Interface between the Fascial System and the Fluid System

The Junctional Areas

Boyd R. Buser, D.O., FACOFP

AAO Convocation

March 2013
Today’s Presentation

• Resp./Circ. Concepts (Dr. Zink’s perspective)
• Thoracic Inlet
  – Effects of somatic dysfunction
    • Biomechanical
    • Respiratory/Circulatory
• Thoraco-abdominal Diaphragm
• Urogenital-Pelvic Diaphragm
Osteopathic Medicine

A.T. Still - Effect of somatic system on movement of air and fluids in the body
Historical Perspective

- D.D. Palmer - Effect of spinal misalignment on nerve function
“The rule of the artery must be absolute, universal and unobstructed, or disease will be the result.” - Autobiography
“The osteopathic physician’s foundation is that all the blood must move all the time in all parts to and from all organs.”

*Research and Practice*
“We strike at the source of life and death when we go into the lymphatics.” - Philosophy of Osteopathy
“A full and complete supply of arterial blood must be generated and delivered to all parts, organs, and glands, by the channels called the arteries. And when it has done its work, then without delay the veins must return all to the heart and lungs for renewal.”

*Philosophy of Osteopathy*
This diaphragm says, “By me you live and by me you die. I hold in my hand the powers of life and death, acquaint now thyself with me and be at ease.”

Philosophy of Osteopathy
Respiratory/Circulatory Concepts

• Significance of somatic dysfunction determined by effect on movement of air and fluids
Circulatory Systems

• “High pressure”
  Arterial

• “Low pressure”
  Venous and Lymphatic
Somatic Dysfunction

Distortion of Thoraco-abdomino-pelvic (TAP) Cylinder
Distortion of TAP Cylinder

Decreased Diaphragmatic Amplitude
Decreased Diaphragmatic Amplitude

Decreased Thoracoabdominal Pressure Gradient
Decreased Thoracoabdominal Pressure Gradient

Passive Congestion of Venous and Lymphatic Systems
“An increase in diaphragmatic amplitude increases the thoracoabdominal pressure gradient, whereas a smaller amplitude decreases the gradient.” (Ganong, *Medical Physiology*)
Passive Congestion of Venous and Lymphatic Systems

Build-up of Waste Products of Cellular Respiration
Build-up of Waste Products of Cellular Respiration

Compromise of Cellular Environment
Compromise of Cellular Environment

Suboptimal Function of Self-healing Properties
Respiratory/Circulatory Evaluation

• History
  – Vague sense of malaise
  – Morning headache or backache that disappears with activity
  – Non-restorative sleep
  – Normal lab evaluation
Respiratory/Circulatory Evaluation

• Physical Exam
  – Increased lumbar lordosis
  – Shallow breathing with increased rate
  – Excessive upper thoracic motion with respiration
  – Decreased diaphragmatic amplitude
  – Presence of “passive congestion”
Sites of “passive congestion”

- Achilles tendons
- Popliteal fossa
- Lateral thighs
- Inguinal region

- Axillary folds
- Supraclavicular area
- Suboccipital area
- Epitrochlear area
Common Compensatory Pattern

• A model developed by J. Gordon Zink, D.O., focusing on fascial distortion and somatic dysfunction, and its effect on the respiratory/circulatory systems of the body.
Fascial pattern in CCP
Common Compensatory Pattern (Spinal)

Apex of Curve: Maximum Rotation

Transition Area: Sidebending Cross-over Point

Transition Area

Axial Symmetry

Apex of Curve: Maximum Rotation

SACRUM

L5 S LR

T12 S R L

T11

T10

T9

T8

T7

T6

T5

T4

T3

T2

T1
Significance of CCP

- Creates framework for interpretation of the significance of “asymptomatic” somatic dysfunction
- Organizes a regional examination
- Directs attention to spinal transitional areas
Significance of Spinal Transitional Areas in CCP and Resp./Circ. Model

• Areas of crossover points of compensatory curves
• Areas of change of anatomical characteristics
• Areas of changes of motion characteristics
• Areas of mechanical stress
• Associated with diaphragms
Superior Thoracic Aperture
(Thoracic Inlet)

- Bony boundaries are T1, first rib, and manubrium
- Forms a “stable bony ring”
- Supports head and neck; creates a “platform” of support for cervical spine
- Provides “anchor” for upper extremity, as the sternoclavicular joint is the only bony attachment of the upper extremity to the axial skeleton
Contents of Thoracic Inlet

- Viscera
- Vascular Structures
- Nerves
- Connective Tissue
  - Sibson’s fascia
Thoracic Inlet

- T1, first rib, and manubrium form a “stable bony ring”
Implications of “stability”

- Somatic dysfunction, especially abnormalities of position and motion, directly affects cervical spine, thoracic spine, and upper extremity.
“Stable bony ring”

- Demand for stability met by atypical anatomical and biomechanical features
- First rib is short, broad, and flat
- Posterior attachment to T1 only
- Anterior attachment to sternum is via a synchondrosis
• First rib is short, broad, and flat
Typical Thoracic Vertebra
T1

- Has single whole costal facet for articulation with the first rib.
Concept of “thoracic base”
Biomechanical perspective

• Coronal plane distortion leads to compensation in C-spine
• Transverse plane distortion may affect upper extremity motion
• Sagittal plane distortion may affect C-spine, thoracic spine, and upper extremity (NVCS)
Sibson’s Fascia

- Located between the transverse processes of C7 and the front of the internal borders of the first ribs
- Covers the cupulae of the lungs and forms the innermost lining of the scalene muscles
- Acts functionally as a cervicothoracic diaphragm for the maintenance of pressure gradients between the cervical area and the thoracic cavity
The thoracic inlet may affect movement of venous blood and lymph by (at least) two mechanisms

- Effect on pressure gradients in the thoracoabdominopelvic (TAP) cylinder
- Adnexal impingement of vascular structures passing through the aperture
Thoracic Inlet Diagnosis

- Infraclavicular parasternal area
  - Convexity vs. concavity
- Costotransverse articulation of T1/first rib
HVLA Treatment

- 2 maneuvers for typical dysfunction

Sidebending

Rotation
Other techniques for diaphragms utilizing pressure gradients

- Pectoral traction
- Diaphragm doming
- Urogenital-pelvic diaphragm treatment
Pectoral Traction

a. The patient is supine, knees raised, and feet flat on the table.
b. The physician is seated at the head of the table, and using the index, middle, and ring fingers of both hands, grasp the patient's anterior axillary folds, penetrating deeply to reach both the pectoralis major and minor.
c. Traction is applied superiorly to stretch the muscles and the deep underlying fascia in the axillary spaces.
d. The patient is instructed to take a deep breath and cough (unless contraindicated), while the physician applies traction.
e. This may be repeated several times, the physician "taking up the slack" after each cough.

This treatment increases the A-P diameter of the thorax and improves venous and lymphatic drainage plus releasing tension in the clavipectoral fascia.
Lower Thoracic Lymphatic Pump: “Diaphragm Doming”

1) The physician stands at the side of the supine patient, facing the patient.
2) The physician's hands contact the patient's lower lateral rib cage.
3) As the patient exhales, the physician's hands augment the medial motion of the lower ribs.
4) The patient is instructed to inhale. As the patient inhales, the physician resists the lateral movement of the lower rib cage.
5) As the patient reaches the height of inhalation, the physician's hands are suddenly removed from the rib cage, causing an in rush of air.
6) The technique may be repeated 2-3 times.
Urogenital-Pelvic Diaphragm

Pelvic myofascial release by separating the ischial tuberosities

a. The patient is placed in the prone position.
b. The patient's knees are flexed and placed together, the thighs internally rotated (so that the feet and legs are directed laterally).
c. Using both hands, the physician places the pads of his thumbs medial to the patient's ischial tuberosities and applies firm lateral pressure.
d. The patient is instructed to cough, unless contraindicated, and, while doing so, pressure is maintained to spread the tuberosities laterally.

This procedure may assess and improve the function of the urogenital and pelvic diaphragms through generation of pressure gradients.