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Maximizing Core Retraining 2

Jennifer Stone, PT, DPT, OCS, CAPP
certified pelvic floor therapist
Clinic Supervisor, Mizzou Therapy Services-Rangeline
Program Director, Pelvic Health Certificate, Evidence in Motion

Objectives

- Explain anatomy and physiology of the entire core and its interrelationship with the rest of the body
- Assess for appropriate motor control of core musculature and identify sources of impairment if they exist
- Name at least 3 options for use of manual therapy to provide a neuromotor “reset” to the core.
- Provide at least 3 examples of motor control retraining for patients regardless of impairment, beginning with very basic muscle activation and progressing all the way into motor
- Explain what the concept of “core stability” should look like and how to practically apply during exercise and athletic training
Core Reset

How to use manual therapy techniques to facilitate motor control retraining

Neuromotor Control/Reset

- What does manual therapy actually do?
- We used to think we were moving joints and stretching tissue—is this accurate?
- Most of the recent studies are pointing to manual therapy being a very powerful tool to alter neuromotor input to generate an altered output
- Serves as the “CTRL+ALT+DELETE” for our nervous system which allows us to do a more effective “software reboot” (core/motor control retraining/relearning)
Motor Control

- How it should work:
  - I want to do something
  - I need to fire all these muscles to make that happen
  - I fire all the muscles and it happens
  - I get the positive feedback loop of success

- Redundancy
  - When we repeatedly do an action or activity, our brain starts to “automate” that (you don’t have to think through details of how to turn your car on or brush your teeth)

When Redundancy Bites us in the Butt…

- Our brain and body do an amazing job of adjusting for non-ideal movement patterns to allow us to keep moving
- This is GOOD—how awful would it be if we stopped functioning every time our back was a little stiff?
- HOWEVER, if we are guarding an area for a long period of time (pain, surgery, a traumatic incident to the area) the brain can get confused and replace the normal motor pattern with the “protective” motor pattern
- If we can “reset” the system, we will be much more successful in quickly reminding people’s bodies of the normal/good motor pattern
Options to Reset the Core

- Anything that alters the neural input in the area
- Suggest using manual therapy first followed by exercise if your goal is rebooting
- High velocity low amplitude thrust (manipulation)
- Soft tissue mobilization
- Muscle energy techniques
- Joint mobilization doesn’t seem to be as effective for this but can still be part of your overall plan of care
  - Joint mobilization is shown to be more effective for increasing range of motion—especially helpful around rib cage if you think that actual lack of mobility is the issue

Manipulation and Muscle Energy Techniques

- Goal: facilitate a “quick stretch” or “muscle overload” to help interrupt chronic motor patterns in an area
- Does the technique matter?
- Decrease in pain, “wipe the slate blank” in order to allow us to build “from the ground up”
- Suggested options
  - Lumbar spine, hips, or pelvis can assist with lower core reset
  - Thoracic spine can assist with sympathetic chain ganglion reset, bladder issues, postural issues, rib cage excursion, and upper core issues
Soft Tissue Mobilization

- Overactive muscles/guarding, especially in posterior chain and pelvic floor
- Don’t forget about potential for cervical soft tissue mobilization to help with diaphragm issues
- You can also mobilize the diaphragm specifically (incorporate breathing for more of a muscle energy technique)
- Lower rib cage mobilization can be helpful if rib tightness is preventing appropriate diaphragmatic excursion (especially likely in the lower rib cage)
- Abdominal mobilizations

Motor Control Retraining

What does “core control” look like?
Keep in Mind What we are Trying to do…

- We are retraining MOTOR CONTROL, not strength
- If the muscles are individually strong, that does you absolutely no good if they are not working together to generate appropriate IAP
- Patients WILL feel better if you strengthen individual muscles (some support is better than none) but if you stop here, you risk just giving them another dysfunctional movement pattern (frequent flyers/will be back for their back pain in a few months or a year)

Let’s Start at the Very Beginning…

- Breath retraining-teaching people to breathe into their pelvis/through their diaphragm (this is surprisingly hard sometimes!)
- If you can lay this foundation correctly, it will be extremely helpful through the rest of the process
- Biofeedback techniques
- Remember that appropriate rib and diaphragm mobility are key to being able to achieve this!
Breathing

- Importance
  - Diaphragm lowers with inhalation (abdomen rises/expands, PFM descends)
  - Diaphragm rises with exhalation (abdomen lowers, internal organs rise 1-3 cm, PFM lift)

- Evaluation – one hand on upper chest, one on abdomen
  - Abdomen should rise/fall, also lateral chest expansion – look at symmetry vs. holding patterns or restriction on one side

- Retraining/facilitation techniques
  - “Breathe into my hands”
  - Therapist using hands to facilitate diaphragm stretch and/or rib excursion

Breathing Progressions

- “Wing arm”
- Sidebend plus breathe
Add in the Next Piece-Pelvic Floor Contraction

- DO NOT initiate if patient is unable to relax PF!
- Start in hooklying or sidelying
- Looking for an “up and in” motion with NO pelvic tilting, gluteal activation, or “bulging out” of the abdominal muscles
- Hip adductors are facilitory (don’t want to be dependent on these long term)
- BREATHING (exhalation) to facilitate PF activation
- Verbal cues (different ones work better for different people)
  - Act as if you are trying to stop the flow of urine*
  - Act as if you are trying to stop yourself from passing gas
  - Draw your muscles up and in
  - (Men) Raise your testicles
  - Kidney bean lift

A Note About Bracing Strategies

- Should we use them or not?
- Is there benefit to learning to isolate a muscle-FOR THE PURPOSE of neuromuscular re-education and reminding the brain where the muscle is/how it works?
- BUT should we stay there? For how long?
Contract/Relax PF Through Full ROM

- Should see a drawing up/in AND ability to bulge down/out (elevator analogy)
- Facilitation and resistant positions
- Verbal cues (in addition to the previous ones)
  - Press down like you are trying to have a bowel movement or pass gas
  - Relax down-go up and in, then back to “rest” then bulge down towards your feet
  - Pelvic Elevator – going to the basement

Incorporate Abdominals

- Start with TrA, then add others
  - Verbal cuing-try to pull ASIS toward one another
- Limit “bracing” strategies – incorporate breath to minimize increases in IAP
- Making sure there is a co-contraction with PFM and TrA, then moving into using these (with breathing!) for movement
- Unweighting techniques
- “Move it and move on,” pelvic floor style
Retraining Functional Movement

- It’s not enough to teach isolated contraction only
- How do we retrain functional movement?
- Anticipatory control
- Incorporating balance
- Sidelying may be a good place to start
- Progress into quadruped, then other positions
- THINK MOVEMENT!! (And movement strategies)

Lower Core Practice—Putting it Together

- Breath retraining—supine, sitting, standing
- Pelvic floor contraction addition
- Transverse Abdominus
- Now incorporate into the following dynamic movements (practice this both as the patient and therapist—how can you cue away from substitution patterns??)
  - Segmental bridge, segmental bridge with arm movements plus band
  - Bridge with leg extensions, bridge with hip abduction/adduction
  - Bird dog with band
  - Squat (wide, narrow, plie), squat with jump
  - Plank, plank with reach, plank with leg lift, open hip down dog to plank and back, plank to side plank
Upper Core

- Also important to incorporate in with breath!
- Here, the “foundation” is the scapular stability
- Start by teaching a retraction, then add in movement
- Exhale on the concentric effort, inhale on eccentric
- Movements to add in once you have the basics
  - Wall angel
  - B shoulder ER with band and squeeze
  - Unilateral and bilateral T and Y

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Upper Core

- Deep Neck Flexor Retraining
- With stabilizer unit or palpation
- Again, start with hold (up to 10 sec)
- Then add in gravity (prone)-WATCH for retraction instead of a tuck!!
- Then can add in arm movement-penguin reach, Ts, lift ahead
Upper Core Dynamic Training

- Add in throwing if applicable
- Scapular punch plus perturbation
- Weightbearing
- Down dog push up with plus
- Work on upside down BOSU
- Plank and/or quadruped work to incorporate “full core”
- Alphabet with weight

Put the Core Together

- Try some options for working the entire core at once!
- Chair pose/squat plus scapular work
- Lots of possibilities with plank position
- Use physioball roll outs, planks, V ups, etc.
- How do we adjust some of these things for our patients who are less physically able?
Don’t Forget Anticipatory Retraining!

- The core should activate prior to any movement (even reaching for the door handle)
- Balance training or doing activities with perturbations can be very helpful here
  - Squats on Bosu
  - Slide training
  - Push ups on Bosu
  - Rebounder work
  - SLS with perturbations
  - Balance work on foam pads, etc.

Diastasis Rectus Abdominus

- Commonly seen in the following populations:
  - Postpartum women (even years postpartum)
  - Individuals who have lost significant weight (especially those post bariatric surgery or hernia repair)
  - High impact or heavy lifting athletes
Diastasis Recti

- Separation of the rectus abdominus to the extent that the linea alba splits under the strain
- Can lead to pelvic instability and low back pain
- Testing:
  - Patient in hooklying-ask to raise head and shoulders while reaching toward feet
  - The clinician measures with fingers/palpation
  - A separation of 1-1.5 fingers width is considered normal and will resolve spontaneously
  - If the separation is 2-2 ¼ fingers-width or there is a bulge upwards that looks like a mound at midline, special precautions are warranted
  - Measure depth AND width (depth more important prognostically)
  - Measure above and below the umbilicus

Diastasis Rectus Abdominus-Management

- Acutely-bracing or splinting for high pressure activities (coughing/sneezing/laughing)-how long/how much do we want to brace the core?? Avoid sit ups/crunches (including sitting up in bed)
- Start GENTLE transverse abdominus training right away (some of the early level isometrics and stabilization exercises we have discussed already); you can use manual bracing or Kinesiotape as needed
- Slowly move into more advanced/functional positions; note, you are trying to retrain the ability to achieve appropriate IAP, if you notice something that makes you think that is not happening, back down!
Diastasis Rectus Management

- **Upper Split**
  - Teaching to “widen ribs”-pulling the abdominals in/down vs squeezing up/forward
  - Suggestions
    - Leg and arm movements on half foam roller
    - Bridging, quadruped work into planking (with forward translation of weight), rotations
    - Use of obliques is key (appropriate use!)

- **Lower Split**
  - Teaching to activate TrA
  - Variation of positions-quadruped, tandem tall kneeling (try this! It’s harder than you think!), movement oriented, plank oriented work-trying to incorporate obliques and spinal muscles as ready

Questions/Case Studies
Case Study 1

- 28 year old male accountant, marathon runner, with insidious onset low back pain x 26 months. No prior history. No prior accidents or surgeries. He played football through high school and also played intramurals in college. Now he plays pick up football but nothing else. Current exercise routine includes marathon training and weightlifting workout 2-3 times per week. He reports that exercise does aggravate his pain, as does sitting for long periods of time and bending over. Easing factors include changing position, pain medication, and heat therapy.

Objective Exam

- Positive SLR with posterior bias
- Hypermobile through lumbar spine and sacrum, hypomobile hips with decreased rotation ROM
- Valsalva noted upon request for pelvic floor activation
- Squat: Immediate anterior tibial translation
- SLS: Immediate loss of balance bilaterally
- Plank: unable
Case Study 1

- Treatment
  - Hip joint mobilizations
  - METs and manipulations to pelvis for neuromotor “reset”
  - Breath work/cuing with all exercises
  - Taught pelvic floor activation in supine, quickly transitioned to use of abdominals in supine as well.
  - Bridging, quadruped with extremity movement, planking (upright at first, working down into plank, then using physioball, plank to side star, plank to inverse V up
  - Retraining gait/cadence

Outcomes

- Seen 8 times over 5 weeks (2/week x 3 weeks, 1/week x 2 weeks)
- Complete relief of back pain with daily activities and training
- Able to complete marathon with reports of muscular soreness and tightness but no pain
Case Study 2

- 44 year old female PSR, chronic history of SI joint dysfunction on and off for the last 8 years. No real mechanism of injury. She has had PT and chiropractic care on and off for the last few years and feels that nothing has really provided lasting benefit. Pain is worse with standing and lifting and especially with transitioning to standing after sitting or lying down for a long time. She doesn’t exercise much, reports occasional walking at this time. 2 children, C sections for both, ages 15 and 13.

Case Study 2

- Objective Information
  - Moderate Trendelenberg gait pattern
  - Hypomobility through lumbar spine and pelvis, normal hip mobility, hypomobile thoracic spine, hypermobile sacrum and hips
  - Severely adhesed lower abdomen around scar
  - Chest breather
  - Positive SLR bilaterally relieved with anterior closure force
  - Unable to SLS
  - 3 finger width diastasis supraumbilical, 2 finger infraumbilical, both 2 knuckles deep
  - Very poor ability to activate PF and TrA, no ability to coordinate
Case Study 2

- **Treatment**
  - Mobility work-spine, use of HVLA prior to motor control training
  - Breath work
  - Taught PF and TrA activation using ultrasound imaging feedback
  - Worked through diastasis rectus/anterior tensioning
  - Incorporated into segmental (pilates) bridge, pelvic rotations/clocks, clam shells, SLS training, unloaded squatting, eventually inclined planks and other more advanced work

- **Outcomes**
  - Seen 12 times over 8 weeks (2/week for 4 weeks, 1/week for 4 weeks)
  - No pain with any ADLs or work, walking daily and doing 10 minute core focused routine for exercise
  - Diastasis-2 fingers wide supraumbilical, 1 finger wide infraumbilical, 0.5 knuckle deep in both places
  - Normal gait pattern
Questions?

- What questions do you have? Clarifications?
- If you think of more later, feel free to contact me anytime: jstone@eimpt.com

References

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References


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- Coccyx.org – coccyx taping technique

References