Pelvic Floor Overactivity: Definition and Pathophysiology

Anna Padoa, MD
Urogynecology and Pelvic Floor Service
Assaf Harofeh Medical Center

WS # 24 – The Overactive Pelvic Floor
**Definition of “overactive pelvic floor muscles”**

- 2005 report from the Pelvic Floor Clinical Assessment Group of the ICS:

  “A condition in which the pelvic floor muscles do not relax, or may even contract when relaxation is functionally needed, for example during micturition or defecation”.

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Pelvic Floor Muscle Anatomy

Superficial layer:
superficial transverse perineal, bulbospongiosus, and ischicavernosus muscles

Intermediate layer:
perineal membrane, or the urogenital diaphragm

Deep muscular layer:
pelvic diaphragm-ischiococcygeus muscle and the levator ani muscle group.

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Innervation of pelvic floor muscles

- The somatic efferent (motor) nerve fibers:
  - 2nd to 4th sacral nerve (S2-S4). Separate branches from the sacral plexus supply the levator ani (S3-S4) and coccygeus (S3-S4) directly, pudendal nerve (S2-S4).

- The autonomic nervous system (viscero-motor) innervations to the pelvic floor:
  - Sympathetic innervation: thoracolumbar region (T10-L2).
  - Parasympathetic innervation: sacral spinal segments (S2-S4).
Pelvic Floor Functions

1. Support of pelvic organs
2. Continence and evacuation of urine and stool
3. Sexual function and childbirth
4. Influencing spinal stability, body posture and breathing
Pelvic Floor Muscle Function

- The pelvic floor muscles work as a functional unit and normally contract simultaneously as a mass contraction.

- Pelvic floor muscle types:
  - 70% type I (slow twitch) – postural and supportive role
  - 30% type II (fast twitch) - necessary for closure of these pelvic openings
‘Tonic’ and ‘phasic’ pelvic floor muscle activity

- ‘Tonic’ activity: the striated urethral and anal sphincters and the levator ani (although not at all sites) demonstrate constant baseline activity

- ‘Phasic’ activity: occurs due to voluntary contraction or reflex activation, for example, in response to postural disturbances or increases in intra-abdominal pressure
Pathophysiology

- OPF implies a physical state of heightened activity within the pelvic floor muscles
- Co-morbid conditions involving different body systems can be present with symptomatic manifestations involving urinary, anorectal and/or sexual dysfunction, genital/pelvic pain and psycho-emotional distress
- Individuals with OPF: commonly found to present with pelvic floor muscle hypertonicity from other sources, most notably myofascial trigger points.
- Recognizing the various potential sources of pelvic floor muscle hypertonicity is particularly important for identifying the specific pelvic floor impairments affecting individuals with OPF, and designing tailored treatment interventions

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‘Muscle tension’: a type of muscular activity that is unintentional. This is amenable to voluntary control with training (e.g., through biofeedback assistance) and may arise from psychological distress or anxiety, overload from sustained contraction or repetitive activity, and/or inefficient use of muscles.
Etiologies of OPF

- Chronic pelvic pain
- Psychological distress
- Psychosocial and psychosexual disturbances
- Abnormal behavior/pattern of pelvic floor muscle use
- Direct trauma or pathology
- Postural abnormalities
Chronic pelvic pain

- OPF has been found to be a physical hallmark of several different conditions involving CPP, an “idiopathic pain disorder” (IPD) which has two primary pathways of vulnerability, both mediated by genetic and environmental/social factors, that underlie its development:
  - Pain amplification
  - Psychological distress.

- Noxious stimuli occurring over a prolonged period of time cause up-regulation of nociceptive system function, which leads to dysregulations in both the peripheral and central mechanisms of sensory and pain processing.
Chronic pelvic pain

Mechanisms responsible for the up-regulation of nociceptive nervous system components:

- **Peripheral sensitization:**
  1. Sensitization of peripheral nociceptors
  2. Activation of ‘silent’ nociceptive afferents
  3. Conversion of myelinated afferents, such that they adopt the properties of nociceptive fibers

- **Central sensitization:**
  - Up-regulation (sensitization) of the dorsal horn of the spinal cord. Consequences of nociceptive system up-regulation:
    1. ‘hyperalgesia’
    2. ‘allodynia’

- **Neuropathic reflexes:**
  1. “neurogenic inflammation”.
  2. “viscero-visceral hyperalgesia”.

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Pathophysiology of myofascial trigger points

- **Trigger points:**
  Hyperirritable spots in skeletal muscles, associated with palpable nodules in taut bands of muscle fibers

- **Taut band:** A group of tense muscle fibers extending from a trigger point to the muscle attachments,

- **Pathophysiology:**
  - Excessive release of acetylcholine at the neuromuscular junction,
  - Injury to the sarcoplasmic reticulum
  - Release of ionic calcium
  - Sarcomere contraction,
  - Spontaneous electrical activity
Psychological distress

Psychological distress is thought to play a role in triggering and/or perpetuating CPP, and consequently OPF.

Fear-avoidance model (FAM) of chronic pain:

A conceptual model that explains how negative pain-related cognitions and maladaptive behavioural responses contribute to the development and maintenance of chronic pain. The fear of pain, combined with pain-related anxiety and hypervigilance to pain, leads to defensive behaviours, notably muscular reactivity/contraction, in the presence of a painful stimulus or in the anticipation of pain.
Psychological distress

Conditioned response to stress of any origin

- Correlation: salivary cortisol level, EMG activity, and muscle tension in TMJ disorder.
- Psychological, sexual, social
- Anxiety, guilt, emotional trauma
- Abuse, violence, fear of pain during intercourse, fear of disease
- Poor childhood experience, over rigid parents…

Tosato JP, 2015
Psychosocial and psychosexual disturbances

- A history of traumatic experience may lead to OPF, especially if the events occur repeatedly or if the person ‘re-lives’ the experiences through, for example, flashbacks or nightmares.

- The pelvic floor muscles are reactive to threatening images alone. These muscles demonstrate reactivity to experienced sexual trauma or abuse.
Abnormal behavior/pattern of pelvic floor muscle use

- Dysfunctional voiding and/or defecation can result from improper learning of these control mechanisms.
  - Paradoxical anal contraction at defecation (fear of pain)
  - Holding PF muscles to avoid UI (fear of bladder leakage)
Direct trauma or pathology

- Both obstetric injury and pelvic surgical procedures, have been reported to result in painful and hypertonic pelvic floor muscles.

- Organ pathology
  - Infection
  - Rec-UTI, PI-IBS, vulvovaginitis, prostatitis, yeast infections…
  - Endometriosis, lichen sclerosis
  - Surgical procedures
  - Stitches in muscles, mesh, nerve entrapment, adhesions…..

- Resulting anatomical disruptions within the pelvic floor, including tissue adhesions and imbalances between the right and left pelvic floor may lead to OPF
Postural abnormalities

- Any ongoing postural abnormality in the region of the spine, pelvis and/or lower extremities can contribute to the development of pelvic pain and/or OPF.
  - 75% of CPP patient after failed gynecological and psychological tx have faulty pelvic position.
  - Short leg, pelvic tilt…..
  - Poor surgical position
Main references


