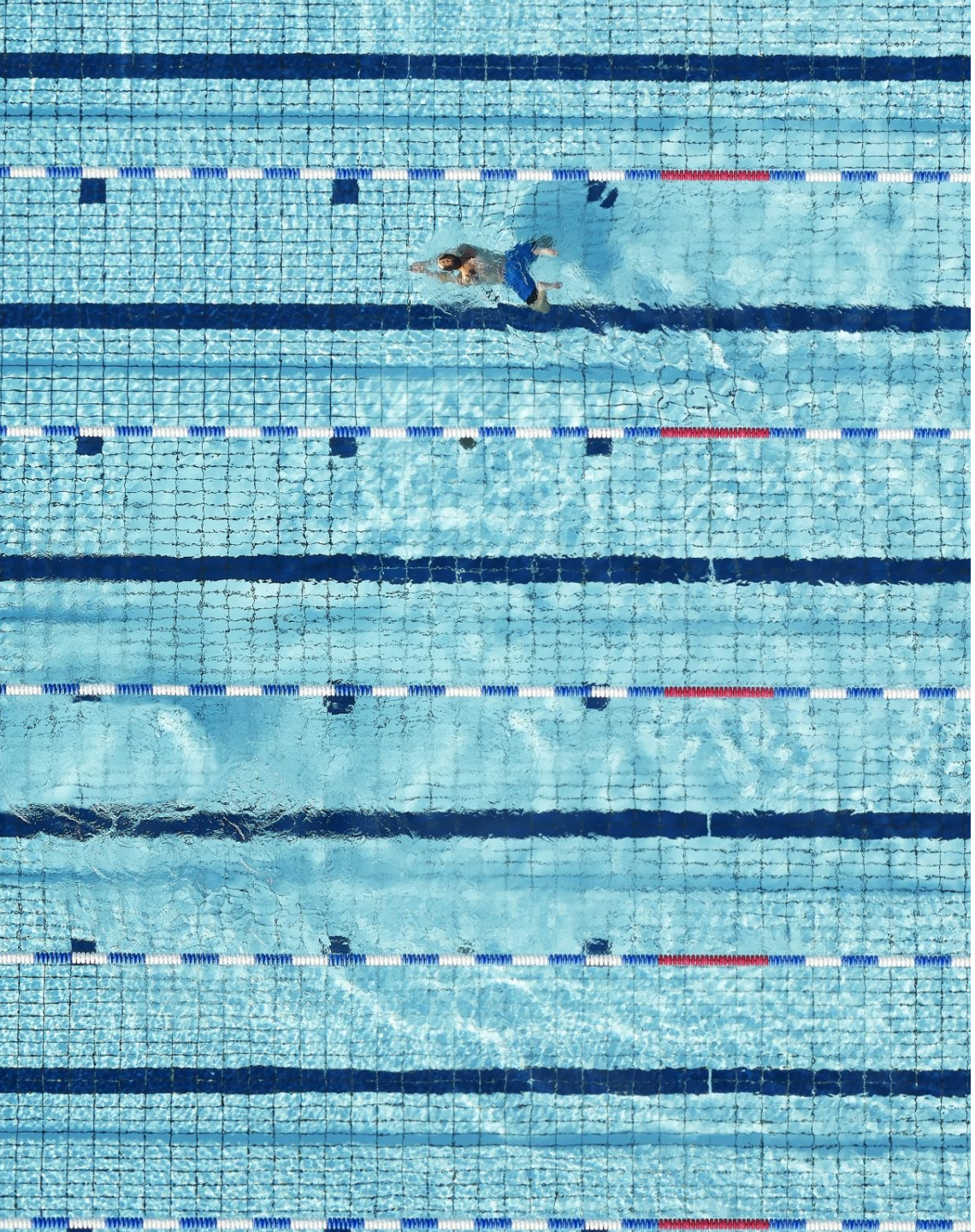


Osteopathic Manipulative Treatment (OMT) for Swimmers

Dr. Christopher Whalen, DO

ONMM PGY-1

Conflicts of Interest

I have no conflicts of interest to disclose.

Acknowledgements

I would personally like to thank these faculty members and co-residents assisting me throughout my training and with today's presentation:

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Dr. James Willson, DO, CAQSM
Dr. Jacob Brower, DO ONMM PGY-3

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   II. Recommended Stretches and OMT.

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   I. Recommended Exercises, Stretches and OMT for management.

III. Osteopathic Manipulative Treatment Review and Practice

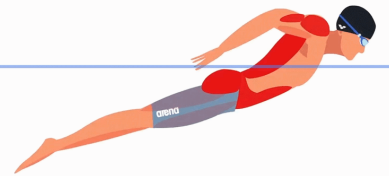
Anatomy of the Strokes

Butterfly [1]

Upper Body
Major Muscle Groups: Upper Trapezius, Shoulder Abductors/Adductors/Extensors, Serratus Anterior, Rhomboids [2]
Minor Muscle Groups: Abdominal, Elbow Flexors, Elbow Extensors

Lower Body
Major Muscle Groups: Gluteal Muscles, Knee Extensors
Minor Muscle Groups: Hamstrings

KEY: Chest Undulation, Scapulothoracic Mobilization



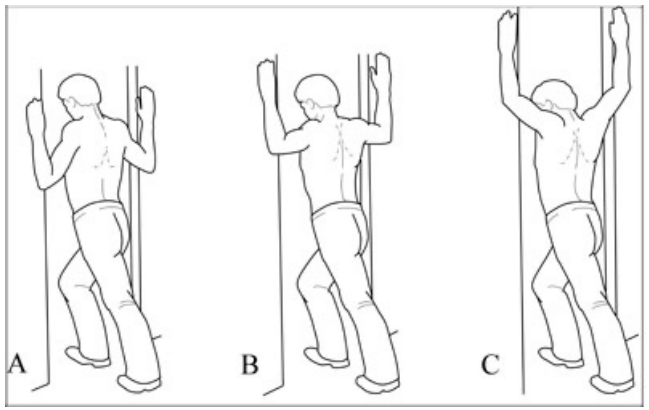
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1. Pink M, Jobe FW, Perry J, Kerrigan J, Browne A, Scovazzo ML. The normal shoulder during the butterfly swim stroke. An electromyographic and cinematographic analysis of twelve muscles. Clin Orthop Relat Res. 1993 Mar;(288):48-59. PMID: 8458154.
2. Lam JH, Bordoni B. Anatomy, Shoulder and Upper Limb, Arm Abductor Muscles. [Updated 2023 May 4]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK537148/

arena WATER INSTINCT

Important Considerations for Butterflyers

Stretches



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4

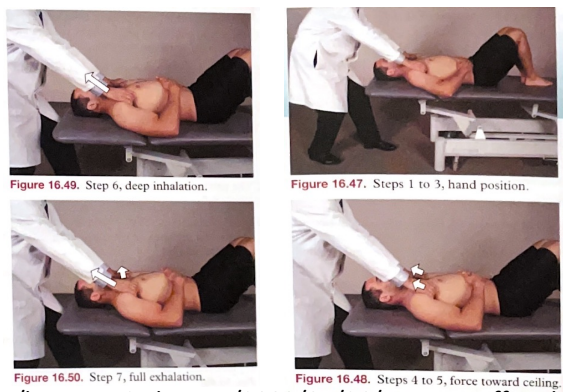


OMT

Scapulothoracic Mobilization



Pectoral Traction



5

3. Abbott Center. (2009, May 26). *Rotator cuff and shoulder pain: 5 stretches*. Retrieved November 19, 2024, from https://abbottcenter.com/bostonpaintherapy/2009/05/26/rotator-cuff-and-shoulder-pain-5-stretches/
4. Gym Geek. (n.d.). *Child's pose: Benefits, tips, and how to perform it correctly*. Retrieved November 19, 2024, from https://gymgeek.com/exercises/yoga-poses/childs-pose/
5. Nicholas, A. S., & Nicholas, E. A. (2016). *Atlas of osteopathic techniques*. Lippincott Williams & Wilkins. https://osteopathicmedicine.lwwhealthlibrary.com/book.aspx?bookid=1629&sectionid=0

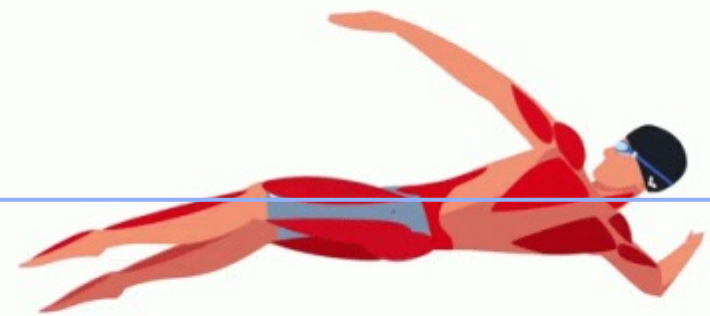
Anatomy of the Strokes

Backstroke[6]

Upper Body
Major Muscle Groups: Trapezius, Shoulder Flexors/External Rotators/Internal Rotators, Latissimus dorsi, Abdominals
Minor Muscle Groups: Erector Spinae, Triceps, Biceps

Lower Body
Major Muscle Groups: Hip flexors, Gluteal Muscles, Knee Extensors
Minor Muscle Groups: Hamstrings

KEY: Scapulothoracic Mobilization



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6. Swimming World Magazine. (2021, November 8). *A look at swimmer muscles by stroke*. Swimming World Magazine. https://www.swimmingworldmagazine.com/news/a-look-at-swimmer-muscles-by-stroke/

Important Considerations for Backstrokers

Stretches

4



OMT

Scapulothoracic Mobilization



4. Gym Geek. (n.d.). *Child's pose: Benefits, tips, and how to perform it correctly*. Retrieved November 19, 2024, from https://gymgeek.com/exercises/yoga-poses/childs-pose/

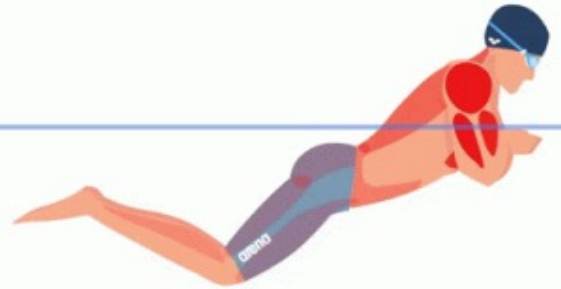
Anatomy of the Strokes

Breaststroke [7]

Upper Body
Major Muscle Groups: Abdominals, Erector Spinae, Upper Trapezius, Subscapularis, Shoulder Adductors/Extensors
Minor Muscle Groups: Biceps, Triceps

Lower Body
Major Muscle Groups: Gluteal Muscles, Hip Adductors
Minor Muscle Groups: Hip flexors, Hip External Rotators, Knee Extensors

KEY: Hip Alignment and Range of Motion



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7. Heinlein SA, Cosgarea AJ. Biomechanical Considerations in the Competitive Swimmer's Shoulder. Sports Health. 2010 Nov;2(6):519-25. doi: 10.1177/1941738110377611. PMID: 23015983; PMCID: PMC3438875.

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WATER INSTINCT

Important Considerations for Breaststrokers

Stretches

8



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OMT

ME Pelvis [5]



Figure 10.188. Steps 1 to 4.

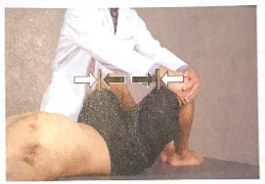


Figure 10.189. Step 5, isometric contractions.

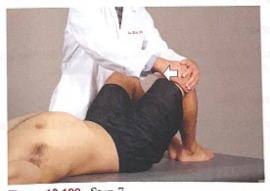


Figure 10.190. Step 7.

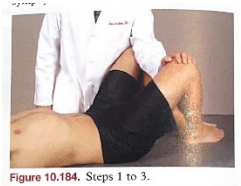


Figure 10.184. Steps 1 to 3.

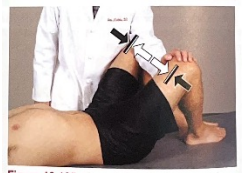


Figure 10.185. Step 4, isometric contraction.

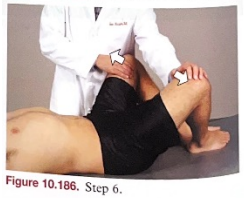


Figure 10.186. Step 6.

Not shown:
-Posterior Innominate ME
-Anterior Innominate ME
-Superior Innominate Shear ME
-Outflare Innominate ME
-Inflare Innominate ME
-Hip Girdle: Spencer Technique

5. Nicholas, A. S., & Nicholas, E. A. (2016). *Atlas of osteopathic techniques*. Lippincott Williams & Wilkins. https://osteopathicmedicine.lwwhealthlibrary.com/book.aspx?bookid=1629&sectionid=0
8. Yoga Class Plan. (n.d.). *Pigeon pose*. Retrieved November 19, 2024, from https://www.yogaclassplan.com/yoga-pose/pigeon-pose-2/
9. Saint Luke's Health System. (n.d.). *Hip adductor stretch: Flexibility*. Retrieved November 19, 2024, from https://www.saintlukeskc.org/health-library/hip-adductor-stretch-flexibility

Anatomy of the Strokes

Freestyle/Open Water Swimming [7]

Upper Body
Major Muscle Groups: Upper trapezius, Serratus Anterior, Subscapularis, Posterior Deltoid, Shoulder adductors
Minor Muscle Groups: Shoulder abductors, Biceps, Triceps, Abdominals

Lower Body
Major Muscle Groups: Hip flexors, Gluteal Muscles, Knee Extensors
Minor Muscle Groups: Hamstrings

KEY: Scapulothoracic Mobilization



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7. Heinlein SA, Cosgarea AJ. Biomechanical Considerations in the Competitive Swimmer's Shoulder. Sports Health. 2010 Nov;2(6):519-25. doi: 10.1177/1941738110377611. PMID: 23015983; PMCID: PMC3438875.

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WATER INSTINCT

Important Considerations for Freestylers

Stretches

4



OMT

Scapulothoracic Mobilization

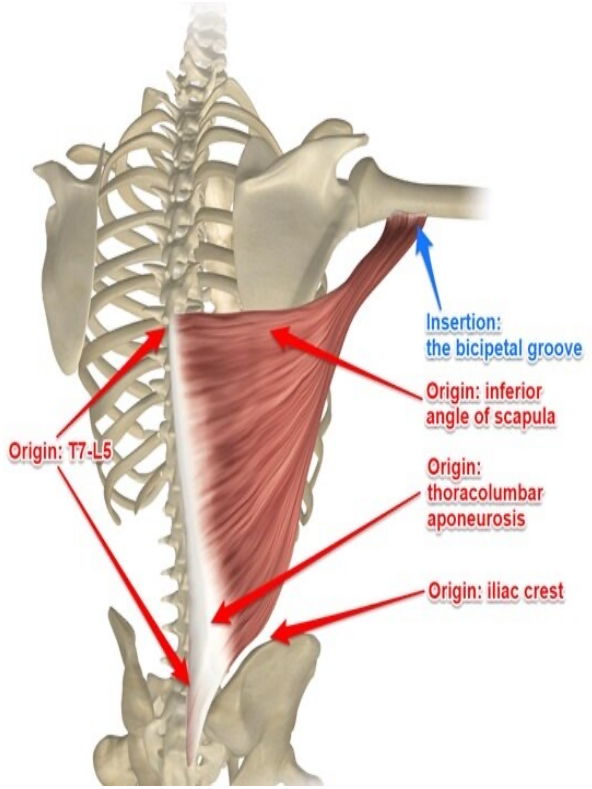


4. Gym Geek. (n.d.). *Child's pose: Benefits, tips, and how to perform it correctly*. Retrieved November 19, 2024, from https://gymgeek.com/exercises/yoga-poses/childs-pose/

Scapulothoracic Mobilization- Inferior

1. Patient lies in lateral recumbent with dysfunctional scapula side up.
2. Physician stands on same side as dysfunction above the shoulder girdle.
3. Physician's caudad hand cups around the inferior angle of the scapula.
4. Physician's cephalad hand grabs patient's posterior arm while allowing the patient's arm to relax across the physician's forearm.
5. Physician adds cephalad traction at the angle of the scapula while abducting/flexing the patient's arm until restrictive barrier is met (yellow arrows).
6. Physician instructs patient to pull their arm back toward their hip for 3-5 seconds (red arrows).
7. After a second of relaxation, the arm is carried further into abduction and flexion with increased cephalad traction of the scapula.
8. Repeat steps 5-7 three to five times.
9. Reassess.

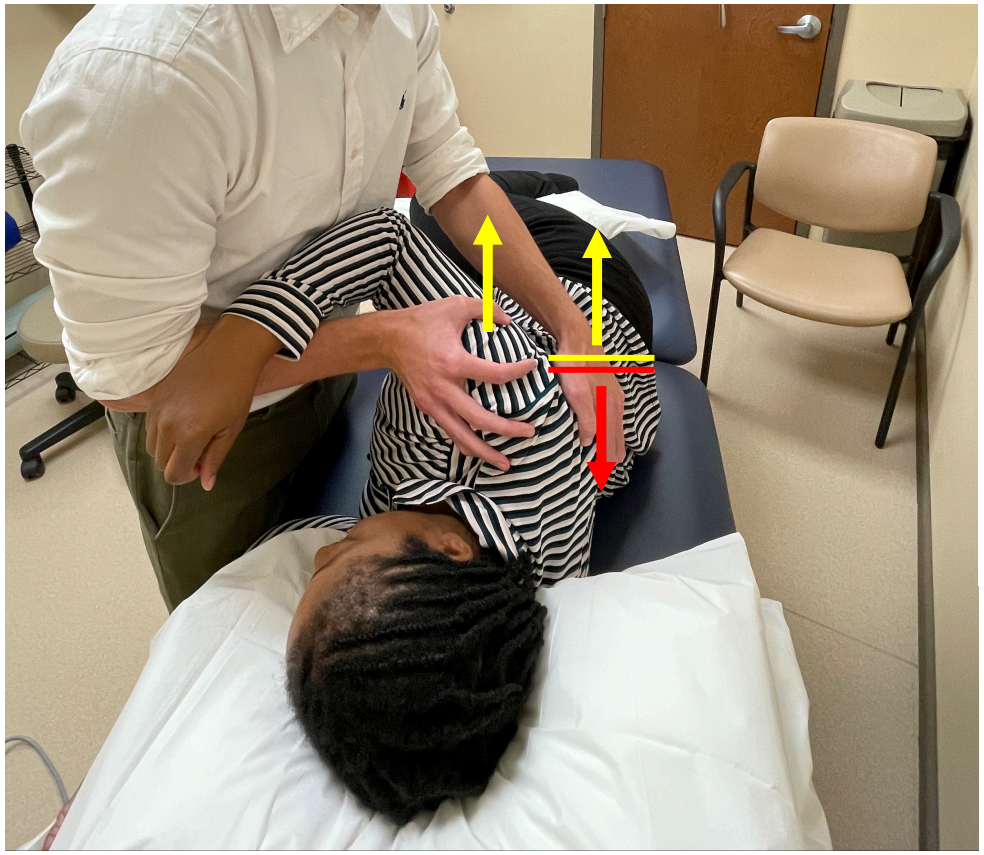


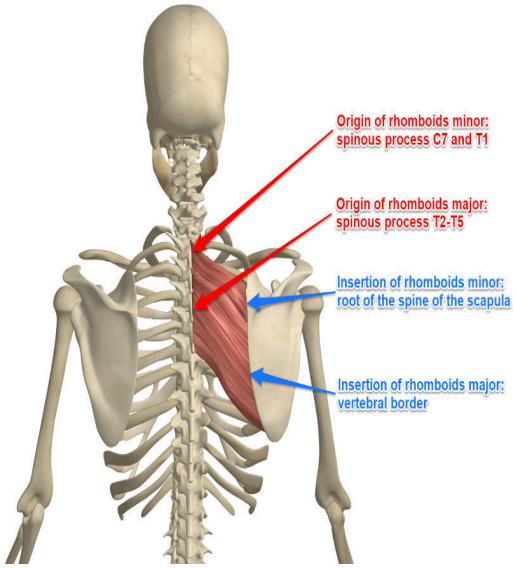


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Scapulothoracic Mobilization- Medial

1. Patient lies in lateral recumbent with dysfunctional scapula side up.
2. Physician stands on same side as dysfunction at the level of the shoulder girdle.
3. Physician's caudad hand hooks around medial border of the scapula.
4. Physician's cephalad hand grabs patient's shoulder girdle while allowing patient's arm to rest across physician's forearm.
5. Physician retracts the patient's shoulder girdle using cephalad hand to ensure shoulder is in neutral position.
6. Physician adds traction using the caudad and cephalad hand towards the ceiling (yellow arrows).
7. Physician instructs patient to retract their scapula OR push into physician's fingers for 3-5 seconds (red arrows).
8. After a second of relaxation, the arm is carried further into lateral traction.
9. Repeat steps 5-7 three to five times.
10. Reassess.





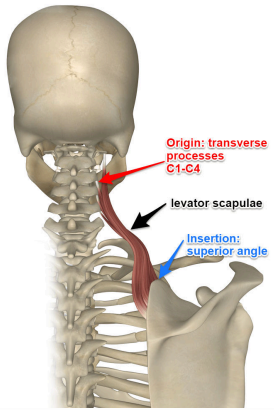
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Scapulothoracic Mobilization- Superior

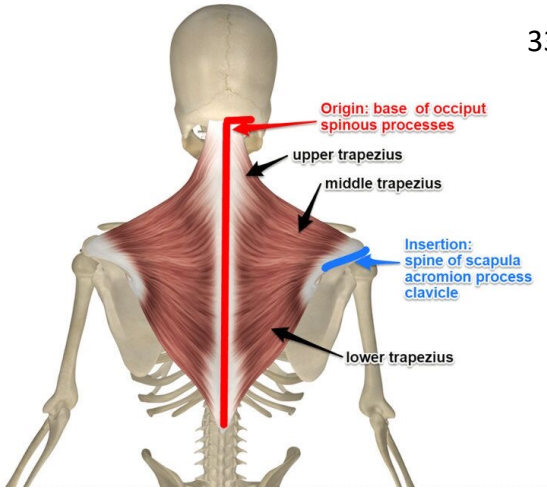
1. Patient lies in lateral recumbent with dysfunctional scapula side up.
2. Physician stands on same side as dysfunction inferior to the shoulder girdle.
3. Physician's caudad hand hooks around spine of the scapula to stabilize superior border of the scapula.
4. Physician's cephalad hand grabs patient's shoulder girdle while allowing patient's arm to rest across physician's forearm.
5. Physician retracts the patient's shoulder girdle using cephalad hand to ensure shoulder is in neutral position.
6. Physician adds inferior traction using the caudad and cephalad hand towards the foot of the bed (yellow arrows).
7. For Levator Scapulae Isolation: Physician instructs patient to elevate their scapula OR shrug their shoulder, tapping at the superior medial border of the scapula for reference (red arrows).
8. For Upper Trapezius Isolation: Physician instructs patient to elevate their scapula OR shrug their shoulder, tapping at the superior lateral border of the scapula for reference (blue arrows).
9. After a second of relaxation, the arm is carried further into inferior traction.
10. Repeat steps 5-7 three to five times.
11. Reassess.



32



33



32. Long, D. (n.d.). *Levator scapulae muscle*. Yoga Anatomy. Retrieved November 22, 2024, from https://www.yoganatomy.com/levator-scapulae-muscle/
33. Long, D. (n.d.). *Trapezius muscle: Yoga anatomy*. Yoga Anatomy. Retrieved November 22, 2024, from https://www.yoganatomy.com/trapezius-muscle-yoga-anatomy/

Pectoral Traction[5]

1. Patient lies supine with hips and knees flexed.
2. Physician stands at head of table.
3. Physician places finger pads inferior to patient's clavicles at anterior axillary fold.
4. Physician slowly leans backward causing hands to move cephalad into patient's axilla.
5. When hands meet a restrictive barrier, a new force is directed upward.
6. Patient is instructed to take deep breaths through the mouth. Physician pulls cephalad while patient inhales.
7. Patient is instructed to exhale fully, physician resists this movement at the axilla.
8. Inhalation with cephalad traction and exhalation with resistance to costal depression.
9. Repeat 5-7 times.
10. Reassess.

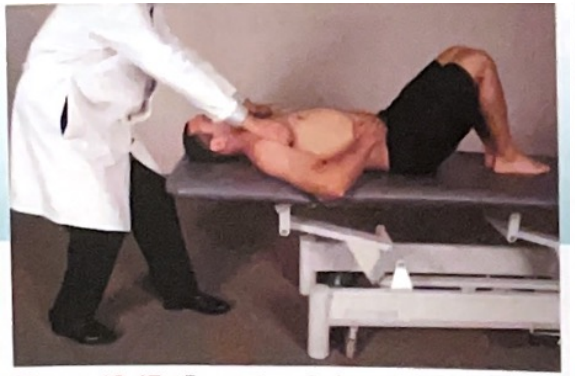


Figure 16.47. Steps 1 to 3, hand position.

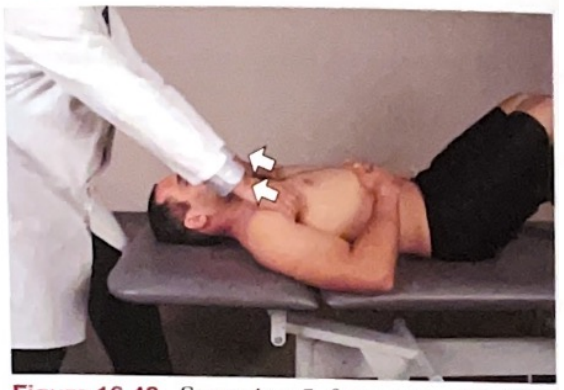


Figure 16.48. Steps 4 to 5, force toward ceiling.

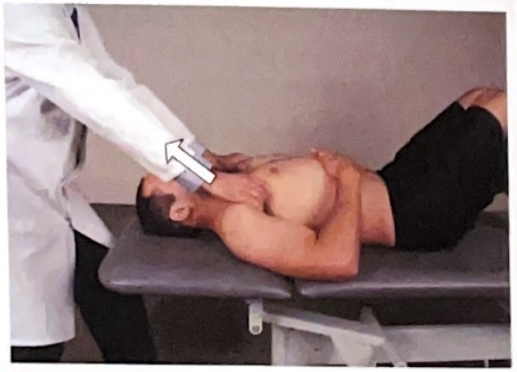


Figure 16.49. Step 6, deep inhalation.

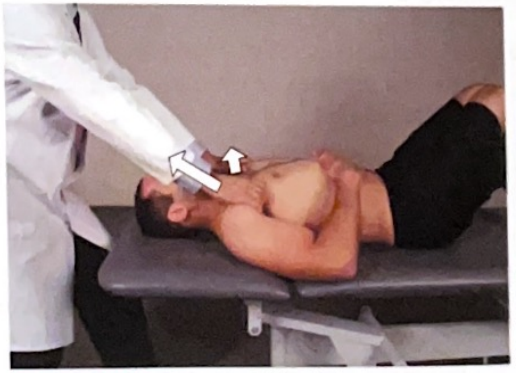


Figure 16.50. Step 7, full exhalation.

5. Nicholas, A. S., & Nicholas, E. A. (2016). *Atlas of osteopathic techniques*. Lippincott Williams & Wilkins. https://osteopathicmedicine.lwwhealthlibrary.com/book.aspx?bookid=1629&sectionid=0

Osteopathic Screen

Inspection

-Posture across plumb line

-> Cervical Lordosis

-> Shoulders (Protracted?)

-> Thoracic Kyphosis

-> Lumbar Lordosis

-> Pelvic Alignment (Anterior Tilt?)

Palpation

-AC joint, Glenohumeral joint, Rotator Cuff Tendinous Insertions, Ribs

Range of Motion

-Ribs: Inhalation and Exhalation

-Shoulder: Flexion, Abduction, ER, IR

-Scapulothoracic Motion

-Hips: Flexion, Extension, ER, IR, Abduction

Osteopathic Screens

-Rib Spring

-Apley's Scratch

-Painful Arc

-Standing Flexion Test

-Seated Flexion Test

Special Tests

-Impingement: Hawkin's-Kennedy/Neer's Test,

-Rotator Cuff Tendinopathy: Empty Can, Full Can, Hornblower's, Belly Press/Lift Off

-Labrum: O'Brien's Test

-Thoracic Outlet: Upper Limb Tension Test, Adson's Test, Costoclavicular/Military Posture/Eden's Test, ROOS/EAST Test, Wright Test.

Injuries in Swimming

- Swimmer’s Shoulder
- Swimmer’s Back
- Swimmer’s/Breaststroker’s Knee
- Thoracic Outlet Syndrome

Swimmer's Shoulder

- "The painful swimmer's shoulder should be considered in the context of the entire kinetic chain." [7]
  - Ex: Weakness in a proximal muscle such as scapula could be putting stress on a distal joint like the shoulder
- Study of 80 young elite swimmers, 91% had painful shoulders with 84% having signs of impingement [7]
- 69% of individuals with swimmer's shoulder were found to have greatest contribution from supraspinatus tendinosis [7]
- Multi-factorial [10]
  - Impingement: Sub-Acromial OR Intra-Articular
  - Glenohumeral Laxity
    - Some studies found increased humeral head translation in 75% of competitive swimmers
    - Generalized laxity in 20% of swimmers

7. Heinlein SA, Cosgarea AJ. Biomechanical Considerations in the Competitive Swimmer's Shoulder. Sports Health. 2010 Nov;2(6):519-25. doi: 10.1177/1941738110377611. PMID: 23015983; PMCID: PMC3438875.
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Swimmer’s Shoulder

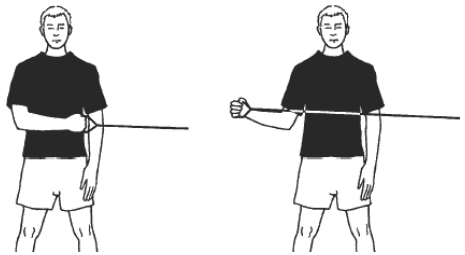


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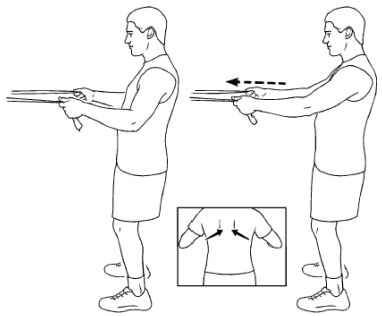
Swimmer's Shoulder

Exercises [12]

13

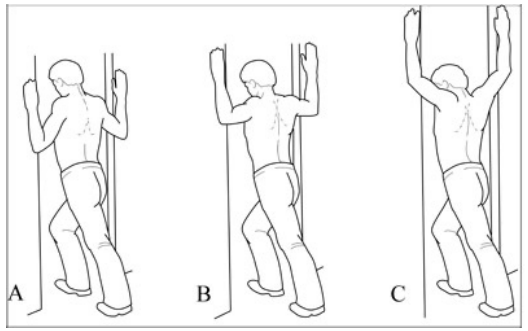


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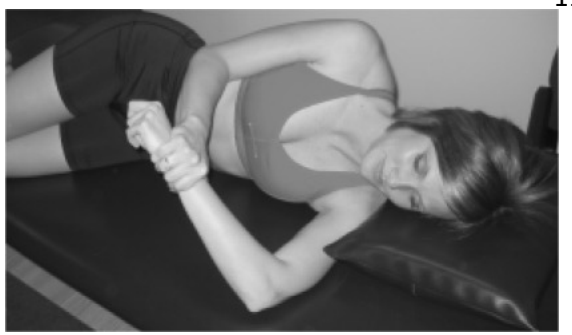


Stretches

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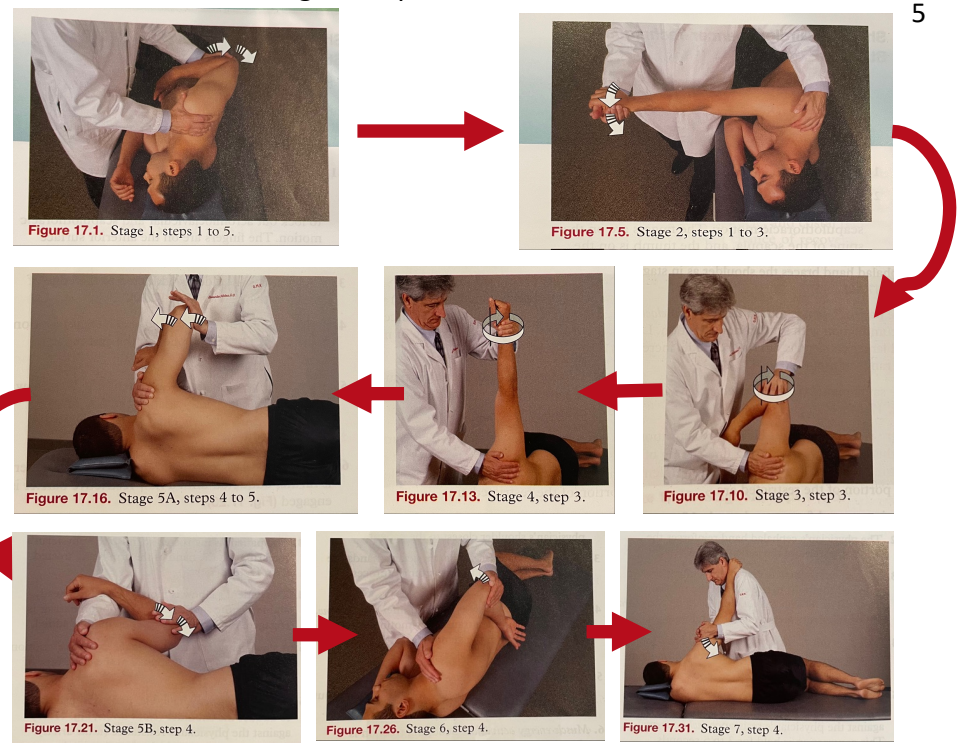
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OMT

Shoulder Girdle: 7 Stages of Spencer

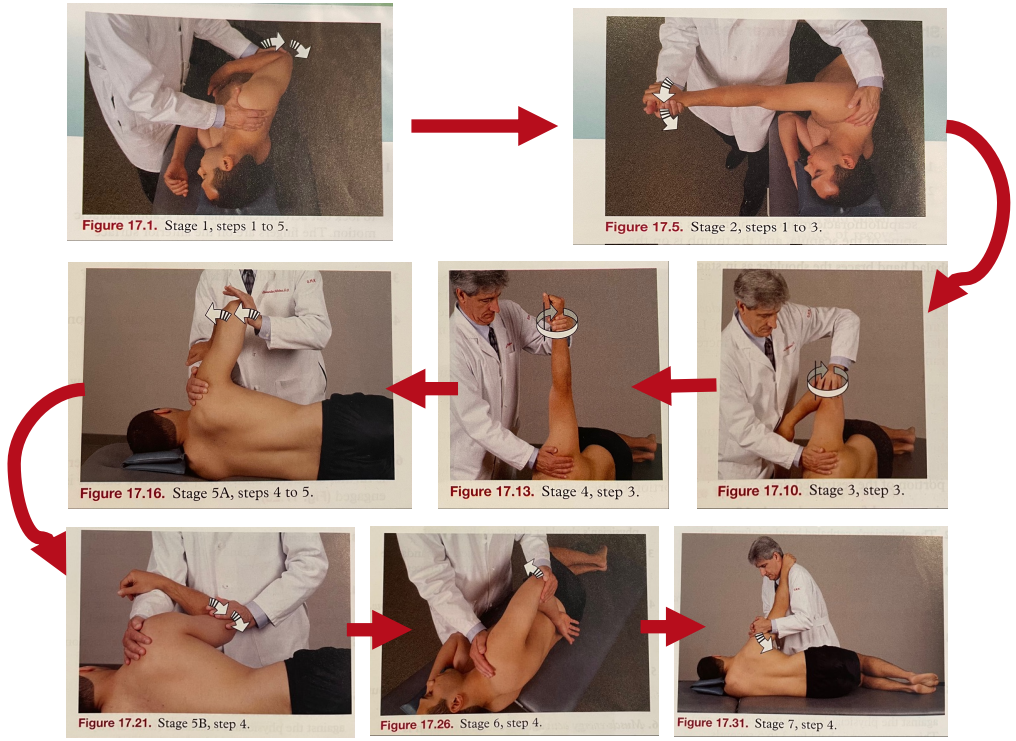
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Shoulder Girdle Spencer Technique[5]

1. Extension
2. Flexion
3. Circumduction
4. Circumduction with traction
5. Abduction
6. Adduction/External Rotation
7. Internal Rotation
8. Pump/Distraction in Abduction
9. Reassess.



5. Nicholas, A. S., & Nicholas, E. A. (2016). *Atlas of osteopathic techniques*. Lippincott Williams & Wilkins. https://osteopathicmedicine.lwwhealthlibrary.com/book.aspx?bookid=1629&sectionid=0

Swimmer's Back[15]

- Breaststroke and Butterfly
- Causes:[16]
  - Core weakness
  - Tight hip flexors
  - Improper technique

17

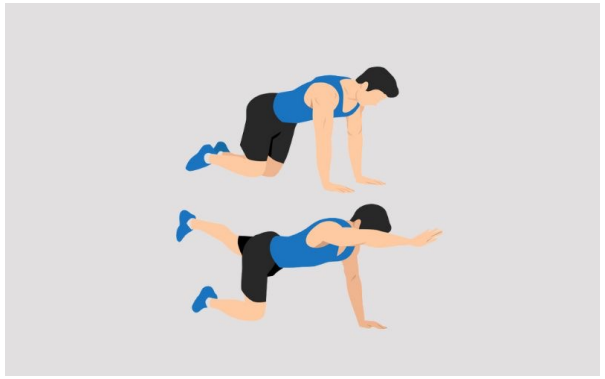


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Swimmer’s Back

Exercises

18



Stretches

19



OMT

20

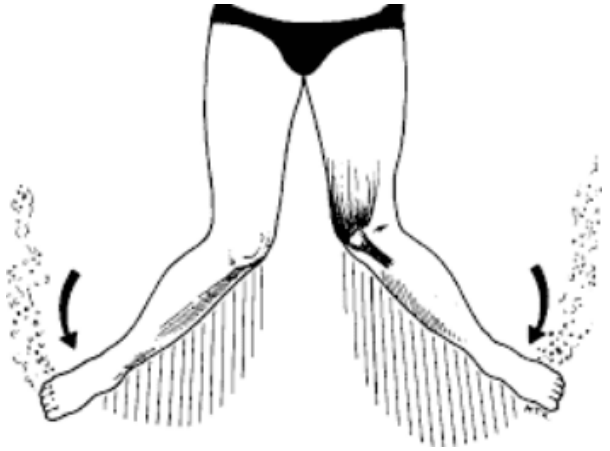


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Swimmer's/Breaststroker's Knee [21]

- 70% of propulsion comes from the kick in breaststroke
- Greatest stress through MCL
- Risks: Decreased Hip Mobility (IR)

22



21. Mangiarelli Rehabilitation Services. (n.d.). *Physical therapy for swimmer's knee*. Retrieved November 19, 2024, from https://www.mangiarellirehabilitation.com/blog/physical-therapy-for-swimmers-knee
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Swimmer's/Breaststroker's Knee

Exercises & Stretches



Breaststroker's Knee Rehabilitation

This exercise programme has specific exercises to strengthen the muscles around your hip and thigh. Stretches are included to release tight hip muscles and improve mobility in your hip. These exercises and stretches will help improve muscle strength and mobility from the hip down, which helps to 'offload' your knee during the breaststroke kick. To get the best benefit, you must perform the exercises with good technique, positioning and alignment. Do them slowly and correctly. Poor practice can lead to strain and injury. These exercises may be adjusted to your specific needs. As you improve other exercises may be added for progression. Your physical therapist will guide you through this. If at any time you feel pain or discomfort consult your physical therapist so they can adjust the rehabilitation programme, rather than simply stopping it all together.

Lateral Walk with Exercise Band

Place an exercise band around your knees, and go into a squat position (as far down as feels comfortable). Walk one leg to the side, and then follow with the other leg. Repeat to one side for five steps, then return to the start position. Perform both sides.

SETS 1 REPS 3

Video: http://youtu.be/i0w7KczRvkk

Lunge

Take a step forwards, and bend the front knee past the vertical. The back knee drops towards the floor. Always keep good alignment: your knee should stay over the 2nd ray of your foot, and never let your knee drop inwards. Only go as far as feels comfortable. Perform lunges on alternating sides.

SETS 3 REPS 10

Video: http://youtu.be/xASFze7P-Fs

Sit-Down Squat with Band

Place your feet shoulder width apart, or just outside shoulder width. Tie an exercise band around your knees keeping it quite tight. Stand in front of a chair, and slowly bend your knees. Maintain a good curve in your lower back, and control sitting down onto a chair. To stand up, do the opposite. Maintain a good spinal curve in your lower back, and push upwards through your legs to straighten your knees into a standing position.

SETS 3 REPS 10

Video: http://youtu.be/CkeKtaK7Peg

Hip Flexor Stretch

In a kneeling lunge position, move your body forwards to create a stretch to the front of your thigh and groin. If you want to make the stretch stronger, tilt your pelvis backwards as shown. Use a pillow under your knee if you find you need the padding. Hold for 30 seconds. Perform both sides.

SETS 1 REPS 3

Video: http://youtu.be/sDn-UtqdX58

Hip Mobilisation Lying

Lie face down, and bend your knees to 90 degrees. Keep your feet together, and drop your feet outwards, and then cross them inwards, as far as feels comfortable. This is a mobility exercise for your hip joints.

SETS 3 REPS 10

Video: http://youtu.be/RAMZ0Q_wF5s

Leg Lift Knee Flexed Prone

Lift your leg behind you, making sure you keep your knee bent. You can either hold this position as a sustained hold, or move your leg up and down. This exercise predominantly strengthens your gluteal (buttock) muscles, but also your lower back muscles on the side you are lifting. Perform both sides.

SETS 3 REPS 10

Video: http://youtu.be/UudoV5OHvac

[23]

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Balanced Ligamentous Tension Knee [5]

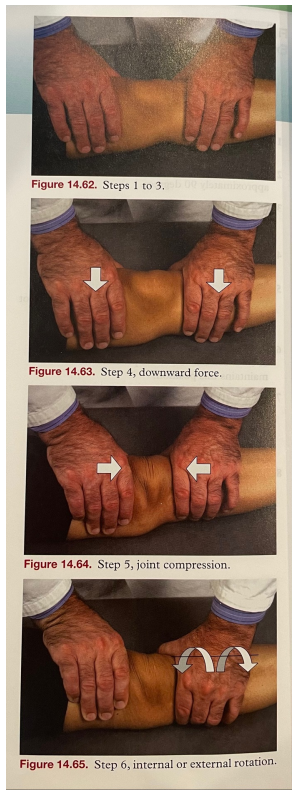


Figure 14.62. Steps 1 to 3.

Figure 14.63. Step 4, downward force.

Figure 14.64. Step 5, joint compression.

Figure 14.65. Step 6, internal or external rotation.

Not Shown:
-Hip Girdle: Spencer Technique

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Balanced Ligamentous Tension- Knee [5]

1. Patient lies supine and physician stands on side of dysfunctional knee.
2. Physician places cephalad hand palm down over anterior distal femur.
3. Physician places caudad hand palm down over the tibial tuberosity.
4. Physician leans down onto the patient's leg directing a force toward the table.
5. Physician adds a compressive force.
6. Physician adds internal rotation OR external rotation to the tibia with the caudad hand until equal tension is palpated.
7. Wait until balanced point achieved and release palpated.
8. Reassess.

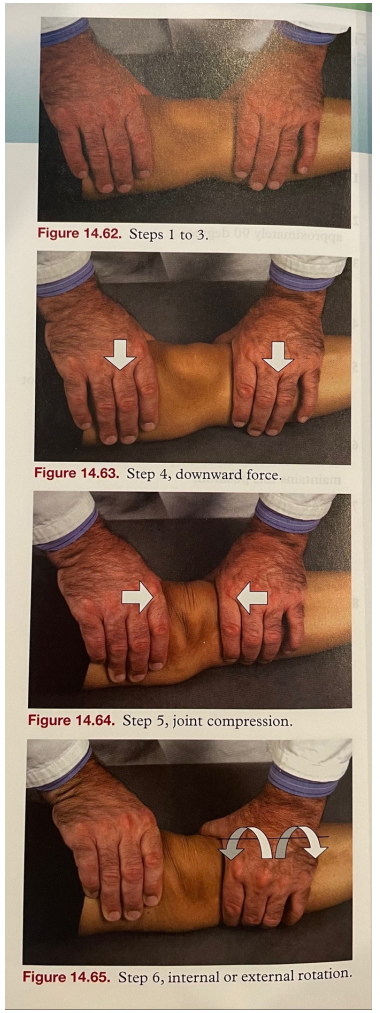

Figure 14.62. Steps 1 to 3.

Figure 14.63. Step 4, downward force.

Figure 14.64. Step 5, joint compression.

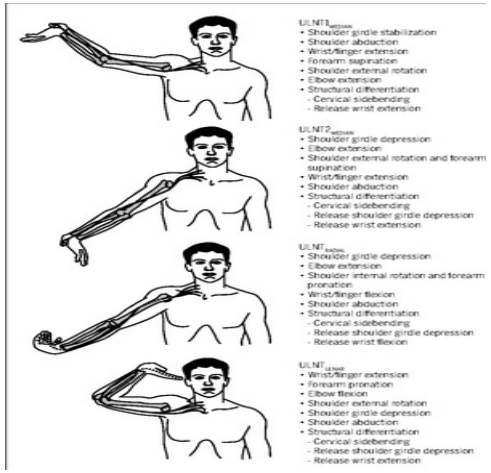
Figure 14.65. Step 6, internal or external rotation.

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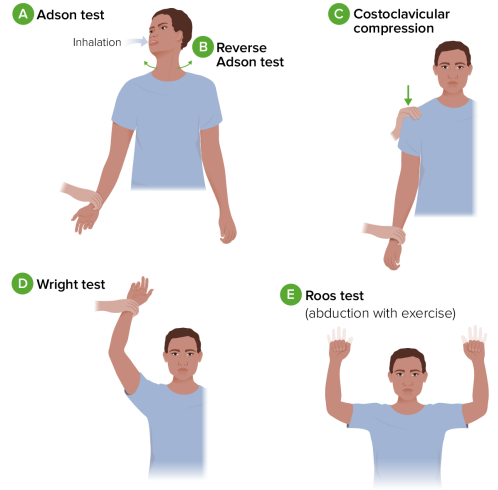
Thoracic Outlet Syndrome[24]

- Patients with neck, shoulder girdle, UE paresthesia
- Special Test: Upper Limb Tension Test
- Areas of Compression
  - Scalene Triangle -> Adson's Test
  - Costoclavicular Space -> Military Posture/Costoclavicular/Eden's Test
  - Pectoralis Minor Space -> ROOS/EAST; Wright Test
- Congenital, Traumatic, Functional
- Neurogenic (95%), Venous (3%), Arterial (1%)
  - Neurogenic preference: Lower Trunk (C8-T1) > Upper Trunk (C5-7)
- Osteopathic Considerations
  - Pelvic Tilt
  - AA Instability

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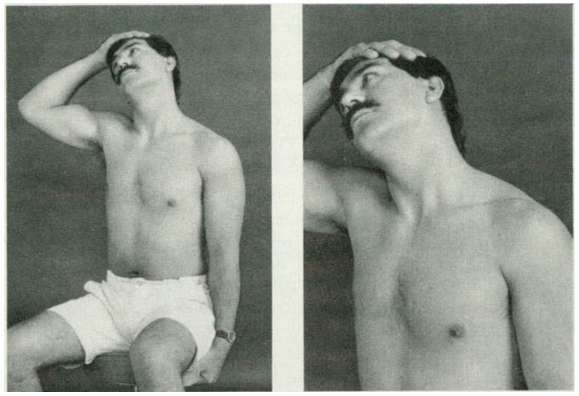
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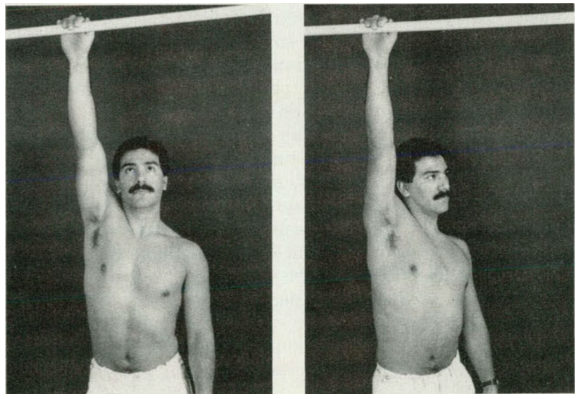
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Thoracic Outlet Syndrome

Stretches



27



OMT

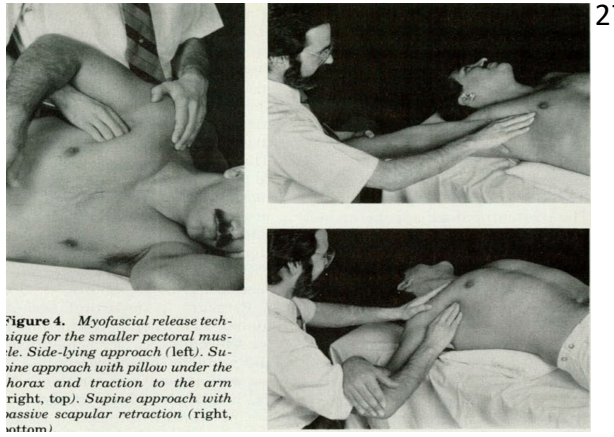


Figure 4. *Myofascial release technique for the smaller pectoral muscle. Side-lying approach (left). Supine approach with pillow under the thorax and traction to the arm (right, top). Supine approach with passive scapular retraction (right, bottom).*

27

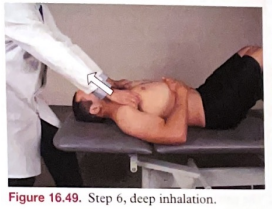


Figure 16.49. Step 6, deep inhalation.

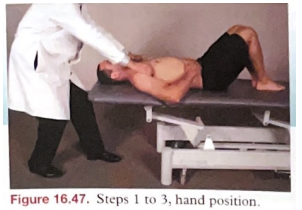


Figure 16.47. Steps 1 to 3, hand position.

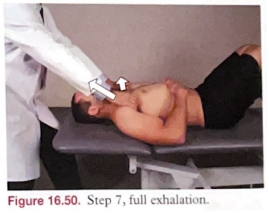


Figure 16.50. Step 7, full exhalation.

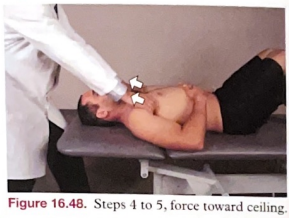


Figure 16.48. Steps 4 to 5, force toward ceiling.

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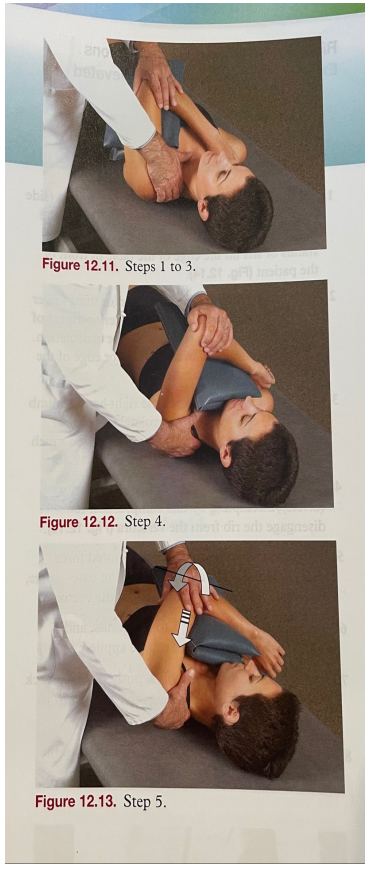


Figure 12.11. Steps 1 to 3.

Figure 12.12. Step 4.

Figure 12.13. Step 5.

5

Not Shown:
-Thoracic Inlet Release
-Myofascial to Scalene

5. Nicholas, A. S., & Nicholas, E. A. (2016). *Atlas of osteopathic techniques*. Lippincott Williams & Wilkins. https://osteopathicmedicine.lwwhealthlibrary.com/book.aspx?bookid=1629&sectionid=0

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Facilitated Positional Release- First Rib[5]

1. Patient lies supine and physician stands on side of dysfunctional rib.
2. Patient's arm is flexed at elbow.
3. Physician's caudad hand controls the olecranon process while the index and third fingers of the cephalad hand palpate the posterior aspect of the first rib.
4. Physician's caudad hand flexes the patient's shoulder and elbow to approximately 90 degrees and then abducts and internally rotates slightly.
5. Physician adducts the arm and simultaneously applies a gentle compression through the patient's arm toward the monitoring fingers at the first rib while pushing the patient's elbow down toward the chest.
6. This position is held for 3-5 seconds.
7. After 3-5 seconds, the arm is brought through further adduction and inferiorly swung back to the lateral bodyline.
8. Reassess.

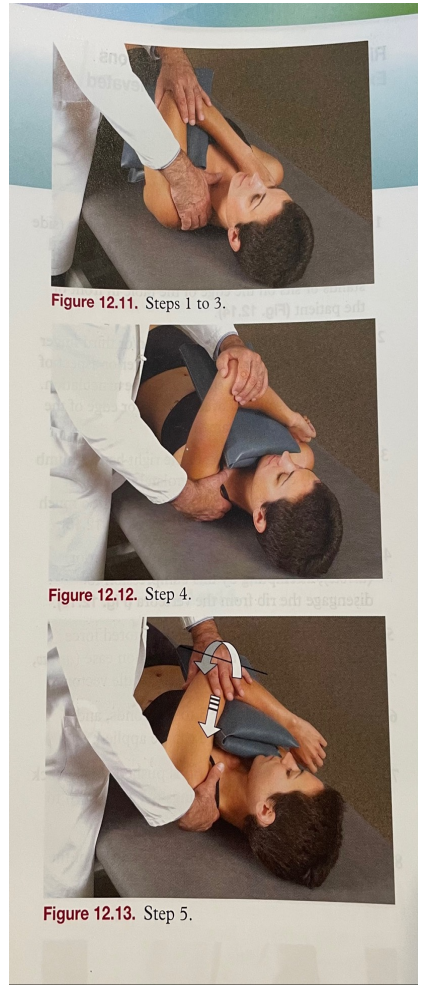

Figure 12.11. Steps 1 to 3.

Figure 12.12. Step 4.

Figure 12.13. Step 5.

5. Nicholas, A. S., & Nicholas, E. A. (2016). *Atlas of osteopathic techniques*. Lippincott Williams & Wilkins. https://osteopathicmedicine.lwwhealthlibrary.com/book.aspx?bookid=1629&sectionid=0

Return To Swim Protocol[28]

- Criteria to begin RTSP:
  - Swimmer should be nearly pain free in shoulder complex
  - Full active extension and ER present.
  - 5/5 strength of the rotator cuff and scapular stabilizing muscles
- Phase One: Stroke Technique and Drills
- Phase Two: Interval Work
- Progress: Increase 200-300 yards each day.
  - If sore during warm-up, but improves within first 500-800 yards repeat similar workout next day. If soreness continues, STOP and take 2 days off. Upon returning decrease yardage by 300.
  - If shoulder becomes more sore during workout, STOP and take 2 days off. Upon returning, decrease yardage by 300 yards.
  - If sore more than 1 hour after swimming, or the next day take 1 day off and repeat the most recent swimming workout.
- Specialty specific (distance/stroke) reintroduced once proper freestyle technique established and swimmer has rejoined team practice

Tool	Name	Use/Indications	Contraindications
	Kickboard	Used to focus on kicking only; Most commonly used with arms extended in front of the body; creates lumbar lordosis	Shoulder injuries; spondylolysis
	Pull buoy	Used to focus on arm stroke only; Placed between upper legs to prevent kicking while providing buoyancy to the lower body	Shoulder tendinitis/tendinosis; elbow or forearm pain
	Fins	Used to increase leg length and surface area of the feet; increase propulsion of stroke	Acute ankle injuries; knee pain
	Zoomers	Used to increase leg strength; increase surface area of the feet, but are shorter than fins and allow for rapid leg motions to increase forward propulsion	Acute ankle injuries; knee pain
	Paddles	Worn on hands; come in variety of sizes; increase surface area of the hand; slow down pull when worn, but build strengthwhile pulling	Shoulder injury or pain; improper stroke technique

28. Spigelman T, Sciascia A, Uhl T. Return to swimming protocol for competitive swimmers: a post-operative case study and fundamentals. Int J Sports Phys Ther. 2014 Oct;9(5):712-25. PMID: 25328833; PMCID: PMC4196335.

	Phase I								
	Week One 1000-1500	**Week Two 1500-2200**	Kick	With fins or zoomers, but no kick board Kick on side or back Arms can be at side or streamlined position if painfree (400 -600)	With fins or zoomers but no kick board Kick on side or back Arms can be at side or streamlined position if painfree (500 -900)	Intervals	None	None
Warm Up	(300-400)	(600-700)						
Drills	Stroke Technique using drills (300-500)	Stroke Technique using drills (400-600)						
Pull Set	None	None	None					
Rest between repetitions	20-30 seconds for all	10-20 seconds for all	10-15 seconds between repetitions Interval 5-10 seconds rest Longer swims should have longer rest periods					
Criteria to Progress	1. Pain free 2. Proper stroke technique during drills per coaches assessment a. Bent elbow recovery b. 4-6 beat kick c. Symmetrical body roll	1. Pain free 2. Proper stroke technique during drills per coaches assessment a. Bent elbow recovery b. 4-6 beat kick c. Symmetrical body roll	1. Pain free during and after practice 2. Ability to maintain good stroke technique at end of practice. 3. No shoulder pain during interval work					

21. Spigelman T, Sciascia A, Uhl T. Return to swimming protocol for competitive swimmers: a post-operative case study and fundamentals. Int J Sports Phys Ther. 2014 Oct;9(5):712-25. PMID: 25328833; PMCID: PMC4196335.

	Phase II – Join Team		
	Week Three 2200-3000 (700-900)	**Week Four 2800-3900** (900-1100)	**Week Five 3500-4700+** (1000-1200)
Warm Up Drills	Stroke Technique using drills Incorporate drills in the beginning and end of practice (600-700)	Incorporate drills in the beginning and at the end of practice (700-900)	A drill set should be incorporated at the end of the workout (800-1000)
Pull Set	None	None	Start pull set conservatively (200-300) Increase pulling yardage by 300 as tolerated DO NOT USE PADDLES! Stop immediately if pain or discomfort is felt.
Kick	With fins or zoomers, but no kick board Kick on side or back Arms can be at side or streamlined position if painfree (700-900)	With fins or zoomers Kick board if comfortable Kick on side or back Arms can be at side or streamlined position if painfree (700-900)	Kick with board if pain free Or Kick in streamlined position, on side or supine with arms at sides Fins and zoomers are optional (700-900)
Rest between repetitions	10-15 seconds between repetitions Interval 5-10 seconds rest Longer swims should have longer rest periods	10-15 sections between repetitions Interval 5-10 seconds rest Longer swims should have longer rest periods	5-15 sections between repetitions Interval 3-10 seconds rest Longer swims should have longer rest periods
Intervals	1 set on interval at 70% effort 1 1 set on interval about 10 slower than regular practice pace (200-500)	Gradually increase number of sets with interval work Maintain correct stroke technique (500-1000)	Start on interval 5-10 sec slower than pre-injury pace, progress to pre-injury interval gradually Maintain correct stroke technique (800-1300)
Criteria to Progress	1. Pain free during and after practice 2. Ability to maintain good stroke technique at end of practice. 3. No shoulder pain during interval work	Join Team 1. Pain free during and after practice 2. Ability to maintain good stroke technique 3. No pain or discomfort during interval work	1. Completely pain free 2. Maintain stroke technique 3. Complete pull work pain free 4. No pain or discomfort during interval work

21. Spigelman T, Sciascia A, Uhl T. Return to swimming protocol for competitive swimmers: a post-operative case study and fundamentals. Int J Sports Phys Ther. 2014 Oct;9(5):712-25. PMID: 25328833; PMCID: PMC4196335.

Key Points for Shoulder Injury Prevention[29]

1. Improve Posture for Shoulder Health:

"One fix that is universal for every sport is making sure the shoulder is starting in a strong neutral position."

2. Stabilize the Platform (Scapula): Scapula Stabilization Program.

3. Keep the Ball in the Socket: Key area to address is stretching out the pectorals minor due to common forward posture.

4. Educate Athletes on Everyday Wear and Tear: Backpacks should hold a maximum of 15% of athletes body weight. Recommend a backpack with a waist belt to relieve pressure off shoulders.

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OMT Review

- Scapulothoracic Mobilization
- Pectoral Traction
- Pelvic ME
- Posterior Innominate ME
- Anterior Innominate ME
- Superior Innominate Shear ME
- Outflare Innominate ME
- Inflare Innominate ME
- Psoas ME
- Balanced Ligamentous Tension of the Knee
- Myofascial Release: Pectoralis Minor
- Facilitated Positional Release: First Rib
- Hip Gridle: Spencer Technique
- Shoulder Girdle: Spencer Technique

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