

KINE6303: Client Case Study 2, Tom

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Client Background: Tom

Tom (52 years old) is a business executive and an avid recreational racquetball player who regularly strength-trains twice a week. After 8 weeks of physical therapy for a right shoulder impingement (pain with movement above shoulder height, especially internal rotation), the physical therapist (PT) treated and discharged (no pain) Tom. The PT's discharge notes included: apical breathing; thoracic kyphosis (TK); bilateral stiff pectorals; and right scapular dyskinesis (SD) with medial-inferior border winging which presents when eccentrically (lowering of the glenohumeral joint, GH, from an overhead position) stressed/fatigued. Tom has no other medical/health issues that would preclude him from: trigger point therapy; self-myofascial release; prone/supine positions; and kneeling positions. Tom's personal goals are to work on his posture and movement dysfunctions.

Corrective Rationale

The human body is an interconnected tensegrity system; one must consider the effects of local dysfunctions in terms of global consequences—illustrated by the concept of regional interdependence and the joint-by-joint approach (Cook, 2010; Cook, n.d.b.). For instance, the lumbopelvic-hip complex (LPHC) is associated with shoulder performance via the thoracolumbar fascia and latissimus dorsi; all the myofascial slings crossing the shoulder area also exert a push-pull effect if unbalanced (Falsone & OTP, 2015). Falsone and OTP (2015) noted the importance of assessing the "shoulder" client from toe to head, paying particular attention to the four joints contributing to shoulder function—GH, scapulothoracic (ST), acromioclavicular (AC) joint, and the sternoclavicular (SC) joint (Falsone & OTP, 2015). Falsone and OTP (2015) quoted Pavel Kolář's definition of ideal alignment (and homeostasis) as

"the ideal coactivations of our internal-external rotators, abductors-adductors, and flexors-extensors".

Based on Tom's background, the corrective rationale should consider the following evidence-based descriptions of associated "typical" issues: special concerns of the overhead/throwing athlete or OTA (including racquet sports); external and internal types of shoulder impingement; and the effects of postural deviations (TK and SD) on breathing and shoulder function.

The Overhead or Racquet Sports Athlete

The coordinated/efficient transmission of energy along the sensorimotor chain from the ground, upward through the lower extremities, LPHC (keystone structure), trunk, and through the upper extremities is critical to generating power and controlling deceleration in the overhead/racquet sports athlete (Edmonds & Dengerink, 2014; Falsone & OTP, 2015; Page, Frank, & Lardner, 2010; Zanca, Saccol, Oliveira, & Mattiello, 2013). Any movement dysfunction (compensatory movement patterns) not only contributes to energy "leaks" and altered afferent/efferent feedback (e.g. affecting torque steadiness), but may also contribute to the development of shoulder-complex abnormalities arising from chronic insults (e.g. the windup/cocking phase of the arm, abduction-external rotation) such as decentrated GH, subacromial impingement (SAI), internal impingement, and SD (Edmonds & Dengerink, 2014; Falsone & OTP, 2015; Fahlström & Söderman, 2007; Zanca et al., 2013). The racquet sports athlete not only delivers a significant amount of force per racquet-stroke, but also receives impact-force/vibration from the incoming ball making optimal joint-mechanics a very important factor in participation-longevity.

Shoulder Impingement: External (Primary)

As the normal subacromial space (area between the humeral head and the coracoacromial arch defined by the under-surfaces of the anterior acromion, coracoacromial ligament, and acromioclavicular joint) is typically between 9-10 mm in adults, it does not take much irritation to significantly reduce that small space causing some degree of impingement of the subacromial structures—supraspinatus tendon, subacromial bursa, and long head of the biceps tendon (Falsone & OTP, 2015; Norris, 2014; Petersson & Redlund-Johnell, 1984). Barring differences in the acromial shape, SAI (common "impingement complaint") in the general population often presents as a result of chronic poor posture (e.g. slouching, upper-cross syndrome or UCS, forward head or FH) and adaptations to tightness/muscle imbalances from recreation/activities-of-daily-living (ADLs) (Reinold, n.d.).

Shoulder Impingement: Internal (Secondary)

Posterior internal impingement/PII (reduced space between the humeral greater tuberosity and the posterosuperior glenoid rim in abduction and external rotation where the posterosuperior labrum, supraspinatus and infraspinatus tendons get "pinched") is more commonly present in the OTA (Manske, Grant-Nierman, & Lucas, 2013; Spiegl, Warth, & Millett, 2014). PII involves the humeral shaft moving posteriorly (hyperangulation) beyond the plane of the scapula during the cocking phase of a throw/swing (Manske et al., 2013). Chronic insults and anatomic adaptations allowing OTA's to perform at expert levels predispose OTA's to: GH internal rotation deficit (GIRD); increased GH retroversion; anterior/posterior instability; scapular weakness (especially in retraction) and/or dyskinesis; and rotator cuff (RTC) weakness (Manske et al., 2013).

Thoracic Kyphosis

Functional thoracic hyperkyphosis (FTH) refers to increases in the TK angle ($> 40^\circ$) resulting from natural aging; FTH also seemed to be correlated with SD (especially in individuals 45 years or older), increased SAI (upon shoulder elevation), and decreased thoracic extension mobility (Nagarajan & Vijayakumar, 2013).

Increased TK, scapular dyskinesis/winging, and tight pectorals are part of Janda's UCS (also forward head posture, breathing, cervicothoracic-scapulothoracic maladaptations) description of postural changes (Malmström, Olsson, Baldetorp, & Fransson, 2015; Page et al., 2010). Negative effects (demonstrating the regional interdependence concept) include (but not limited to): altered trunk-LPHC relationship; decreased thoracic mobility; decreased scapulothoracic stability; impaired shoulder function; and impaired respiratory function due poor posture (altering the shape of the thoracic cage, increased anteroposterior diameter of thorax, reduced xiphisternum-pubic distance) affecting the movements between the rib cage and thoracic structures (decreased lung volume, reduced respiratory efficiency or dyspnoea, decreased respiratory muscle endurance) (Al Dajah & Muthusamy, 2015; Malmström, Olsson, Baldetorp, & Fransson, 2015; Page et al., 2010).

Scapular Dyskinesis Inero-Medial Border Winging

Static/dynamic prominence of the medial border ("winging") is primarily due to the failure in maintaining congruency between the scapula and thorax by the serratus anterior (SA) (Park et al., 2014; Srikumaran et al., 2014; Falsone & OTP, 2015). The SA stabilizes the ST junction, maintains the medial-inferior borders of the scapula, and eccentrically decelerates downward rotation, retraction, and anterior tipping (Brookbush, 2015; Park et al., 2014; Srikumara et al., 2014). SA works synergistically with the trapezius in upward rotation, with

pectoralis minor in protraction, and with the lower trapezius in posterior tipping (Brookbush, 2015). Inferior-border prominence might also indicate: general anterior tightness; tight pectoralis minor; tightness of the short head of the biceps; shortened pectoralis major; weak lower trapezius; and weak SA (Falsone & OTP, 2015; Sevinsky & SMOG, n.d., ShoulderDoc.co.uk, n.d.). The scapular stabilizers provide local integrity and "controlled mobility" thereby facilitating gross movement elsewhere (Cook, 2010; Falsone & OTP, 2015).

Corrective Strategy

The overall corrective strategy (reset-reinforce-reload) for Tom will be to restore proper posture (primary) and increase scapular stability (secondary). Better posture will obviously improve breathing and scapular functioning. Ideally, one would clear the postural issue (TK), reassess, and then address the SD issue if that was still present.

The author's assumptions for this theoretical case are: no pain is present; Tom has regained mobility in his right shoulder; Tom is dedicated to both his sport and exercise compliance; Tom has been screened prior to week 1; and at every checkpoint in the corrective program, Tom has been re-assessed/screened and is able to progress. For the sake of brevity, the author will make a general reference to the exercise instructions from the class materials, and only provide further details if appropriate. Tom is a busy business executive, and the strategy will emphasize consistency and quality of execution—focusing on 5 or less exercises at a time.

There will be three phases (as per assignment criteria): phase 1 (beginning at week 1); phase 2 (beginning at week 6); and phase 3 (beginning at week 12, assuming that Tom will just use that last program design and complete the "reload"). Each phase will be divided into three sub-phases (A, B, C progressions). No more than 8 exercises are used at any point in time (as per

assignment criteria). Tom must fully master one sub-phase before graduating to the next sub-phase. Tom may not mix-and-match exercises between different sub-phases.

Phase 1: Week 1

Goals

Phase 1 is the "reset"—restoration of proper posture which includes retraining/promoting diaphragmatic breathing, regaining thoracic mobility previously limited by excessive kyphosis; and developing postural and breathing awareness. Liebenson (2014) noted that proper postural stabilization (e.g. sagittal stabilization) formed the basis for dynamic activities and sports performance.

Phase 1A

The goal is to address the tight/short/overactive muscles that are altering the normal muscle length-tension relationships (affecting joint centration and range of motion or ROM) (Hildebrand, 2012). Tom will focus on self-trigger point release (TP), self-myofascial release (SMR), and stretching his pectorals, biceps, upper back, and latissimus dorsi.

Mindfulness. Throughout the day, Tom should either mentally note or jot down (e.g. use phone to text himself) times when he notices: he starts slouching; neck feels tight; chest feels tight; or mid-upper back feels tight/uncomfortable.

Frequency. Tom should do phase 1a exercises at least once daily (should take no longer than 12-15 minutes) for the first 2 weeks, and "as needed" thereafter in a general stretching-warm-up protocol or for "postural breaks" during his workday.

Progressions. All TP and SMR may be progressed by combinations of: using more pressure but not to the point of pain (e.g. use more bodyweight and less support); graduating from a softer to firmer implement (e.g. soft foam, firm foam, tennis ball, rubber lacross ball);

using a textured implement (e.g. foam roller with ridges/bumps); and decreasing the surface area between the body-part and implement. Stretching progression would gradually increase the ROM of the stretch (increasing intensity of stretch without producing pain).

Progression criteria/benchmarks. All TP, SMR, and stretching benchmarks are when the client no longer feels an adequate intensity of "stretch", or when the TP is no longer irritated/tight.

Regressions. All TP and SMR regressions would be decreasing pressure, using a softer implement, and increasing the surface area between the body-part and implement. Stretching regressions would be decreasing the ROM.

Exercises. According to Dr. Sheri Walters, researchers recommended holding TP pressure until ischemic, but more practical recommendations ranged from 20-100 seconds (or long enough for the initial intensity "soreness" to subside/relax a bit) (Gulick, 2014; Ingraham, 2016; Paolini, 2009). For static stretches (post-workout or off-days), the general recommendation is to hold for 30-60 seconds, but no less than 20 seconds (Verstegen & Williams, 2014).

Pectoral TP/SMR. Refer to (and follow) Davies and Davies (2013), pages 163-168, Figures 7.2-7.8, and 7.11-7.12. Start massaging the TP by using your fingers or a soft ball. Pectoral TP pain may be felt in the anterior shoulder and arm; pectoral TPs promote the developmental "protective posture" of trunk flexion, shoulder protraction (and elevation), and internal rotation (all of which also affect breathing) (Davies & Davies, 2013; Falsone & OTP, 2015). Tom may use the chest foam roll (exact instructions in Verstegen & Williams, 2014, page 278) as a progression. Also, modify the chest foam roll into a chest static stretch: in prone, position the foam roll under the forearm with the shoulder abducted between 70-90°, with

elbows flexed; use bodyweight to sink towards the ground (or can use a wall as in the standard wall-chest stretch).

Biceps brachii TP/SMR. Refer to (and follow) Davies and Davies (2013), page 120, Figures 5.43-5.44. Start massaging the TP by using your fingers or a soft ball. The biceps help maintain the humeral head in the glenohumeral fossa, and referred pain may be felt in the anterior shoulder and elbow (Davies & Davies, 2013).

Thoracic spine foam roll. Refer to (and follow exactly) Verstegen and Williams (2014), page 280. Tom may want to try a massage stick as a progression to get into his lats and upper trapezius as shown in Verstegen and Williams (2014), pages 283-284 (massage stick low back and neck). Continuing on (after Tom has mastered phase 1b positional breathing), Tom may progress to "trigger point-thoracic spine" in Verstegen and Williams (2014), page 291.

Phase 1B

The goal is to work on dynamic neuromuscular stabilization (DNS) exercises to coordinate posture and retrain diaphragmatic breathing via manipulation of developmental positions (Liebenson, 2014). Phase 1b should not begin earlier than week 3. Ideally, Tom would already have been assessed using Liebenson's (2014) DNS positional tests for stabilization.

Mindfulness. Throughout the day, Tom should either mentally note or jot down (e.g. use phone to text himself) times when he notices: he starts breathing shallowly; chest instead of diaphragmatic breathing; and any periods that he might tend to hold his breath.

Frequency. Tom should do phase 1b exercises twice a day (morning and before bed), 5+ days per week, for at least 1 week before attempting progression to phase 1c.

Progressions. DNS principles of progression are (from easier to more difficult): supine/prone positions (reset deep intramuscular core stabilization) to sitting, standing,

quadruped and oblique/transitional positions; restricting degrees of freedom to increasing degrees of freedom; from closer to the ground (and/or closed chain) to higher positions (and/or open chain); from more stability to less stability; and adding resistance (Liebenson, 2014).

Progression criteria/benchmarks. The benchmark for progressing difficulty is for Tom to maintain proper diaphragmatic breathing and posture/alignment in the given position for the duration of 6 minutes.

Regressions. DNS principles of regression would include removing the progressive challenges until the client can perform the task with integrity.

Exercises. Tom may elect to include chest and spine SMR/stretch from phase 1a.

Retrain optimal breathing. Refer to the instructions "How to Train Optimal Breathing" on page 38 in Liebenson (2014) with Figure 4-19 (page 33, feet flat, knees bent), and "Supine Position" (do not initially elevate legs) (page 38). Due to the author's scope of practice, the client (laying supine) should place their own hands along their lateral rib cage order for feedback in retraining lower thoracic expansion. Another feedback method is to have the client place one hand on top of their sternal area and the other hand on their abdomen. The sternal/clavicular area should not have excessive movement (apical breathing). Exercising in front of mirrors would provide visual feedback as well (watching for excessive movement above the sternoclavicular area including shoulder movement). Tom should breathe for 6-8 minutes per session initially while he is working on mastering supine and prone positions. Thereafter, Tom should start with 2-3 minutes in supine/prone breathing, but focus on more advanced progressions.

Progression 1. Perform the exercise straight-legged.

Progression 2. Perform the exercise with knees bent at 90° with support. Refer to Liebenson (2014), Figure 4-31b, page 39.

Progression 3. Perform as in progression 2, but without the legs supported.

Progression 4. Perform with a Thera-Band resistance as described in Liebenson (2014), page 40, Figure 4-33.

Prone breathing. Refer to "Prone Position" and "Modification in Prone Position" in Liebenson (2014), pages 40-41, Figures 4-34 through 4-36. Perform the exercise as described beginning on the floor and progressing to the ball.

Oblique/side-sitting and quadruped positions. This is a progression from supine-prone breathing. Refer to Liebenson (2014), pages 41-45, Figures 4-37 through 4-42. Tom can try these if he has mastered supine and prone breathing.

Seated breathing. This is a progression from supine-prone breathing. Refer to Liebenson's "Squat" breathing (2014), page 45, Figure 4-43. Instead of squatting, start with sitting in a chair with proper posture: without excessive TK; erect/lengthened without excessive hyperextension; head-neck-shoulder-LPHC alignment; feet flat on the ground; keep shoulders relaxed ("sticky shoulder") maintain good space between the clavicles and ears. If feedback is needed, place one hand over the sternal area and one hand on the abdomen (use mirror if desired). Maintain diaphragmatic breathing.

Standing/squat position breathing. This is a progression from seated/quadruped breathing. Refer to Liebenson (2014), page 45, Figure 4-43. Perform as described only after mastering supine, prone, and seated positions.

Phase 1C

The goal is to increase thoracic mobility while maintaining proper breathing. Rotation in the transverse plane should be felt really good since most "sitting" jobs emphasize flexion in the sagittal plane. Phase 1c should not begin earlier than week 4.

Mindfulness. Throughout the day, Tom should either mentally note or jot down (e.g. use phone to text himself) times when he notices his mid-upper back and neck feeling stiff. The goal is to increase body awareness/connectedness.

Frequency. Tom should do phase 1c exercises at least once a day (unless otherwise stated), 5+ days per week.

Progressions. If Tom is not feeling an adequate challenge in ROM, intensity of stretch, and or coordinated effort (posture and breathing), then Tom may consider progressing.

Progression criteria/benchmarks. While building complexity, always be vigilant for form; emphasize quality over quantity. Tom may progress the exercises in phase 1c if he can maintain proper form/alignment and breathing consistently for every performance of every task. Tom may not progress more than two exercises (phase 1c) on the same day, and Tom must spend at least 2 days at each level of progression.

Regressions. If proper form/alignment and breathing cannot be maintained consistently, then either stop (i.e. case of fatigue) or regress the exercise.

Exercises. Tom may elect to include the chest SMR/stretch from phase 1a.

Trigger point, thoracic spine. Refer to Verstegen and Williams (2014), page 291. To start, perform this exercise without the overhead arm movement (i.e. steps 1-2, then 6-7).

Between each crunch, include an extra full breath using proper breathing techniques.

Progression 1. Perform the full exercise with the overhead arm movements. Be sure to utilize proper breathing techniques.

Swiss ball shoulder/hip flexibility. Refer to Liebenson (2014), page 256, Figure 20.2. To start, follow the instructions for the "initial" exercise referring to Figure 20.2A. Work on the

spinal extension, keeping the shoulders relaxed (not "creeping" up to one's ears), and breathing properly.

Progression 1. Refer to Liebenson (2014), page 256, Figure 20.2B, and perform the side-lying "progression" instructions.

90-90 stretch with arm sweep. Refer to Verstegen and Williams (2014), page 274. Perform the exercise as instructed with proper breathing techniques. Do not let the shoulder "creep" up to one's ears (elevated shoulders); keep shoulders relaxed. Envision a string attached to the top of your head that is pulling in the cephalic direction, and another string attached to your tailbone pulling in the opposite direction (caudally). Maintain as lengthened of a spine as possible, and be aware of one's "masses and spaces". Avoid the twisted and flexed (hunched) position.

Quadruped thoracic spine rotation. Refer to Verstegen and Williams (2014), pages 152-153 (both the "leg abduction on wall" and "leg extended on wall" variations). To start, assume the quadruped position without the leg abducted (or without the leg extended and placed on the wall), both legs on the ground. Proceed with the rest of the exercise (steps 2-8) in Verstegen and Williams (2014), page 152. Really work on maintaining a lengthened spine from the top of the head to tailbone. The temptation is to add the rotation, but with some degree of forward flexion. Be mindful of breathing.

Progression 1. Refer to Verstegen and Williams (2014), page 152. Perform steps 1-8 exactly as outlined.

Progression 2. Refer to Verstegen and Williams (2014), page 153. Perform steps 1-6 exactly as outlined.

Progression 3. This one is for the office (or anywhere). Sit tall on the edge of a chair (without wheels). Cross your arms over your chest such that the opposing hand rests on the opposing anterior shoulder; let the elbows rest and fall naturally. Keeping a lengthened posture, chest elevated (do not slouch), and relaxed neck/shoulders, rotate your left shoulder to your left side as far as you can, then return to center and take a nice deep breath. Do the same thing to the right side. Try to keep the hips still so that they are not doing the work for you. Make this harder by standing (the hips will be tempted to move more).

Phase 2: Week 6

Goals

Phase 2 is the "reinforce" which involves sensorimotor (emphasis on the neurological) re-patterning/programming of proper posture/breathing which may include both protective (lifestyle changes for Tom) and corrective factors in order to promote the retention/sustainability of the "reset" (Cook, n.d.a.). Additionally, some of the exercises have a cross-over benefit for scapular stabilization which will help Tom's eccentric "winging" issue. Phase 2 "introduces" Tom to his scapula. The goal is to challenge Tom while making sure his posture and breathing have improved. Tom should not regress to poor habits when faced with a new challenge.

Phase 2A

Phase 2a will focus on reinforcement in the sagittal plane.

Mindfulness. Based on Tom's notes on his body awareness during the day, Tom should start scheduling small breaks throughout his day to either check his posture and/or perform a few stretches/exercises. Examples are: taking a 5 minute break every 2 hours; standing up from one's work-chair every hour, reach for the sky, and sit back down; or stand up when speaking on the

phone. Tom should perform an ergonomics walk-through with an ergonomics professional (or occupational therapist) at his workplace and at home.

Frequency. Tom should do phase 2a exercises at least once a day (unless otherwise stated), 5 days per week.

Progressions. If Tom is not feeling an adequate challenge in the intensity and/or coordinated effort (posture and breathing under dynamic situations), then Tom may consider progressing.

Progression criteria/benchmarks. Tom may progress to phase 2b if he can maintain proper form/alignment and breathing consistently for every performance of every task in phase 2a for at least 5 days.

Regressions. If proper form/alignment and breathing cannot be maintained consistently, then either stop (i.e. case of fatigue) or regress the exercise.

Exercises.

Sliding overhead press. Refer to Verstegen and Williams (2014), page 288. To start, follow steps 1-4 exactly. Important points: always use good breathing techniques; arms/hands should maintain contact with the floor/mat (only slide as far overhead as you can still maintain contact with the floor); shoulders should not "creep" or elevate upwards. Pay attention to form and the motion/rotation of the scapula. Think about initiating the overhead movement with your scapula—smooth/controlled symmetrical movement upward and downward. Feel the pressure of the floor against the scapula and use that as feedback.

Breathing challenge. Inhale deeply prior to the "press". During the "press", exhale and countdown from 3 to 1 (i.e. a 3-count). When lowering the "press", inhale and count-up from 1 to 3. If the breathing becomes too easy, try a 4-count. Feel the expansion in the diaphragm.

Progression 1. Do this exercise with legs straight out instead of knees bent.

Progression 2. Do this exercise with knees bent (and straight-legged), plus add a resistance to the overhead press by using a Thera-Band or tubing along the same plane of motion. One may anchor the band in a door jamb, around one's foot, or lay on top of the middle section of the band (so long as one can grasp the ends to "press").

Progression 3 (optional). Do this exercise in a sitting position with your back against a wall. Start with knees bent, and follow the same progression ideas in progressions 1 and 2, above.

Progression 4 (optional). Do this exercise in a standing position with your back against a wall. Progress this by using a band or tubing. Falsone and OTP (2015) noted that few professional athletes pass progressions 3 and 4.

Segmental glute bridge. Refer to Verstegen and Williams (2014), page 155. Perform the exercise as described—slow and controlled. Focus/visualize each and every vertebra peeling off the floor and back down (segmental mobility in sagittal plane).

Regression. If Tom is having difficulty with the segmental work, then Tom should stand against a wall (back to wall, with heels touch the wall). Slowly "peel"/roll-down off the wall, towards your feet as if to touch your toes (only go as far down as you can).

Bear position (with "walk"). Refer to Liebenson (2014), page 44-45, and Figure 4-42. To start, assume the bear position (without the "walk"). Maintain proper breathing/alignment, elongated spine (no TK, no hyperextension), and a relaxed and neutral neck. The body should feel symmetrically loaded. Feel the hands and feet push the ground away, and at the same time feel one's trunk being lifted away from the ground (imagine a string pulling up). This closed-chain position will also engage/activate the SA more and promote optimal joint-centration. Hold

the position as long as comfortable and increase one's body-awareness. Try to shift weight (e.g. controlled rocking) forward-and-back; try shift weight side-to-side. Pay attention to how the scapula feels (spotter should ensure no "winging" takes place).

Progression 1. Include the "walk". Perform the exercise in its entirety as described.

Progression 2. Refer to Verstegen and Williams (2014), page 169, "Handwalk" exercise. Perform as described with the same body awareness. A spotter should make sure no scapular "winging" takes place with these more dynamic progressions.

Exercise with Thera-Band in a standing position. Refer to Liebenson (2014), page 46, Figure 4-45 (page 47). Perform this exercise as described with proper alignment and breathing. Watch for scapular "winging" upon fatigue and either stop or regress.

Regression. Use less resistance (or no resistance), and by limiting the ROM.

Phase 2B

Phase 2b will focus on reinforcement with trunk rotation.

Mindfulness. Based on Tom's ergonomics walk-through in phase 2a, Tom should try to make some adjustments to his office and home spaces.

Frequency. Tom should do phase 2b exercises at least once a day (unless otherwise stated), 5 days per week.

Progressions. If Tom is not feeling an adequate challenge in the intensity and/or coordinated effort (posture and breathing under dynamic situations), then Tom may consider progressing.

Progression criteria/benchmarks. Tom may progress to phase 2c if he can maintain proper form/alignment and breathing consistently for every performance of every task in phase 2b for at least 5 days.

Regressions. If proper form/alignment and breathing cannot be maintained consistently, then either stop (i.e. case of fatigue) or regress the exercise.

Exercises.

Reverse lunge, forearm to instep with rotation. Refer to Verstegen and Williams (2014), page 175. This exercise will be performed without the "lunge" (step 1-2) from standing position. To start, assume a straight-arm plank position (if needed, regress by supporting oneself with the forearms instead). Maintain proper head-to-toe alignment (no TK), breathing, and scapular control (no "winging"). With your left foot, step in towards your left hand (looks like a lunge position now). Follow steps 4-5 as written in Verstegen and Williams (2014), page 175.

Parallel rotational throw, kneeling. Refer to Verstegen and Williams (2014), page 208. To start, perform the exercise as it is written, but "touch" the ball to the wall instead of throwing.

Progression 1. Refer to Verstegen and Williams (2014), page 209, "Parallel Rotational Throw, Split Squat" (half-kneeling). Perform this exercise by touching the ball to the wall first. Progress this by incorporating the throw later in phase 2c.

Progression 2. Refer to Verstegen and Williams (2014), page 210, "Parallel Rotational Throw, Standing". As before, perform as written, first touching the ball to the wall, then throwing later in phase 2c.

Progression 3. Refer to Verstegen and Williams (2014), page 212, "Perpendicular Rotational Throw, Standing". Perform as written, first touching the ball to the wall, then throwing later in phase 2c.

Adaptation. If Tom cannot "catch" a ball well, this series may be done using a TRX Rip Trainer and bungee.

Phase 2C

Phase 2c will focus on whole-body reinforcement with trunk rotation.

Mindfulness. With increasing challenges, Tom should still be mindful with his posture, breathing, and scapular engagement. Performing exercises slow and controlled will allow Tom to improve his mind-body connectedness, paying attention to all the sensory details.

Frequency. Tom should do phase 2c exercises at least once a day (unless otherwise stated), 5+ days per week.

Progressions. If Tom is not feeling an adequate challenge in the intensity and/or coordinated effort (posture and breathing under dynamic situations), then Tom may consider progressing.

Progression criteria/benchmarks. Tom may progress if he can maintain proper form/alignment and breathing consistently for every performance of every task in phase 2c for at least 5 days.

Regressions. If proper form/alignment and breathing cannot be maintained consistently, then either stop (i.e. case of fatigue) or regress the exercise.

Exercises.

Inverted hamstring with rotation. Refer to Verstegen and Williams (2014), page 282. Perform this exercise as written.

Squat and twist with Thera-Band. Refer to Liebenson (2014), pages 49-50, Figure 4-49. Perform this exercise as written—slow and controlled.

Progression. Increase difficulty by increasing the band resistance. However, increasing resistance is not the purpose of this exercise.

Parallel rotational throw, kneeling. Refer to Verstegen and Williams (2014), page 208. To start, perform the exercise as it is written, with the "throw". Refer to the phase 2b version of this exercise. Instead of "touching" the ball (in phase 2b), perform the "throws". Follow all the progressions as in phase 2b, with throws.

Phase 3: Week 12

Goals

Phase 3 is the "reload" which reinstates motor control via exercise programming to support the reset-reinforce, and to build/expand upon the "reinforce" patterning by reloading function (Cook, n.d.c.). Tom's progress (and maintenance) in correcting his postural alignment (no TK) and breathing should positively affect his shoulder-complex function, particularly stabilization of his right scapula. Realistically, re-assessment/screening should take place to determine the degree of SD remaining and what correctives should be implemented. Phase 3 will incorporate some exercises to challenge Tom's scapular stabilizers (SA and lower trapezius).

Phase 3A

Phase 3a will focus on "reloading" Tom in the sagittal plane.

Mindfulness. Tom should still practice developing mindfulness (including but not limited to): awareness of his body and its functioning; energy levels; mood/emotions and how they affect his performance; self-regulation in terms of breathing and inhibition/activation (e.g. excitatory levels); and stress. Encourage Tom to maintain his "posture breaks" during the workday, notes on ups/downs, attentiveness to his posture/breathing during activities/recreation.

Frequency. Tom should do phase 3a exercises at least four times per week.

Progressions. If Tom is not feeling an adequate challenge in the intensity and/or coordinated effort (posture and breathing under dynamic situations), then Tom may consider progressing.

Progression criteria/benchmarks. Tom may progress to phase 3b if he can maintain proper form/alignment and breathing consistently for every performance of every task in phase 3a for at least 4 days.

Regressions. If proper form/alignment and breathing cannot be maintained consistently, then either stop (i.e. case of fatigue) or regress the exercise.

Exercises.

Plank to push-up with plus. Refer to "Plank Series" in Liebenson (2014), pages 123-124, with Figure 8-13 (page 124). Perform one set of "Plank Series" (exactly as described in Liebenson, 2014) as a movement prep to the "Push-Up with Plus" in Liebenson (2014), page 128-129, Figure 8-23. Perform the "Push-Up with Plus" exactly as described in Liebenson (2014).

Cuing for "Plank Series". Pay attention to alignment (no rounding of the back in fatigue) and breathing. Utilize proper shoulder packing or "sticky shoulders", mindful of your scapular control (no "winging"). Think of your scapula being drawn to the heels of your feet, but without any excessive tension/depression.

Progression 1. For either the "Plank Series" or "Push-Up with Plus", Tom may support either his legs or upper-body (but not both simultaneously) with a little less stable surface (e.g. use a vibration platform, airex pad), but do not use a stability ball.

Progression 2. To progress the "Plank Series" further, refer to Verstegen and Williams (2014), pages 144-145, "Dynamic Pillar Bridge, TRX". Perform the exercise as described.

Progression 3. To progress the "Plank Series" further, refer to Verstegen and Williams (2014), page 148, "Pillar Bridge, Dynamic Alternating [Arms], TRX". Perform as described.

Progression 4. Refer to Verstegen and Williams (2014), page 244, "Push-Up, TRX". Perform as described.

Pull progressions.

Movement prep. Refer to Liebenson (2014), page 164-165, "Bridge Track in Hook Lying", Figure 10-5 and 10-6 (page 165). Perform the exercise as described with these modifications: emphasis on the arms/shoulders/scapula that are resting on the ball; feel your scapula drawn downwards (toward your tailbone) and into the ball (retraction and depression); alternately protract and retract your shoulder away from and into the ball with the arms overhead.

Low row/pull. Perform after the movement prep. Refer to Liebenson (2014), page 373-375, with Figures 32-10 (straight arm) and 32-11 (bent elbows) on page 375 for the "Low Row" (scapular retraction, depression, SA, lower trapezius activation). Important cuing: do not be tempted to let shoulders rise; maintain good posture (do not round back); keep arms naturally close to body (do not flay out); row "lower" in Figure 32-11 with elbows at 90°. These can be done using a cable machine with adjustable arms.

Progression 1. Refer to Verstegen and Williams (2014), page 248, "Bent-Over Row, 1 Arm, 1 Leg, Dumbbell". Perform the exercise as described.

Progression 2. Refer to Liebenson (2014), page 260, Figure 20-11, "TRX Pull-Up/Scapula Stabilizers". Perform this exercise as described beginning with less incline (i.e. more upright position) and increase the incline for increased difficulty.

Progression 3. Refer to Liebenson (2014), page 128, Figure 8-22, "Inverted Pull-Up". Perform this exercise as described.

Phase 3B

Phase 3b will focus on "reloading" with a rotational component.

Mindfulness. Same as in phase 3a.

Frequency. Tom should do phase 3b exercises at least four times per week.

Progressions. If Tom is not feeling an adequate challenge in the intensity and/or coordinated effort (posture and breathing under dynamic situations), then Tom may consider progressing.

Progression criteria/benchmarks. Tom may progress to phase 3c if he can maintain proper form/alignment and breathing consistently for every performance of every task in phase 3b for at least 4 days.

Regressions. If proper form/alignment and breathing cannot be maintained consistently, then either stop (i.e. case of fatigue) or regress the exercise.

Exercises.

Cable chop, lateral, half-kneeling. Refer to Verstegen and Williams (2014), page 215. Perform as described, except start with full kneeling instead of half-kneeling.

Progression 1. Perform as described in half-kneeling position.

Progression 2. Refer to Verstegen and Williams (2014), page 226, "Rotational Chop, Standing". Perform as described.

Progression 3. Increase resistance.

Rotational lift. Refer to Verstegen and Williams (2014), page 227. Perform as described, except start in full kneeling position instead of standing.

Progression 1. Perform as described in half-kneeling position.

Progression 2. Perform as described in standing position.

Progression 3. Increase resistance.

Rotational row, TRX. Refer to Verstegen and Williams (2014), page 252. Perform as described starting from a position with less incline (i.e. more vertical) and progressively increase the incline for more difficulty.

Phase 3C

Phase 3c will focus on "reloading" in a more dynamic, full body way.

Mindfulness. Same as in phase 3a.

Frequency. Tom should do phase 3b exercises at least four times per week.

Progressions. If Tom is not feeling an adequate challenge in the intensity and/or coordinated effort (posture and breathing under dynamic situations), then Tom may consider progressing.

Progression criteria/benchmarks. Tom may progress if he can maintain proper form/alignment and breathing consistently for every performance of every task in phase 3c for at least 4 days.

Regressions. If proper form/alignment and breathing cannot be maintained consistently, then either stop (i.e. case of fatigue) or regress the exercise.

Exercises.

Tinioca (warm-up). Refer to Verstegen and Williams (2014), page 176. Perform as described. This will help Tom move well in the court.

Squat to press, 1 arm dumbbell. Refer to Verstegen and Williams (2014), page 235. Perform as described.

Kettlebell swing. Refer to Verstegen and Williams (2014), page 219. Perform as described.

Turkish get-up. Refer to Verstegen and Williams (2014), page 238. To start, perform steps 1-3 (only go as far as pressing the kettlebell up), then lower the kettlebell back down and resume your initial position by reversing the steps. In essence, you only go as far as an arm bar.

Progression 1. Perform steps 1-6.

Progression 2. Perform the full exercise as described.

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