Cervical Anterior Fusion Post-Operative Rehabilitation Guidelines

- No driving while on narcotics
- No Tobacco!
- NO NSAIDs: time frame per surgeon
- +/- C-Collar per surgeon order based on history of osteoporosis, poor bone quality noted during surgery or smoker
- Initiate Outpatient PT 12 weeks status-post surgery; Home PT at discharge as needed
- Progress as appropriate

Phase 1 (1 - 12 weeks post-op)

Goals:

- Wound healing (<5-8 lb lifting limit, +/-C spine collar as ordered)
- Performing ADLs correctly
    - Don/doff shoes, correctly picking items off ground, etc
- Sitting no greater than 30 minutes at a time
- Appropriate sitting posture- suggest using a lumbar roll and cervical/thoracic retracted positioning
- Walking program (goal 30 minutes twice per day)
- Correct usage of assistive device as indicated

Phase 2 (typically 12 weeks post-op)

- regimented PT program (2-3x/week) for recommended 6-8 weeks (12-24 visits)
    - NDI at initial evaluation
    - Education on precautions, prognosis

Goals:

- Pain control (modalities, soft tissue mobilization as needed)
- Wound healing (<5-8 lb lifting limit slowly increased, approximately 5 pounds every other week while working with PT, C collar may be discontinued between 6-12 weeks post-op, per surgeon's recommendation)
- Improve endurance
    - Maintain erect posture throughout the day
    - Encourage position changes, limit sitting to 30 minutes
    - Appropriate body mechanics with ADLs (<5-8 lb weight limit)
    - Re-establish neuromuscular control of cervical and scapulothoracic muscle stabilizers
    - Continue progressive walking program and progress towards discharging assistive device

Suggested Interventions:

- Ambulation/endurance
    - Progress toward discontinuing assistive devices
    - Initiate aerobic conditioning
        - UBE no resistance/treadmill/recumbent bike

- Cervical/Upper Extremity/Core conditioning
    - Gentle cervical retractions
    - Scapular retractions
    - Biceps/triceps/shoulder ER/IR/Flex/EXT
    - Fine motor function with hands
- Flexibility, mobility
    - Soft tissue mobilization for hypertonic paraspinal muscles
    - Encourage movement
        - Avoid sitting for prolonged periods of time (30-45 mins)
- Balance, POSTURE, gait training
    - Heels together, semi-tandem, tandem, SL stance with eyes open/closed
    - Functional activities
        - Functional movements
            - Bend with knees to reach towards floor
            - Lift close to body
- Control pain, inflammation
    - Ice/modalities for pain/inflammation
- Facilitate healing of incision (watch for redness, drainage, swelling, etc)

Avoid:
- Lifting, push/pulling (yardwork, chores) >5-8 lbs up to 3 months post-op
- End range cervical stretching/movements
- Overhead lifting

Other Considerations/Precautions:
- Consult doctor for return to driving, returning to work
    - Return to work may be shorter for sedentary jobs
- Sitting
    - No longer than 30-45 mins
    - Good work/home ergonomics
- Avoid lotion/cream, submerging incision underwater until fully healed

Phase 3 (16+ weeks post-op)
Goals:
- Achieve functional shoulder AROM (avoid frequent overhead reaching until 12 weeks)
- Improve UE strength (<5-8 lbs through 12 weeks)
- Gentle cervical AROM starting at 3 months
- Demonstrate proper posture, ergonomics, and work simulation
- Continue progressive walking program

Suggested Interventions:

- Progress strength, endurance
    - Aerobic conditioning
        - UBE, treadmill, upright/recumbent bicycle, progress towards discharging assistive devices for patients healing from severe myelopathy
    - Muscle conditioning of cervical and scapulothoracic spine
        - Gentle cervical mobility
        - Cervical isometrics in neutral
        - Shoulder shrugs, scapular clocks
        - Incorporate resistance bands/light weights/pulley system including in standing/side-lying including: mid back rows, lat pull downs, high rows, PNF D1/D2 pattern, shoulder ER/IR, shoulder ADD/ABD
        - Dynamic core co-contraction conditioning (2-3x x 10 → 15 → 20)
            - Hook-lying pelvic neutral (hip at 90°): marches → SL heel slide → leg lift c knee ext., dead bugs
            - Sitting or standing pelvic neutral: alt. UE → marching → marching c alt. UE
            - Bridges with postural cuing
            - Quadruped progression
        - LE strengthening with neutral spine (progress with resistance band, 2-3x 10 → 15 → 20)
            - Stability ball wall squats
            - Standing steamboats
            - Side stepping
            - Lunges (forward, lateral, posterior)
- Core: tra/multifidi/glute med/max isometrics
    -
- Mobility/flexibility
    - BUE pectoralis major/minor stretching (supine/standing)
- Balance
    - DL → DL, EO → EC, no UE movement, stable → unstable surface, dynamic movements
- Initiate simulated work activities
- + / - pool therapy based upon wound healing
- Pain modulation
    - Grade I-II joint mobilizations above/below surgical site
    - Ice/modalities as needed for pain management

Avoid:

- Lifting >5-8 lbs up to 3 months post-op
- Cervical AROM exercises or prone exercises
- Avoid running/horseback riding for 6 months

Phase 4 (5-6 months post-op)

- Return to baseline standing/walking duration and distance
- Discharge cervical collar
- Increase weight limit by 5 lbs every other week as tolerable starting at 3 months post op as appropriate
- May begin overhead activities (progress slowly)
- May initiate elliptical training
- Hold run/jog/horseback riding/contact sports until 6 months
- Independence with home exercise program
- NDI at discharge

Goals:

- Proper sitting/standing posture
- Minimal to no pain with all or most activities
- Return to work/prior level of function or greater
- Within normal limits of cervical AROM and shoulder AROM
- Independent with home exercise program
- Achieve MCID on the Neck Disability Index outcome measure questionnaire

Suggested Interventions:

- Muscle endurance of cervical and scapulothoracic stabilizers
    - UBE (fwd/retro standing), standing cervical retractions, prone off end of table cervical retractions, prone superman's, prone on stability ball Y, T, W, push up plus, rhythmic stabilization training (Thera band/body blade) and medicine ball wall circles.
- Trunk and LE strengthening 2-4 sets x 10 → 15 → 20 repetitions
    - Stabilization exercises
        - Bridges
        - Planks
        - Upward/downward chops (cable column)
        - Walkouts/rollouts on stability ball
        - Cable column resistance walking (close to body → away from body or OH)
        - Loaded carries (farmers walks, 90/90 bottoms up, kettle-bell carries)
        - Paloff Press
    - LE conditioning/balance with neutral spine 2-4 sets x 10 → 15 → 20 repetitions with progressive resistance or on unstable surface
        - Squats (DL → SL)
        - Lateral band walks, lateral walks with shoulder abduction
        - Lunges with military press

Phase 4 (6+ months post-op)

- Return to baseline function
- Be consistent with a home exercise program
- May initiate jogging/running/horseback riding
- May progress core stabilization to forward/side planking/dead lifting

Recommendations for return to work based on physical demand:

Work Type:	**Return to Work:**
Sedentary (<5-8 lbs) or Light (frequently 5 lbs)	Within 6-12 weeks
Moderate (frequently 20lbs, occasionally 50lbs)	6-12 weeks restrictive duty (less than 5-8 lbs) Next 3-4 weeks (week 12-16 post op) restricted to less than 20 lbs and no overhead lifting Week 16+ post op, return to moderate to full duties progressing 5 lbs every other week from 8-10 lbs starting week 12
Heavy (frequently 50lbs, occasionally 100lbs)	Week 6-12 post op, patient may return to light duty if available – no lifting >5-8 lbs the first 12 weeks, no overhead reaching Next 3-4 weeks (week 12-16 post op) restricted to less than 20 lbs and no overhead lifting Between 12-24 weeks, return to moderate to full duties – start at 8-10 lbs (week 12) and progress 5 lbs every other week

Creation date: March 2008
Latest revision date: April 2022

Authors

Jordan Hudson DPT

Sean Meers DPT

Reviewers

Andrew Grossbach MD, Neurological Surgery, The Ohio State University Wexner Medical Center

Jonathan Karnes MD, Orthopaedic Surgery, The Ohio State University Wexner Medical Center

Safdar Khan MD, Orthopaedic Surgery, The Ohio State University Wexner Medical Center

Varun Singh MBBS, Orthopaedic Surgery, The Ohio State University Wexner Medical Center

Stephanus Viljoen MD, Neurological Surgery, The Ohio State University Wexner Medical Center

Elizabeth Yu MD, Orthopaedic Surgery, The Ohio State University Wexner Medical Center

Jennifer Belu APRN-CNP PT, The Ohio State University Wexner Medical Center

Donald Miller Jr PA-C, The Ohio State University Wexner Medical Center

Julia Rose Ed. D., PA-C, The Ohio State University Wexner Medical Center

References

Abbott A, Halvorsen M, Dedering A. Is there a need for cervical collar usage post anterior cervical decompression and fusion using interbody cages? A randomized controlled pilot trial. *Physiotherapy Theory & Practice*. 2013;29(4):290-300.

Dolan P, Greenfield K, Nelson RJ, Nelson IW. Can exercise therapy improve the outcome of microdiscectomy? *SPINE*. 2000;25:1523-32.

Blanpied PA, Gross AR, Elliott JM, Devaney LL, Clewley D, Walton DM, Sparks C and Robertson EK. Neck Pain Clinical Practice Guidelines. *J Orthop Sports Phys Ther.* 2017;47(7):A1-A83.

Daniels A, Paller D, Feller R, Thakur N, Biercevicz A, Palumbo M, Crisco J and Madom I. Examination of cervical spine kinematics in copmlex, multiplanar motions after anterior cervical discectomy and fusion and total disc replacement. *International Journal of Spine Surgery.* 2012; 6:190-194.

Ducker TB. Restriction of cervical spine motion by cervical collars. Abstract. John Hopkins Universtiy, 1990.

Engquist M, Löfgren H, Öberg B, Holtz A, Peolsson A, Söderlund A, Vavruch L, Lind B. Surgery Versus Nonsurgical Treatment of Cervical Radiculopathy: A Prospective, Randomized Study Comparing Surgery Plus Physiotherapy With Physiotherapy Alone With a 2-Year Follow-up. *SPINE*. 2013;38(20):1715-1722.

Erdogmus CB, Resch KL, Sabitzer R, Muller H, Nuhr M, Schoggl A, et al. Physiotherapy-based rehabilitation following disc herniations operation. Results of a randomized clinical trial. *SPINE*. 2007;32:2041-9.

Kalfas, I. (2001). Principles of bone healing. Neurosurgical Focus, 10(4), 1-4.

Graaf MT, Schmitt MA. The Effect of Training the Deep Cervical Flexors on Neck Pain, Neck Mobility, and Dizziness in a Patient With Chronic Nonspecific Neck Pain After Prolonged Bed Rest: A Case Report. *Journal of Orthopaedic & Sports Physical Therapy*. 2012;42(10):853-860.

Hanney WJ, Kolber MJ. Improving Muscle Performance of the Deep Neck Flexors. *Strength & Conditioning Journal*. 2007;29(3):78-83.

Hermansen AMK, Cleland JA, Kammerlind AC, Peolsson ALC. Evaluation of Physical Function in Individuals 11 to 14 Years After Anterior Cervical Decompression and Fusion Surgery – A Comparison Between Patients and Healthy Reference Samples and Between 2 Surgical Techniques. *Journal of Manipulative and Physiological Therapeutics*. 2014;37(2):87-96.

Highland, T R., Dreisinger, T.E., Vie, L.L. and Russell, G.S. Changes in isometric strength and range of motion of the isolated cervical spine after eight weeks of clinical rehabilitation. *Spine.* 1992;17(6):77-82.

Iqbal ZA, Rajan R, Khan SA, Alghadir AH. Effect of Deep Cervical Flexor Muscles Training Using Pressure Biofeedback on Pain and Disability of School Teachers with Neck Pain. *Journal of Physical Therapy Science*. 2013;25(6):657-661.

Kisner, Carolyn and Colby, Lynn A. *Therapeutic Exercise: Foundations and Techniques.* F.A. Davis Company, 2012.

Landers MR, Addis KA, Longhurst JK, Vom Steeg BL, Puentedura EJ, Daubs MD. Anterior cervical decompression and fusion on neck range of motion, pain, and function: a prospective analysis. *The Spine Journal*. 2013;13(11):1650-1658.

McGregor AH, Dore CJ, Morris TP, Jamrozik K. Function after spinal treatment, exercise and rehabilitation (FASTER): improving the functional outcome of spinal surgery. *BMC Musculoskeletal Disorders*. 2010:11.

McGarvey AC, Osmotherly PG, Hoffman GR, Chiarelli PE. Scapular Muscle Exercises Following Neck Dissection Surgery for Head and Neck Cancer: A Comparative Electromyography Study. *Physical Therapy*. 2013;93(6):786-797.

Miller CP, et al. Soft and rigid collars provide similar restriction in cervical range of motion during fifteen activities of daily living. *SPINE*. 2010;35:1271-1278.

Peolsson A, Söderlund A, Engquist M, Lind B, Löfgren H, Vavruch L, Holtz A, Winström-Christersson A, Isaksson I, Öberg B. Physical Function Outcome in Cervical Radiculopathy Patients After Physiotherapy Alone Compared With Anterior Surgery Followed by Physiotherapy. *SPINE*. 2013;38(4):300-307.

Peolsson; M. Peolsson; G. Jull; T. Lofstedt; et al. Preliminary evaluation of dorsal muscle activity during resisted cervical extension in patients with longstanding pain and disability following anterior cervical decompression and fusion surgery. *Physiotherapy*. 2015;(1):69. doi:10.1016/j.physio.2014.04.010.

Persson, L and Lilja, A. Pain, coping, emotional state and physical function in patients with chronic radicular neck pain. A comparison between patients treated with surgery, physiotherapy or neck collar- a blinded, prospective randomized study. *Disability and Rehabilitation.* 2001; 23(8):325-335.

Phillips FM, Geisler FH, Hilder KM, Reah C, Howell KM and McAfee PC. Long-term Outcomes of the US FDA IDE Prospective, Randomized Controlled Clinical Trial Comparing PCM Cervical Disc Arthroplasty With Anterior Cervical Discectomy and Fusion. *Spine.* 2015;40 (10):674-683.

Sathyendra, Vikram and Darowish, Michael. Basic Science of Bone Healing. *Hand Clinics.* 2013;29(4):473-481.

Scherman DB, Mobbs RJ, Phan K. Adjacent Segment degeneration and disease following cervical arthroplasty: a systematic review and meta-analysis. *J Spine Surg.* 2016;2(1):82-84.

Tarazona D, Schroeder G, Vaccaro A and Radcliff K. Value of Cervical Disk Arthroplasty. *Clinical Spine Surgery.* 2019;32:4-9.

Teff, Richard and Boyea, Bryan. William Beaumont Army Medical Center. Cervical Fusion/Arthroplasty-revised Aug 2008.

Young IA, Michener LA, Cleland JA, Aguilera AJ, Snyder AR. Manual therapy, exercise and traction for patients with cervical radiculopathy: A randomized clinical trial. *Physical Therapy*. 2009;89(7):632-642.

Zarkadis N, Cleveland A, Kusnezov N, Dunn J, Caram P and Herzog J. Outcomes Following Multilevel Cervical Disc Arthroplasty in the Young Active Population. *Military Medicine.* 2017; 182:e1790-e1794.