ANATOMY
Part 1 The female pelvis

Uterine Size during Pregnancy & after Birth
Basics on the Pelvis

Function

- Transmits the body weight from spine to legs and down
- Very strong thick bone to take this mechanical loading
- Forms a strong stable ring
- Baby's head must pass through the central space for birth

Bones

- Two hip bones and the sacrum plus coccyx ('tail bone')
- Hip bones - blade part (ilium), 'sitting bone' part (ischium) and pubic part (pubis).

Joints

- Sacro-iliacs – synovial, but designed for only very slight movement
- Reinforced by very strong ligaments front and back
- Pubic symphysis (cartilage joint) - bone ends held together by cartilage

Variations in shapes of pelvis

- Spectrum of shapes between males and females, and between females
- Relatively easy to distinguish between shapes
- External measurements are not important in childbirth
- The shape and size of the central space is what counts
- Bony pelvis is lined inside with muscles and soft tissue, blood vessels etc.
The Female Pelvis

The female pelvis differs from male in shape and number of joint sacro-iliac surfaces. The female pelvis has a larger, rounder outlet for childbirth and the hip sockets are set wider. The sacro-iliac joint surfaces are shallower and only articulate at S1,2 not 3. This all allows for greater movement and greater potential for SI pain caused by imbalance or too much mobility during pregnancy and weight bearing on one leg or sit bone, or lying exclusively on one side at night, childbirth or carrying baby on one hip.

The female pelvis varies considerably in shape. The four main types are gynaecoid, anthropoid, android and platypelloid. These variations are not due to disease but to heredity and racial characteristics and can influence the manner in which labour progresses.

Gynaecoid Pelvis 50%

This is the most common female pelvis. The brim is round. The pelvis is shallow. The subpubic angle is wide. The sacrosciatic notch is wide. The transverse diameter of the outlet is 10 cm at least.

Effect on labour: Usually a straightforward labour & birth. The head engages in the brim in the transverse diameter or in an occipitoanterior position and the labour is normal.

Anthropoid Pelvis 24%

Resembles the pelvis of the ape. The brim is oval. Increase in the anteroposterior diameter. Decrease in the transverse diameter. The sacrum is long and narrow.

Effect on labour: Can hinder engagement of the fetal head. The head may engage in the anteroposterior diameter sometimes with the occiput posterior, which may lead to face to pubes presentation. This pelvic shape is noted in tall well-built women. Generally the pelvis is so large that the labour is easy.
Android Pelvis 20%

This resembles the male pelvis.
The brim is triangular.
The true pelvis is deep.
The sacrum is straight.
The subpubic angle is narrow.
The sacrosciatic notch is narrow.
The transverse diameter of the outlet less 10%.
The pelvis may be funnel shaped.

Effect on labour: The head may engage in the transverse or occipitoposterior position. The descent of the head through the pelvis may be difficult and can cause deep transverse arrest during second stage labour. Owing to the narrow subpubic angle the head may be forced back causing lacerations to the perineum.

Platypelloid Pelvis 6%

Simple flat pelvis. Rare.
The anteroposterior diameter is short.
The sacrosciatic notch is narrow.
The narrowing of the pelvis continues in the cavity and the outlet.
Os pubis often 1cm thicker.

Effect on labour: The head will engage in the transverse diameter of the brim. Often marked entering pains. Labour may take very long. Rotation of the head may be restricted causing deep transverse arrest.
Pelvic Ligaments

These diagrams show how the hip bones and sacrum are connected by very strong ligaments.
(Diagrams from Anatomy of Hatha Yoga by H. David Coulter)
The 3 circles through which the baby passes

1. Superior opening = largest at the top, measured by health professionals, from the pubis to the sacrum and side to side between the iliopectineal lines at the same level.
2. Middle opening = ischial spines side to side, from half way up the pubic symphysis to the sacrum at the back level with S3-4. The pelvic diaphragm attaches to this rim.
3. The inferior opening = from coccyx at back to lower edge of pubic symphysis at front, side to side to the lower edges of the ischia or sit bones.

The baby’s journey out is also affected by the shape of the pubic arch which can vary in width and height. It is of course also affected by the birthing mother’s positions and movements during during her labour.
ANATOMY PART 2

Muscles of the back & abdomen

Basics of deep muscle structure

Layers of muscle supporting the back
- Contrast between superficial, intermediate and deep muscles
- Importance of intermediate bracers
- Deep muscles are key to perinatal yoga. Of especial significance are the quadratus lumborum and the Psoas.
- Importance of Poas. Runs through the pelvis, and acts as a hip flexor. Is also thought to hold the deepest levels of our emotional and postural histories (cf. Liz Koch The Psoas Book)

Layers of muscle supporting the abdomen
- Superficial. External obliques.
- Deep. Lower portion of rectus, and Transverse abdominis.

Breath and muscle
- Yoga asanas with breath awareness can lengthen and release tension in the muscles
- Stretching on the exhale promotes lengthening and release.

Front, back…
- Movement of the breath, in particular, the complete exhale, promotes a strengthening and energizing of the deep layers of muscles supporting the back.

and below
- Movement of the breath promotes a strengthening and energizing of the pelvic floor muscles
The Vertebral Column
The muscles of the back: superficial layers
The muscles of the back: deep layers
The muscles of the back: intermediate layers
The Posterior Abdominal Wall: internal view
Muscles of the anterior abdominal wall

- The external + internal oblique + transversus work together to:
  - Compress abdominal contents during urination, defecation and childbirth
  - Resist ‘sway’ back
  - Help to support the upper body, contributing to bending and twisting
The Psoas (or iliopsoas) muscle

Diagram from The Psoas Book, by Liz Koch

The psoas passes through the pelvis, over the hip joint and attaches to the inner side of the femur.

The ilacus is fan-shaped, lining the inside of the pelvic basin and attaching via the same tendon as the psoas to the top of the femur.

Functions

Hip flexor, supporting the free swing of the leg when walking. Transfers weight from the trunk into the legs and feet. A guide wire (like guy ropes that support a tent pole) that stabilise the spine.

Pregnancy and the psoas

A shortened psoas muscle reduces the internal space available for the abdominal contents, including the uterus and the growing baby.

Fear is sensed through the psoas muscle. Fear causes the psoas muscle to contract and releasing the psoas muscle can help release old fears.

Benefits of releasing the psoas in pregnancy

It gives the baby more room. It can relieve back pain and sciatica. It may help a baby's journey through the birth canal as a released psoas encourages the hip bones to open and can aid the downward flow of energy. It may promote spontaneous labour, helping to prevent the need for induction of an "overdue" baby.
Quadratus Lumborum

Diagram from *The Muscle Book* by Paul Blakey

Action:

Lateral flexion (side bending) of lumbar vertebrae, depression of twelfth rib, assistance of diaphragm in inspiration.

T12 is an area of great importance because:

- Psoas first inserts here
- Diaphragm lowest fibres here, therefore link with breathing
- Quadratus lumborum inserts here
- Trapezius muscle attaches here and moves up
- Uterus reaches this level by mid pregnancy
ANATOMY PART 3

The Pelvic Floor

several muscles together form the pelvic floor

THE PERINEUM DURING DELIVERY

The underlying muscles of the pelvic region shown as the baby’s head emerges:

a. Baby’s head emerging through the vagina
b. Pubic bones
c. Perineum
d. Anus
e. Muscles of the pelvic region

the pelvic floor muscles have a “sling” effect supporting the organs inside the pelvis

the pelvic floor is stretched and slightly damaged even in the easiest of labours
Female Perineum and Urogenital Diaphragm

- Bulbospongiosus muscle with deep perineal (investing or Gallaudet's) fascia partially removed
- Superficial perineal space (pouch or compartment)
- Ischiopubic ramus with cut edge of superficial perineal (Colles') fascia
- Perineal membrane
- Ischial tuberosity
- Sacrotuberous ligament
- Gluteus maximus muscle
- Ischioanal fossa
- Urethra
- Sphincter urethrae muscle
- Perineal membrane (cut and reflected)
- Compressor urethrae muscle
- Sphincter urethrovaginalis muscle
- Vagina
- Deep transverse perineal muscle
- Greater vestibular (Bartholin's) gland
- Perineal membrane
- Bulb of vestibule
- Bulbospongiosus muscle (cut away)
- Ischiocavernosus muscle
- Bulb of vestibule
- Perineal membrane
- Greater vestibular (Bartholin's) gland
- Bulbospongiosus muscle
- Perineal body
- Superficial transverse perineal muscle
- Obturator fascia
- Tendinous arch of levator ani muscle
- Inferior fascia of pelvic diaphragm (cut)
- Levator ani muscle
- External anal sphincter muscle
- Anococcygeal (ligament) body