Pregnancy in the Foot and Ankle

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Disclosure
Objectives

- Discuss various pathology in the foot and ankle present during pregnancy
  - Systems approach
- Discuss newborn pathology
Childbirth

- childbirth is the process whereby an infant is born.

http://en.wikipedia.org/wiki/Pregnancy
Why?

- Prevention
- Map for infant disease detection
- Comfort

- 31% of postpartum women complained of foot pain during pregnancy. (Ponnaapula)
Problems

- Over pronation!
- Plantar fasciitis
- Metatarsalgia
- Tendon issues:
  - PT, Achilles, Peroneals
- Tarsal Tunnel Syndrome
- Neuropathy
- Ingrown toenails
- Leg Cramp Syndrome
- Bunion deformities*

*Neuropathy and bunion deformities are often associated with conditions like diabetes.
Dermatological

Nails
Pigmentation
Pruritis
Nails

- Increased toenail curvature (Block et al, Ponnapula)
- Mechanical pressure from restrictive shoes? (Heifetz)
- Coarsening of nail texture
  - Nutritional insufficiency
    - Fetal diversion of nutrients/metabolic (Payne)
- Faster fingernail growth
  - Hormonal influenced increase in peripheral blood flow. (Hewitt et al)
Pruritus
(58%) Shivakumar
Xerosis, eczema, atopic eruption, lichen planus, scabies or tinea.
Fetal manifestations
PE, Hx, labs, ?biopsy
Pigmentation

- 46-90%
  - Influx of progesterone, estrogen and melanocyte stimulating hormones. (Winton)
  - Influx of melanin in epidermal basal cell layer (Eudy) estrogen receptors on melanocytes!
  - Predominance with darker skin tones
  - Typically self resolving.
  - Hydroquinone or dexam cream (Erricksen)
Vascular

Hyperhydrosis
Edema
Varicosities
Hyperhidrosis

- Estrogen and progesterone induce thermoregulatory alterations
  - Eccrine, adrenal activity increases
- Thyroid hyperactivity
  - Iodine deficiency → thyroid hypertrophy
  - Yields hyperhidrosis (Pannapula)
- 40%
  - 55% of these—pruritus → fungal colonization
Edema

- Greatest effect in 3rd trimester
- Multimodal: mechanical, hormonal.
Edema

- Gravid uterine pressure of pelvic and femoral vasculature increases hydrostatic pressure yielding dilation of veins and valvular dysfunction. (Parmley)
- Hormonal: NO (vessel engorgement); corticotrophin/estrogen: third spacing (Dorup)
Edema

- Pathologic edema: preeclampsia
- Relieving factors
  - LLD, elevation, TED hose.
Varicosities

- Up to 40% (Winton)
- Vessel distension and fragility
  - relaxin
- Angiogenic growth factors
- Advancing age
  - Increased collagen disorganization
  - Vessel
Neurological

Compression neuropathy
Radiculopathy
Tarsal Tunnel Syndrome
Neurological

- 43% report tingling, burning or numbness.
- 88% of these with ankle edema. (Ponnopula 2010)
Mechanical component?

- Compression neuropathy
- Level?
- Radiculopathy
Neurological

- **Tarsal Tunnel Syndrome (tibial nerve compression)**
  - carpal tunnel has been found affecting 35-62% (Mabie 2005), often in last tri (Padua 2001)
- Earlier onset yields higher post partum symptoms at 1y. (Padua 2002)
Musculoskeletal

Factors 2/2:
Weight gain
Biomechanical influences.
Hormonal influences
Weight Gain

- Goals:
  - Normal BMI: 25-35 lbs
  - Low BMI: up to 40lbs
  - High BMI: as low as 9 lbs.

- Body weight increases forces through extremities

Biomechanics of gait

- Additional weight in the torso has immediate effects such as:
  - Lordosis
  - posterior upper body tilt
  - sagittal tilt of the pelvis (Franklin)

- Foti and Bagley: anterior pelvic tilt
  - increased a mean of 4 degrees during pregnancy (range, -10:13).
  - increased demand placed on hip abductor, hip extensor, and ankle plantar flexor muscles during walking.

- weight bearing stance was found to be 30% wider (Bird).
Widened gait, >pronation?

- wider step width, and mediolateral ground reaction force tended to be increased in a medial direction.

Endocrine influence

- Progesterone
- Relaxin
Relaxins?
Relaxin

- Increases water content in ST,
- Activates fibroblasts.
- 10 fold surge during pregnancy
- Collagenolytic
- Increases joint flexibility (Zarrow)
  - Rhesus
Relaxin

- Sex hormone receptors have been found within human and rabbit tendons (Sciore)
- Relaxin induced cartilage and bone erosion (O’Byrne)
- Spring ligament and TP attenuation/laxity=1cm lowering of talar head. (Nyska)
- Alvarez: no sig changes measured pre to post, changes thought to be volumetric. (Alvarez)
Serum Relaxin Concentration

- Relaxin has been associated with increased knee joint laxity and decreased anterior cruciate ligament (ACL) strength in animal models. (Dragoo)
- Blecher and Richmond reconstructed ACL 2 months prior to conception. Laxity marked at near parturition, resolved 2 months post partum (1998).

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Recommendations

- TED hose prior to edema! ?mid 2nd trimester.
- Orthotics: comfort versus preventative—early!
  - BMI?
- Sensible shoes
References

- Sciore P, Frank CB, Hart DA. Identification of sex hormone receptors in human and rabbit ligaments of the knee by reverse transcription-polymerase chain reaction: evidence that receptors are present in tissue from both male and female subjects. J Orthop Res. 1998 Sep;16(5):604-10.


caveat

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Thank you

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