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Diagnosis and treatment of Diastasis Recti Abdominus

Jennifer Cumming, PT, MSPT, CLT, WCS

No disclosures
Learning Outcomes

1. Review and label anatomy of abdominal wall and deep motor control system
2. Verbalize the causes and prevalence of diastasis rectus abdominus (DRA)
3. Demonstrate how to assess for DRA
4. Describe basic treatment strategies for improving functionality of abdominal wall and deep motor control system

Case study #1 complaints

- Mrs. H is 37 year old who is 6 months post-partum
- Back pain since late pregnancy and postpartum period.
- Pain not responding to traditional physical therapy
- Pain with transition movements and bending
- Also c/o stress urinary incontinence and pain with intercourse
Case study #1 orthopedic assessment

- 1 ½ finger diastasis rectus abdominus just inferior to umbilicus
- Active straight leg raise (ASLR) with best correction at PSIS indicating involvement of posterior deep motor control system
- L3 right rotation at level of DRA
- Hypertonicity B internal oblique muscles

Case study #2 complaints

- Ms. S is a 20 year old elite college level athlete
- History of DRA developing with high level athletic training
- Complains of LBP with prolonged sitting, bending, and lifting activities
Case study #2 orthopedic assessment

- L SI joint unlocks with weight shift L
- L rib translation with weight shift L
- L external oblique and erector spinae hypertoncity
- 1 finger DRA just superior to umbilicus
- ASLR best correction at pubic symphysis indicating involvement of anterior pelvic floor muscles

Case study #3 complaints

- During pregnancy:
  - Severe pubic symphysis pain with all activities
  - Seen Webster trained chiropractor for pubic symphysis alignment with no success
  - Unable to complete home or work activities due to pubic pain
Case study #3 orthopedic assessment

- **During pregnancy**
  - B SI joint unlocking with weight shift to either leg
  - 4 finger DRA at umbilicus and 3 finger DRA superior to umbilicus

- **Postpartum**
  - B SI joint unlocking with single leg stance L and 75% weight shift on R
  - 1 ½ finger DRA superior to umbilicus and 2 fingers at umbilicus
  - PFM weakness (2/5) with increased tone deep transverse perineal, levator plate, and obturator internus

Anatomy
Trunk components

- Deep muscles
- Superficial muscles
- Diaphragm
- Pelvic floor muscles
- Lumbar spine
- Pelvis
- Lower ribs

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Multifidus mm

- Superficial fibers
  - Insert 3 vertebral levels below insertion
- Deep fibers
  - In pelvis, attaches to deep levels of thoracolumbar fascia of raphe of glut max
  - Connect into capsule of SIJ
  - Blends with Sacrotuberous ligament
  - More Type I fibers than Type II

Download for free at https://openstax.org/details/books/anatomy-and-physiology
**Erector Spinae mm**

- **Longissimus thoracis pars lumborum**
  - Runs L1-L5 from transverse processes to medial aspect of PSIS
- **Longissimus thoracis pars thoracis**
  - Runs from T1-12 ribs and transverse processes and attaches to transverse processes of lumbar spine and sacrum
- **Iliocostalis lumborum pars lumborum**
  - Runs from transverse processes of L1-L4 to iliac crest lateral to PSIS
- **Iliocostalis lumborum pars thoracis**
  - Runs from inferior borders of lower 7 ribs to ilium and sacrum

**Quadratus lumborum**

- Deep to erector spinae and lateral to psoas
- Arises from transverse processes of L5 and iliac crest.
- Lateral fibers attach to medial half of 12th rib
- Medial fibers attach to anterior surfaces of transverse processes superior to L5

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**Psoas attachments**

- T12-L1 and L4-L5 anterior fibers
- L1-L5 posterior fibers
- Provides lumbar and hip segmental control
- Important role as hip flexor
- Optimally recruits prior to superficial hip flexors or adductors

**Iliacus**

- Attachments along iliac crest to lesser tubercle
- Blends with Psoas
- Hip flexor

Contributors to lumbar stability

- Muscle activation for vertebral form closure
- Fascial tension
- Increased intra-abdominal pressure
- Static stability and maintenance of neutral spine requires minimal co-contractions of trunk muscles

Diaphragm attachments

- Xyphoid process
- Internal surfaces of lower 6 ribs
- Lumbar spine
- Arcuate ligament arch over psoas and quadratus lumborum
Diaphragm

- Note how far into the thoracic cavity the diaphragm goes. The core really starts in mid-thoracic range and runs to pelvic floor.

Diaphragmatic assistance with trunk control

- Contributes to trunk control
- Resting tone increased prior to peripheral movements
- Tonically active with sustained activity
- Modulates activity with respiration during peripheral activities
Diaphragm restrictions

- Hypertonicity of EO, IO, RA or ES often restrict movement of lower ribs and prevent proper diaphragmatic excursion
- With decreased diaphragmatic excursion, inspiration will occur primarily in upper anterior chest

Coordination of diaphragm and TrA

- TrA and diaphragm activity linked with opposing patterns
- TrA activity increases with expiration while diaphragm activity decreases
- TrA activity decreases with inspiration while diaphragm activity increases
Pelvic floor function in breathing

Inhale:
- Diaphragm actively contracts, and pulls down, expanding rib cage and belly
- Pelvic Floor relaxes and descends

Exhale:
- Diaphragm relaxes up, rib cage contracts, abdominals contract
- Pelvic floor contracts and lifts

Pelvic Floor Superficial layers
- Ischiocavernosus, bulbospongiosus, transverse perineal, deep transverse perineal, urethral sphincter, urethrovaginalis
- Share common attachments at perineal body
- Provide more sphincteric action
Pelvic Floor Levator ani group

- Deepest layer of the pelvic floor muscles
  - Iliococcygeus, ischiococcygeus, puborectalis
- Share tendinous attachments with obturator internus
- Attach at coccyx, ileum, ischium and pubis

Thoracolumbar fascia

- Critical structure for load transfer between trunk and lower extremities
- Contains alpha-smooth muscle actin called myoblasts with contractile capability
- Tension is transmitted to ligamentus flavum and assists with lumbar alignment
### Bony and fibrous attachments of thoracolumbar fascia

<table>
<thead>
<tr>
<th>Bony attachments</th>
<th>Fibrous attachments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iliac crest</td>
<td>Ligamentum flavum</td>
</tr>
<tr>
<td>PSIS</td>
<td>Iliolumbar ligament</td>
</tr>
<tr>
<td>Posterior sacrum</td>
<td>Supraspinous ligament</td>
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<tr>
<td></td>
<td>Sacrotuberous ligament</td>
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</tbody>
</table>

### Muscle attachments of thoracolumbar fascia

- Transverse abdominus
- Internal oblique
- External oblique
- Glut max
- Latissimus dorsi
- Biceps femoris
- Quadratus lumborum
- Lower trap
- Multifidus
- Erector spinae
Four fascial slings for trunk

- **Posterior oblique sling**
  - Attaches to latissimus dorsi and glut max via the thoracolumbar fascial plane

- **Anterior oblique sling**
  - Attaches to external oblique, anterior abdominal fascia, and contralateral hip adductors.

- **Longitudinal sling**
  - Attaches to peronei, biceps femoris, Sacrotuberous ligament, thoracolumbar fascia and erector spinae

- **Lateral Sling**
  - Attaches to glut med, glut min, TFL and lateral thoraco-pelvic stabilizers.

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**Fascial Slings**

**Posterior Oblique Sling**

**Anterior Oblique Sling**

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Posterior Fascial support

Note the connections from the pelvic floor, pelvis and sacrum, hip adductors, lumbar spine, and circumventing around the abdominal wall.

Normal abdominal wall anatomy

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Functions of abdominal wall

- Abdominal and pelvic support
- Orifice closure
  - Esophagus, inferior vena cava, aorta, rectum, vagina, urethra
- Breathing
- Movement control and stability
  - Work synergistically with diaphragm and pelvic floor
  - Provide joint control of pelvis, lumbar spine, lower thorax

Transversus Abdominus

- Deepest abdominal muscle
- Arises from inguinal ligament, iliac crest, thoracolumbar fascia, and inner surfaces of lower 6 ribs
- Attaches into fascial plane of rectus abdominis and linea alba and midline
- Fibers of upper, middle, and lower sections of TrA lay at different orientations
  - Superior fibers lay superiomedially
  - Middle and inferior fibers lay inferiomedially at slightly different angles

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Functions of TrA

- Generally increases intra-abdominal pressure for improved spinal stability
- Superior portion
  - Assists in stabilizing rib cage
- Middle
  - Contributes to spinal stability via connections into thoracolumbar fascia
- Inferior
  - Contributes to pelvic stability

Internal oblique

- Lies between TrA and EO
- Arises from iliac crest, inguinal ligament, and thoracolumbar fascia inferior to L3
- Attach to 7-10th ribs at costochondral joints and tips of 11-12th ribs
- Blend into rectus fascia and into linea alba to pubic crest
- Fibers are generally oriented in superiomedial plane
- Over activity of IO presents with increased inferior rib angle or rib flaring
External oblique

- Largest abdominal muscle
- Arises from lower 8 ribs
- Interdigitates with serratus anterior and latissimus dorsi, possible attachments onto thoracolumbar fascia
- Attach onto anterior iliac crest
- Blend to rectus fascia and into linea alba
- Fibers run generally inferomedially
- Over activity presents with rigidity of rib cage or acute inferior rib angle

Internal and external oblique mm

- Hyperactivity of internal oblique pulls ribs down and out—will have widened sternal angle
- External oblique hyperactivity will have narrowed infrasternal angle with ribs being pulled in and down
- With hyperactivity or with imbalance between IO, EO and TrA, will pull linea alba down and apart
- TrA smallest at level inferior to umbilicus
- IO is responsible for inferior section of linea alba closure
Rectus abdominus

- Arises from pubic crest and ligaments of pubic symphysis
- Inserts into 5-7 costal cartilage and xyphoid process
- Enclosed in fascial sheath formed by aponeurosis of TrA, EO and IO
- Medial borders of RA connect via the linea alba, a strong fascial sheath

Linea alba anatomy

- TrA fibers form the posterior section of the rectus sheath
- TrA pulls across rectus sheath
- EO and IO fibers form anterior section of rectus sheath.
- Highest compliance of linea alba is longitudinal
- Lowest compliance is in transverse plane
- Inferior to umbilicus compliance is smaller transversely compared to oblique direction
Note fascial envelope formed by obliques and TrA

Optimal abdominal wall function requirements

- Intact anatomy that is able to generate force closure
  - Hernias or DRA are inability to complete force closure
- Optimal timing of muscle activation, relaxation and elongation
- Adequate strength and endurance to complete task
Normal width of linea alba

- Using ultrasound Beer et al 2009, measured 150 nulliparous women aged 20-45 years
- Mean width was highly variable at inferior, superior and level of umbilicus
  - 7 mm +/- 5 mm at xiphoid
  - 13 mm +/- 7.3 cm at just superior to umbilicus
  - 8 mm +/- 6.2 cm inferior to umbilicus

Prevalence of DRA

- 66% of women with DRA have pelvic floor dysfunction (UI, POP, pain) Spitznagle et al 2007
- 100% of women have DRA of 2.7 cm during 3rd trimester Mota 2014
- Many DRA do not close at 8 weeks and remain unchanged at 1 year post-partum Coldron et al 2008, Liaw et al 2011
- DRA can change up to 4 months after discontinuation of breastfeeding
- Some women have diastasis of other fascial planes as well
Occurrence during pregnancy

- Begins to appear in 2nd trimester and occurs at 100% rate in 3rd trimester
- Normal resolution begins day 1 of postpartum period and continues at quick rate through week 8
- After 8th week, recovery plateaus with 39% non-closing DRA

Causes of DRA during pregnancy

- Hormonal changes to elasticity of connective tissues
- Mechanical stress via increased abdominal pressure on abdominal wall from growing uterus and fetus
- Displacement of pelvic and abdominal organs from growing uterus and fetus
Risk factors for non-resolving DRA

- Research definition of 16 mm at 2 cm below umbilicus
- Prevalence of 100% at 35 weeks gestation with mean IRD 65 mm with range from 22-126 mm.
- Prevalence at 6 months postpartum 35-39%
- No statistical difference found between women with/without DRA at 6 months postpartum.
  - Pre-pregnancy BMI
  - Pregnancy weight gain
  - Baby's birth weight
  - Abdominal circumference during pregnancy
  - Fascial hypermobility (Brighton's score)

Causes of DRA in postpartum period

- Caused by variable changes that differ from patient to patient
- Knowns:
  - 1) Deep stability system muscles are often compromised
  - 2) Superficial muscles are often overactive
  - 3) Recruitment strategies are suboptimal for task at hand
Co-morbidities with DRA

- In urogynecological population, 52% found to have DRA *Spitznagel 2007*
- Of this population, 66% had at least one pelvic fascial support related dysfunction
  - Stress urinary incontinence
  - Fecal incontinence
  - Pelvic organ prolapse

Behavior of linea alba with DRA

- Inter-recti distance (IRD) greater at rest with subjects with DRA vs those without
- Distortion index (seen on real time ultrasound) greater in those with DRA
  - Linea alba became wrinkly, domed, or sagged
- IRD increased with curl up without cues to engage TrA
- Many subjects with DRA could reduce distortion index with cues to activate TrA prior to curl up.
- However, this strategy sometimes increased the IRD but improved function of patient
Inter-rectus distance with functional tasks

- Lee and Hodges 2016 measured distance between rectus abdominus mm at rest and with curl up task with and without cues to activate deep core
- From this information able to determine distortion index with real time ultrasound of linea alba with all three tasks
- Rated the quality of abdominal muscle activation regarding:
  - Optimal activation of TrA
  - Inconsistent activation between tasks or from left to right
  - No TrA co-activation with dominance of superficial mm

Findings from Lee and Hodges 2016

- Found that with patients with minimal distortion index at rest (minimal sagging or doming of linea alba) did not have increased distortion index with functional tasks
- Linea alba tension was maintained at rest and with functional tasks
- Infrasternal angle should stay the same and inter-rectus distance should not change with proper activation of TrA and functional linea alba
Correlation of width and load transfer failure

- Some women with DRA are able to produce enough force closure of lumbar and pelvis to have functional load transference across DRA
- Other women with same IRD fail to regain ability to transfer forces for lumbar and pelvic stability
- Factor of difference is not width of linea alba but tension that can be generated across linea alba between left and right abdominal walls
- As long as forces are sufficient to stabilize the lumbar, pelvis and thoracic spine, patient demonstrate good load transfer regardless of width of linea alba

Using IRD only for DRA assessment

- Body of research has focused on use of IRD to assess DRA changes in postpartum women.
- Focus noted that curl up task narrowed IRD while cues for activating TrA increased IRD in some women
- Suggested that post-partum women with DRA should perform curl ups instead of TrA activation
- Primary goal was to narrow IRD
- This theory did not look at function or load transference strategies.
  - Pascoal, Dionisio, Cordeiro, Moto 2014
What if we look at function instead of solely at IRD?

- Strategies that focus solely on IRD narrowing allows for increased distortion index of linea alba on U/S
- Increased distortion of linea alba decreases abdominal pressure, pelvic floor control, function of thoracic and lumbar spine, and pelvic stability
- Abdominal wall activation strategies aim to decrease distortion index of linea alba but may increase the IRD
- Individual assessment is required to assess linea alba behavior with TrA activation and curl up tasks

Our goal is not necessarily to close the DRA but to generate tension across the linea alba to restore function.
Assessment
TrA assessment

- Must be palpated to assess activity accurately
- Without deep palpation, assessment will be of IO or EO activity or hypertonicity and TrA activity will be missed
- Best assessment is to palpate through layers to reach TrA
- Slowly palpate and assess through EO and IO and surrounding fascial layers
- Once you reach the TrA, gently abduct palpating hands to take up slack of surrounding fascial tissue and linea alba
- TrA co-contracts with PFM
  - Cues should include PFM and TrA visualizations for best TrA contraction

Assessment of deep fibers of multifidus

- Patient lies prone.
- Palpate multifidus lateral to spinous process
- Pressing firmly, compare fibers of opposite sides at same lumbar level
- Hypertonicity in erector spinae mm must be released before able to fully assess deep multifidi
- With proper synergy of PFM and TrA, multifidi will co-contract with deep system with cuing.
- Proper activation will feel like swelling into palpating finger
- Common substitutions include ES and QL activation
Active straight leg raise

- The ASLR assesses the pt's ability to transfer loads across the linea alba.
- Ideally, LE raises with little to no effort and no movement of pelvis in relation to ribs or LEs.
- Compression on pelvis can decrease effort in patients with poor load transfer strategies or pelvic girdle pain.
- Provider can vary location of compression for more information on load transfer deficits. *Lee and Lee 2004*

Compression anterior pelvis

**Level of ASIS**
- Simulates:
  - Lower fibers of TrA
  - IO
  - Abdominal fascial planes

**Pubic symphysis**
- Simulates:
  - Anterior pelvic floor muscles
  - Endopelvic fascia
  - Lowest fibers of TrA
  - Lowest fibers of IO
Compression of posterior pelvis

**Level of PSIS**
- Simulates
  - L5-S1 multifidus
  - Thoracolumbar fascia

**Ischial tuberosities**
- Simulates
  - Posterior pelvic floor muscles
  - Endopelvic fascia

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**Observe ASLR assessment**

- Observe left vs right for ease of lift and ask patient’s assessment of ease of movement
- Flexion should occur at hip joint without pelvic movement
- Ribs should be stable without drawing in or flaring
- Ribs should not be braced and there should be some lateral rib expansion with breath
- Should not be thoracic spine extension or shift from left→right
ASLR assessment

Observe ASLR assessment

- Observe left vs right for ease of lift and ask patient’s assessment of ease of movement
- Flexion should occur at hip joint without pelvic movement
- Ribs should be stable without drawing in or flaring
- Ribs should not be braced and there should be some lateral rib expansion with breath
- Should not be thoracic spine extension or shift from left→right
Activating TrA and differentiating from IO and EO

- Note degree of infrasternal angle
  - Widened angle indicates increased IO activation
  - Narrowed angle indicates increased EO activation
- Best cue per research includes phrases focusing on deep core
- Palpate abdominal wall and give following cues to feel difference in mm activation
  - Make rib cage heavy
  - Flatten your back to the mat
  - Pull your belly button up and in
  - Draw your hip bones closer together like they are connected by a wire

Curl up task

- Requires co-activation of all abdominal muscles
- Is automatic strategy patient to patient
  - When TrA is activated, a hollowing of the abdominal wall is noted
  - Poor TrA activation can cause doming or sagging of abdominal wall
- When TrA activation is cued and the patient may be unable to sustain the contraction
  - Endurance deficit
Head lift

Curl up task

- Observe the task
- Is there a hollowing or doming along linea alba
- Palpate linea alba and note inter-recti distance
- Note tissue at bottom of linea alba and if it is firm or soft
- Give cues for TrA activation
  - Repeat curl up task and note changes in quality of task and firmness of linea alba
Screen SIJ force closure

- Check SIJ stability for the desired task
  - Check with weight shift, single leg standing, squat, single leg squat, step through
- Watch quality of movement with desired task
  - Side bending, trunk rotation, hip drop, bracing all indicate compensatory strategy with that task
Treatment strategies

Video of DRA in clinic
Kinesiotape options for DRA

- Pt engage deep motor control system. Anchor tape lateral to one side of rectus abdominus fascia and tape to other side. Repeat in opposite direction.
- Tape at level that responded best with ASLR assessment
- This may be at SIJ vs DRA itself

Support for pelvic ring and thorax

- Use a Serola SI belt for pelvic ring support as needed
- Kinesiotape for stability
  - SI stability: Can tape across SI joint with external support or a * over SI joints individually
Pelvic brace

- My go to first exercise. Starts to reconnect synergistic relationship of TrA, PFM, multifidus and diaphragm
- Take the time to find what cues give your patient the best activation
- Cues:
  - Bring tailbone and pubic bone
  - Bring ASIS together
  - Bring belly button up and in

Where to start with exercises

- With necessary support at linea alba, activate TrA and deep motor control system at appropriate level for patient and for goal task
- Start with symmetrical activation
  - Pelvic brace
  - Dead bug or single knee fall out or Saurman levels
  - Bridges
  - Squats
  - Multifidus activation
Advancing to task

- Advance to unilateral exercises when patient able to transfer load across linea alba without a breakdown in the functional system
  - Lunge
  - Single leg standing
  - Single leg squat
- Train to task with simulated exercises, assessing patient’s ability to transfer load across linea alba without breakdown

When to or not to advance

- Watch that your patient demonstrates good pelvic stability before moving forward
- Check SI force closure with task
- Watch for:
  - Hip drop
  - Thorax side bending or rotation
  - Bracing through ribs
  - Hip ADD or valgus knee
- If you are seeing this, your patient is compensating
Training to the task

- What is your patient's goal?
- Demonstrate childcare, homecare, work activities
- Add the appropriate resistance for the desired task
  - Lifting a newborn vs a toddler
  - Lifting 25# boxes at work
  - Serving a volleyball

Recent patient with DRA

- Mrs E G5P5 with c/o urinary incontinence and core weakness.
- 3 months postpartum with vaginal delivery.
- Stated she has above issues since 1st baby 10 years ago
- Denies pain
Orthopedic assessment

- R hip drop with weight shift
- R SIJ unlocking with weight shift
- >10 finger DRA at, above and below umbilicus
- PFM and TrA strength 1/5
- Seen for 13 visits over the course of 9 months

DRA without TrA activation
DRA with TrA activation

ASLR after treatment
Case study #1 complaints

- Mrs. H is 37 year old who is 6 months post-partum
- Back pain since late pregnancy and postpartum period.
- Pain not responding to traditional physical therapy
- Pain with transition movements and bending
- Also c/o stress urinary incontinence and pain with intercourse

Case study #1 orthopedic assessment

- 1 ½ finger diastasis rectus abdominus just inferior to umbilicus
- Active straight leg raise (ASLR) with best correction at PSIS indicating involvement of posterior deep motor control system
- L3 right rotation at level of DRA
- Hypertonicity B internal oblique muscles
Case study #1 treatment and outcomes
Post-partum 6 months with back pain

- Cues and HEP for multifidus activation with focus on L3 level
- Manual STM internal oblique to decrease pull on linea alba
- Ther ex for TrA, multifidus, diaphragm, and PFM activation for deep motor control

- After treatment, able to complete childcare activities with good motor control of L3 vertebrae
- Able to transfer loads across linea alba at level of DRA

Exercises

- Multifidus activation in sitting and standing
- TrA and PFM activation in standing with squat and squat with rotation
- Neuromuscular retraining for deep core activation prior to any lifting, rotation, or bending activities
- Activity driven for lifting baby out of crib and off changing table
Case study #2 complaints

- Ms. S is a 20 year old elite college level athlete
- History of DRA developing with high level athletic training
- Complains of LBP with prolonged sitting, bending, and lifting activities

Case study #2 orthopedic assessment

- L SI joint unlocks with weight shift L
- L rib translation with weight shift L
- L external oblique and erector spinae hypertonicity
- 1 finger DRA just superior to umbilicus
- ASLR best correction at pubic symphysis indicating involvement of anterior pelvic floor muscles
Case study #2 treatment and outcomes
Athlete

- Ther ex with focus on PFM activation prior to deep motor control system challenges
- Multifidus and TrA HEP
- External oblique and erector spinae mm releases

- Return to sport without pain
- Improved deep motor control with bending and lifting activities with good SI joint force closure
- Good load transference across linea alba

Exercises for case 2

- Pt’s go to muscles all global
- Neuromuscular re-ed to access deep motor control system
- HEP for PFM, TrA, and multifidus activation in standing. Then layered in up on toes, single leg standing, squat and then trunk rotation for serving.
Case study #3 complaints

- During pregnancy:
  - Severe pubic symphysis pain with all activities
  - Seen Webster trained chiropractor for pubic symphysis alignment with no success
  - Unable to complete home or work activities due to pubic pain

Case study #3 orthopedic assessment

- During pregnancy
  - B SI joint unlocking with weight shift to either leg
  - 4 finger DRA at umbilicus and 3 finger DRA superior to umbilicus

- Postpartum
  - B SI joint unlocking with single leg stance L and 75% weight shift on R
  - 1 ½ finger DRA superior to umbilicus and 2 fingers at umbilicus
  - PFM weakness (2/5) with increased tone deep transverse perineal, levator plate, and obturator internus
Case study #3 treatment and outcomes
Pregnant and newly post-partum with pubic pain

- During pregnancy
  - Stability through pelvic ring with Serola SI belt
  - K-tape across linea alba for improved load transfer during pregnancy

- Postpartum
  - Serola belt for SI joint stability
  - TrA, multifidus and PFM muscle activation for functional deep motor stability
  - Motor control challenges with functional activities in varied positions—supine, sitting, standing, standing in stride, step ups

- Outcomes
  - DRA closed and able to transfer loads across linea alba
  - Functional motor control system strength with increasing strength of TrA, multifidus, and PFM muscles

Exercises in pregnancy
- K-tape for stability. Note to have pt change often and to protect skin.
- Hands and knees rocking and bird dog 1.

- Focused on closed chain activities for improved pelvic stability
Exercises in post-partum

- Started with TrA, multifidus, and PFM activation in supine and sitting to access deep motor control system
- Continued with symmetrical stability: bridge, SKFO, body weight squat
- Advanced with asymmetrical stability: TrA activation with leg lift, Single leg bridge, lunge, step ups.
- Pt’s job required donning HazMat suit and climbing ladders.
- HEP advanced to pelvic brace with single leg standing and single leg step ups

Resources

- Pascoal AG et al. (2014). Inter-rectus distance in postpartum women can be reduced by isometric contraction of the abdominal-muscles: A preliminary case-control study. Physiotherapy. 100(4), 344-348.