

Pelvic Floor Dysfunction & the Female Athlete

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Why look at the female athlete separately?

- For most of us, there is a presumption that women have always participated in sports, however this is a relatively recent change (historically speaking).
- Title IX has existed since 1972 and ensures that "no one is excluded from sports participation in any education program receiving federal financial assistance".
- The number of female athletes has increased dramatically in that time. However, while women strive for equality on the athletic field, we must still be aware of essential differences in the anatomy and physiology of the female athlete and be aware of those differences when treating them.
- My role today is to speak to you about the female pelvic floor and how it affects female athletes.

The Female Pelvic Floor

Five Layers of Pelvic Floor:

- Superficial perineal muscles
- Urogenital diaphragm
- Levator ani muscles
- Smooth muscle sphincter
- Endopelvic fascia

Superficial Perineal Muscles

Made up of slow & fast twitch fibers; minimal function in continual continence but influence urge management; also react to increased pressure on the bladder

1. Superficial transverse perineal - *ischial tuberosity to perineal body, supports perineal body;*
2. Ischiocavernosus – *ischial tuberosity to pubic rami, erection of clitoris*
3. Bulbospongiosus (at one time was called bulbocavernosus) – *perineal body around vestibule to clitoris, clitoral erection*

Urogenital Diaphragm

- *Collectively known as external urinary sphincter in females. The external urinary sphincter in males is much less complex than females. They have only the sphincter urethrae. It is made up of primarily slow twitch fibers, which is important for continence*
1. Sphincter urethrae – around urethra, attaches to inferior pubic ramus
 2. Compressor urethrae – pubic arch to pubic arch around urethra and vagina
 3. Urethrovaginal muscle – around urethra and vagina

Levator Ani Group (Pelvic Diaphragm)

Attach to the pubis anteriorly and arcuate ligament laterally, then sling around the bladder neck and urethra; deep to the perineum; slow twitch fibers; postural support at rest; with urgency/activity, they contract and thus maintain the angle of the bladder neck

- Puborectalis
- Pubococcygeus
- Iliococcygeus
- Coccygeus (not part of levator ani but assists in function – at one time called ischiococcygeus as it attaches to ischial spine)

Smooth Muscle (Sphincters)

- External urinary (urogenital diaphragm in females) and anal sphincters – blend with levator ani
Requires conscious relaxation to void
- Internal anal sphincter – more near distal anal canal
Relaxes automatically with pressure changes from stool in the lower colon (non-voluntary)
Able to distinguish gas, liquid, & solid
- Internal urinary sphincter – in bladder neck, proximal to the urethra (Also non-voluntary)

Endopelvic Fascia

- Gives attachment to & envelops pelvic floor muscles and pelvic organs
- Vagina and urethra pass through the fascia
- Composed of smooth muscle, elastin, collagen and blood vessels
- Provides bladder neck support

Associated Muscles

Gluteals

- Should be at rest during most functions related to continence,

Abdominals

- Contraction of the rectus abdominus or obliques increases intra-abdominal pressure, and thus on the bladder and pelvic floor muscle groups.
- Contraction of the transverse abdominus is concurrent with activity of pelvic diaphragm and levator ani groups (very important for proper function of pelvic floor muscles)

Obturator internus

- Within the deep hip external rotators, attaching lateral side of arcuate ligament (or tendinous arch of the levator ani group) to greater trochanter, which is the attachment for all deep pelvic muscles.
- Increases tension via the arcuate ligament throughout the lower pelvis, and thus assists in support of the bladder and urethra

Hip adductors

- Attachment at pubis near urogenital and pelvic diaphragm muscles
- Facilitate overflow activity in the levator ani group
- Also assist in re-lengthening the obturator internus

What is Pelvic Floor Dysfunction?

- First, we must define the pelvic floor – this is the layer of muscles that support the pelvic organs and span the bottom of the pelvis.
- Basically, pelvic floor dysfunction is any problem with function of the pelvic floor

Types of Pelvic Floor Dysfunction

- There are 2 main types of pelvic floor dysfunction.
 - Supportive (This is the more common type of dysfunction in athletes.)
 - Hypertonus

Supportive Dysfunction

- **Symptoms:** incontinence, back pain, pelvic pressure, heaviness, lack of sexual orgasm, "falling out" feeling in pelvis, bladder/bowel difficulties, suprapubic pressure, frequent UTI
- **Diagnoses:** urinary stress and/or urge incontinence, fecal incontinence, cystocele, cystourethrocele, rectocele, uterine prolapse, rectal prolapse, perineal descent syndrome
- **Causes:** childbirth, loss of muscle strength, compression trauma to pelvic floor tissues, high impact activities, pelvic fractures/malalignments/subluxations, poor coordination of the "abdominal canister"

Hypertonus Dysfunction

- **Symptoms:** pelvic pain, painful intercourse, constipation, incomplete bladder & bowel emptying, radiating pain to posterior thigh, rectal pain, coccygeal pain
- **Diagnoses:** Nonrelaxing puborectalis, levator ani syndrome, piriformis syndrome, coccygodynia, dyspareunia, proctalgia fugax, pelvic floor tension myalgia, puborectalis syndrome, vaginismus, vulvodynia
- **Causes:** increased muscle tension, trauma (including childbirth)

Most Common Dysfunctions in Female Athletes

- Urinary (and sometimes fecal) Incontinence
- Pelvic Organ Prolapse
- Diastasis Recti (DRA)
- Pelvic pain

Urinary Incontinence in female athletes

- Females participating in repetitive, high-impact sports are at the highest risk for urinary incontinence.
- The most common type of incontinence in the female athlete is stress urinary incontinence (SUI).
- SUI has been reported in up to 30% of Elite female athletes*
- Primary sports involved include trampolining (80%), gymnastics (67%), basketball (66%), and tennis (50%).
- Other activities included running, aerobics, and walking and involve some amount of repetitive bouncing
- Symptoms are so common that "athletic incontinence" has been proposed as a new term to describe the loss of urine while exercising only.

Urinary Incontinence in female athletes (continued)

- Fecal incontinence was also reported but at lower levels (14.8%)
- Prolapse symptoms were reported mainly only in parous women after vaginal birth
- Most common physiological cause is pelvic floor weakness, along with pelvic floor muscle fatigue and increased intra-abdominal pressure during exercise.
 - The increased intra-abdominal pressure that occurs when jumping, running or landing can overload the pelvic floor structures and decrease the contraction force of the pelvic floor muscles.

Urinary Incontinence in female athletes (continued)

- Often there is an imbalance between the hip muscles and the pelvic floor.
- Diastasis Recti during/after pregnancy can cause dysfunction of the pelvic floor.
- There is a positive correlation between incidence of incontinence and number of vaginal births.
- May be a predictor of urinary incontinence in later adulthood
- Effects can include decreased performance, change in sport and avoidance of physical activity all together

Urinary Incontinence in female athletes (continued)

- Specific training guidelines for female athletes with PFD are not typically discussed in exercise science curricula or addressed in professional strength and conditioning texts.
- Because of the stigma and embarrassment surrounding pelvic floor concerns, many female athletes are not familiar with PFD, avoid seeking help, and consequently do not receive adequate care for this condition. In fact the percentages listed above are considered to be too low, as incontinence is believed to be vastly underreported (screen your patients/clients!)

Proposed Factors in Athletic Incontinence

- Multiple studies have been done to look at causative factors of UI in female athletes.
- Some have proposed a neuromuscular fatigue is involved in UI as higher incidences of UI are reported during practice as opposed to competition
 - Some studies have reported a higher prevalence of hypermobility joint syndrome in physically active young females with UI compared to a control group
 - An imbalanced inner core can lead to leakage when the pelvic floor is "overwhelmed" by the abdominal contraction during explosive movements

Proposed Factors in Athletic Incontinence (cont.)

- Disordered eating in female athletes has been suggested as another predisposing factor for PFD in female athletes (female athletic triad)
- Overactive pelvic floor can lead to chronic fatigue and then to incontinence (this also relates to urinary urgency, incomplete bladder emptying, and pain).
- Several studies with young female athletes found a positive association between the flexibility of the plantar arch and UI.

Treatment Intervention for SUI

- Begin with a thorough medical exam to rule out medical causes.
- Physical Therapy Intervention to include:
 - Nutritional Education
 - Pelvic floor strengthening (Kegels)
 - Multiple studies have shown that pelvic floor strengthening is an effective first line treatment for stress UI.
 - Postural education
 - Core stability and strengthening
 - Possible use of vaginal weights to help with high impact SUI
- Possible use of a pessary to support the pelvic organs during sports

Nutritional Influences on Continence

- Water intake
 - 6-8 glasses / day helps maintain adequate bladder capacity, or the bladder will shrink
 - Proper fruit / veg / fiber / mineral balance also key
- Irritants to the bladder
 - Soda (caffeine & phosphorus)
 - Coffee / Tea (caffeine)
 - Alcohol
 - Citrus
 - Spicy foods

These can stimulate bladder contraction due to irritation of the bladder lining, and thus escalate incontinence.

Other Problems in the Female Athlete

- Female Athlete Triad
- Special Populations
 - The aging athlete
 - The pregnant athlete

Female Athlete Triad

- Interrelationship of disordered eating, menstrual dysfunction, and osteoporosis.
- Some athletes develop an “obsession” with exercise and excessive thinness
- Can lead to amenorrhea which then can contribute to osteoporosis.
- In a recent study, athletes with disordered eating were three times more likely to present urinary incontinence than women without disordered eating.

The Older Female Athlete

- Health benefits of exercise, particularly in the older population, are profound.
- Our role in Health Care is to support this population and design a rehab or training program that considers issues related to aging:
 - Normal strength decrease
 - Cardiopulmonary changes
 - Connective tissue changes
 - Balance dysfunction

The Pregnant and Post-Partum Athlete

- The pregnant female athlete will also have cardiopulmonary and postural changes (as the center of gravity moves forward).
 - Avoid exercising to exhaustion
 - Avoid situations where there is a risk of becoming overheated
- Always consult with physician before beginning or continuing any exercise routine.

The Pregnant and Post-Partum Athlete (cont.)

- Be aware of diastasis recti
 - Some amount of diastasis recti is normal
 - occurs when the linea alba, the band of tissue that connects your left and right **rectus** abdominus, stretches, widening the space between the two muscles
 - More than 2 finger widths is concerning
 - Also evaluate depth, a deeper opening is more concerning than a shallow one
 - Work on stability, transverse abdominis, small movements

Diastasis Recti – Not Just for Moms!

- We are seeing an increase of referrals for diastasis recti in female athletes (who have never given birth) as a result of incorrect training methods
- Make sure your clients/patients are exercising correctly and have good core support!
- Avoid cross-over abdominals in clients with DRA as the external obliques will pull further on the linea alba
- Teach log roll for supine to sit – no “jack-knife”
- Emphasize transverse abdominis
- Have your client define “core”

Your Pelvic Floor Team at Cox!

Lydia Holland, DPT – Phone (417) 269-5500 – now treating female urinary incontinence, prolapse, and pelvic pain at The Meyer Center in Springfield.

Allison Thomas, PTA – Phone (417) 269-5500 – assisting Lydia with treatment of female urinary incontinence and prolapse at The Meyer Center in Springfield.

Crystal Warren, PT, CAPP-pelvic - Phone (417) 730-5500 – now treating male, female, and pediatric urinary incontinence, incomplete bladder emptying, prolapse, and pelvic pain at Cox Ozark Therapy Services in Ozark, MO.

Brittany Ernst-McVeigh, DPT – Phone (417) 269-3177 – will be available starting in July 2019 to treat female urinary incontinence and prolapse at Cox North in Springfield.

PT Assessment

1. Postural/lumbar/SI assessment/general MMT as needed.
2. Pelvic Floor External/visual inspection
 - vagina and rectum should not be gaping, check for episiotomy scars and hemorrhoids, should see visible lift of pelvic floor with contraction (at least a 3/5)
3. Pelvic Floor Internal Assessment
 - vaginal or rectal; assess strength, pain, muscle tone, prolapse
 - “Perfect” scale (see next slide):

PT Assessment (cont.)

3. “Perfect” scale (cont):
 - Power (use strength grades)
 - 0 = no discernible PFM contraction
 - 1 = a flicker or pulsation – very weak contraction
 - 2 = weak contraction, increase in tension of muscle but no discernible lift or squeeze
 - 3 = moderate contraction, will feel a “squeezing” on the finger
 - 4 = good contraction – elevation of posterior vaginal wall against resistance
 - 5 = strong contraction – will have difficulty removing finger

PT Assessment (cont.)

3. “Perfect” scale (continued):
 - Endurance (contraction is timed up to 10 seconds)
 - Repetitions (how many endurance contractions can they perform)
 - Fast (how many quick contractions can they perform)
 - Elevation (observe lift of pelvic floor)
 - Co-contraction (can they contract pelvic floor and transverse abdominis together)
 - Timing (have patient cough and watch contraction of pelvic floor)

PT Intervention

Pelvic Floor Re-training

- Specific contraction of the pelvic muscles is the most direct treatment. Focus on quick twitch ability (works the urogenital diaphragm), sustained contraction (works the levator ani group), and sub-maximal training for most global results.
- Watch for substitution patterns from abdominals / gluteals / adductors, or valsalva.
- Work in multiple positions. When able, add in pelvic floor contractions with functional activities (squatting, etc)

PT Intervention (cont.)

- Add in pelvic floor synergistic training (coordination of pelvic floor with transverse abdominis and multifidi (interestingly, many women with UI are unable to coordinate these 3 muscles)
 - Deemphasize use of rectus abdominis at least initially because this is shown on real time ultrasound to have a downward force on the bladder.
- Teach proper breathing patterns alone and in conjunction with PFM activity.

PT Intervention (cont.)

Assisted Pelvic Muscle Exercise

Because of the close interrelation of the muscles of the pelvis, common attachment of the arcuate tendon, and overflow principles, any exercise incorporating hip rotation or adductor contraction should elicit pelvic floor activity on Emg, thus strengthening and adding appropriate tension through the pelvic region, to assist in incontinence.

PT Intervention (cont.)

- Biofeedback
 - Use to assist in teaching appropriate contraction (uptraining) and rest (downtraining)
- Electrical Stimulation
 - Studies show E-stim effective in muscle training, but not as successful in long-term management of incontinence. May be helpful especially for neurogenic incontinence
- Nutritional Education
 - Bladder/bowel diaries; education on dietary irritants, improving amounts of water/fiber ingested
- Physiologic Quieting (Relaxation)
 - Because the ANS plays such an integral role, techniques to normalize it's influence can be very beneficial. Diaphragmatic breathing, visualization of hand warming, and segmental relaxation can all help to achieve

PT Intervention (cont.)

- Manual Therapy to reduce muscle spasm
 - Intravaginal/Intrarectal massage and trigger point release
 - Visceral mobilization (requires further specialized training)
- Modalities to reduce pain
 - Moist heat
 - Cold packs
 - Interferential stimulation
 - Ultrasound

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