in long-term. (Jull et al. 2002)
- Low-load and high-load training for DCF correlated with significant reduction in pain and NDI score. (Jull et al. 2009)
- Higher pain levels associated with greater delays in activation of DCF during rapid flexion of shoulder and lower amplitude of activation during isometric DCF contraction. (Falla et al. 2011)

Conclusions

- Patients with neck pain show decreased activation of the deep cervical flexors.
- Literature supports two clinical tests of DCF strength – CCFT & DCF Endurance Test.
- Low-load exercise training in the CCFT position and DCF activation in sitting have been shown to increase strength of DCF.
- Strengthening of DCF has been shown to improve pain in patients with neck pain.
Thank You

References


References Continued


References Continued