Prevalence and Pathogenesis of Pregnancy- and Childbirth- related Pelvic Floor Dysfunctions : Preventive Urogynaecology?

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Strong Pelvic Floor After Childbirth?

The complete protection of the perineum has undoubtedly remained a weak spot in our art.

Ferdinand AMF von Ritgen, 1855.

German obstetrician (1787-1867) who described the *Ritgen maneuver*: Delivery of a child's head by pressure on the perineum while controlling the speed of delivery by pressure with the other hand on the head.

Background

- **NORMAL** childbirth damages the pelvic floor especially when non-evidence based and potentially harmful obstetric practices are used during labor.

- Pelvic floor health has a WIDER definition than normal urinary and fecal control, integrity of pelvic organ support and sexual health that includes the drive towards safer and less traumatic childbirth.

- Therefore, this topic includes prevention of child birth-induced support-related pelvic floor dysfunctions such as pelvic organ prolapse [POP], stress urinary incontinence [SUI] and fecal incontinence [FI].

Prevalence

- The relative risk of having pelvic floor dysfunction during pregnancy and puerperium is 10.8!

- The odds of levator muscle trauma increase by 10% for each year of delayed child bearing and is identified on postpartum imaging in 20-40% of primiparas.

- After the **FIRST** vaginal birth:

  1- 52% have some degree of anterior vaginal prolapse, 24 % have evidence of POP on examination after 12 years and 14.6% have symptoms of POP after 20 years.

  2- 26% develop SUI.

  3- 4-25% suffer from FI in the postpartum period.

PATHOGENESIS
I- Direct Injury

- Direct injury to the pelvic floor MUSCLES significantly contributes to weakness of supportive function and development of support-related pelvic floor dysfunctions.

- Spontaneous perineal lacerations commonly occur at vaginal delivery particularly in primiparous women .

- Occult or recognized anal sphincter disruption is also possible with subsequent FI in 50 % of cases.

PATHOGENESIS
II-Indirect injury

- Over the last two decades, neuro-physiological and experimental research has revealed that vaginal delivery damages the pelvic floor muscles through mechanisms UNRELATED to traumatic disruption.

- During the second stage of labor, the pudendal nerve is **compressed** by the fetal head against the ischial spines.

- This subjects the nerve to a 33% increased strain causing entrapment neuropathy and partial de-nervation of the striated pelvic floor muscles.

PATHOGENESIS
II-Indirect injury

- In labor simulation computer and animal models, the fetal head and biomechanical labor forces produce a 3-fold increase in **stretch** and **compression** to the pelvic floor muscles during labor.

- This leads to muscle injury because the muscular tissue elasticity threshold observed in normal parturition is low.

- Straining during vaginal delivery also causes **traction** injury to the pudendal nerve similar to chronic constipation.

PATHOGENESIS
II-Indirect injury

- Indirect neural and muscular injuries are increased when:
  a- Labor dystocia is not detected and treated promptly (prolonged second stage, large-size baby).
  b- Aggressive maneuvers are used to expedite delivery such as manual compression of the uterus, dilatation of the vagina and excessive traction by the forceps or ventouse.

- *These obstetric interventions are still “endemic” in some Mediterranean countries mainly in rural communities and remote geographical areas.*

Episiotomy

- Episiotomy has been TRADITIONALLY performed by the obstetric providers to protect against direct trauma to the pelvic floor muscles during parturition.

- However, the value of this procedure is increasingly questioned by the urogynecologic community.

- There is associated postoperative morbidity of episiotomy ***in the absence of clearly-defined evidence for efficacy of preventing support-related pelvic floor dysfunctions and a higher risk of anal sphincter damage with the median approach.***

Episiotomy

- 4 years after the first delivery, there was NO difference in the prevalence of urinary incontinence, perineal pain or painful intercourse between restrictive versus routine **medio-lateral** episiotomy ***(Fritel et al, BJOG 2008;115: 247-252).***

- Logistic regression confirmed that a policy of routine episiotomy was associated with double the risk of anal incontinence compared to a restrictive policy (OR = 1.84, 95% CI: 1.05–3.22).

Episiotomy

- Episiotomy is PARADOXICALLY associated with decreased perineal muscle strength and performance during the postpartum period than spontaneous perineal lacerations because of greater tissue disruption.

- The optimum ratio between the length of episiotomy and the length of perineum as well the angle of medio-lateral episiotomy that can reliably predict minimal perineal damage is NOT known.

- *Episiotomy particularly the routine procedure is frequently performed in Mediterranean countries!*

Pregnancy

- There is high-quality data suggesting that pregnancy has a detrimental effect on pelvic floor support and that a *bona fide* effect of pregnancy CANNOT be excluded.

- The risk of SUI amongst women who had had elective cesarean was higher than that in nulliparous women representing a net effect of pregnancy itself ***(EPINCONT).***

- Repeated pregnancy has a negative cumulative influence on the pelvic floor similar to other pregnancy-induced disorders like diabetes mellitus and hypertension.

Pregnancy

- The exact mechanisms during gestation remain obscure but could be due to:
  a- Increased urine production.
  b- Degenerative changes in the autonomic innervation of the lower urinary tract.
  c- Mechanical pressure exerted by the gravid uterus.
  d- Elevated elastolytic activity with softening of the collagenous supports of the pelvic organs due to endogenous hormonal changes (progesterone, relaxin).
  e- Increased BMI.

- *The grand multiparity and total fertility rates have been constantly rising in some Mediterranean countries!*

Pelvic Floor Muscle Training

- There is strong contemporary evidence that pelvic floor muscle training [PFMT] during pregnancy or postnatal period can prevent SUI in late pregnancy or postpartum SUI and FI, respectively.

- There was a greater treatment effect following more intensive regimes but with smaller long-term benefits because of poor compliance.

- In a recent systematic review, pregnant women without SUI randomized to antenatal PFMT were 56% and 30% less likely than women with no PFMT to report SUI in late pregnancy and up to 6 months postpartum, respectively.

Pelvic Floor Muscle Training

- Postnatal women with persistent SUI 3 months after delivery who received PFMT were 20% less likely than women who did not receive PFMT to report USI 12 months after delivery.

- Women with postnatal FI who received PFMT were also about half as likely to report FI 12 months after delivery.

- *PFMT is RARELY practiced during pregnancy or after delivery because of modest appreciation of its value and inadequate human and physical resources in the Mediterranean region!*

Elective Caesarean Delivery

- Although cesarean delivery reduces the risk of pelvic floor trauma, it is NOT entirely protective.

- The debate is ONGOING as the evidence supporting this finding is mostly derived from ***small studies of heterogeneous cohorts with short-term follow up and different and/inconsistent definitions of incontinence.***

- Epidemiological studies implicate parity with SUI, FI, POP BUT the effect of mode of delivery is less clear.

Elective Caesarean Delivery

- Less pelvic floor damage occurs after elective but not necessarily emergency cesarean delivery.

- Elective cesarean delivery may prevent against direct trauma to the pelvic floor but not the effects of pregnancy or other indirect injuries.

- The most recent systematic review (2013): Inadequate, conflicting or inconsistent evidence not in favor of intervention **(Level D= No recommendation possible).**

Elective Caesarean Delivery

- 5-10 years after the first birth, the odds for POP after spontaneous vaginal birth is significantly greater (OR 5.6, 95% CI 2.2–14.7) than after elective cesarean and significantly increases further (OR 7.5, 95% CI 2.7–20.9) after instrumental delivery.

- After 12 years, women who had all births by caesarean are the least likely to have POP(OR 0.11, 95% CI 0.03–0.38) compared to spontaneous vaginal delivery.

- Symptomatic POP is more prevalent after vaginal delivery than caesarean (14.6 versus 6.3%, OR 2.55; [95% CI] 1.98–3.28) 20 years after the first birth but is not increased after acute versus elective caesarean.

Elective Caesarean Delivery

- In one study; the NNT for SUI was 8-9. However, the NNT was only 2 in women with short stature and an infant weighing more than 4000 g for SUI.

- In another study, 6.8 additional operative births or 8.9 spontaneous vaginal births relative to cesarean births would lead to one additional case of POP after 5 years.

- The NNT was very high (167) for FI in a third study.

Consequences: Increased Demand for Curative Urogynaecology

- In view of the increased risk of POP, SUI, FI following pregnancy and childbirth in Mediterranean countries, a growing demand for CURATIVE urogynecological services is anticipated.

- The need may be EVEN higher than the reported prevalence since the majority of patients in the Mediterranean region do NOT seek health care.

Preventive Urogynaecology?

- The most pragmatic and SHORT-TERM solution to restore the demand/supply equilibrium in Mediterranean countries may be to ***reinforce the preventive perspective of our urogynaecological practice.***

- The goal is to transcend across the novel and artificial subspecialty boundary in Obstetrics and Gynecology and pursue the time-honored public health idiom “prevention is better than cure”.

Recommendations

- Raise awareness amongst maternity care givers about childbirth-induced pelvic floor dysfunctions.

- Disseminate information about the safe and evidence-based practices in labor using the available and updated electronic literature resources (WHO Reproductive Health Library: Pregnancy and Childbirth, Care during childbirth. (http://www.who.int/rhl).

- Highlight the potential and independent adverse consequences of pregnancy on pelvic floor support.

Recommendations

- Communicate the categorical **prophylactic** benefits of **routine** PFMT during pregnancy and after delivery.

- Highlight the importance of capacity building of career champions in female pelvic floor physiotherapy backed up with modern equipment.

- Participate in rounds/audits of near-miss or extensive pelvic floor injuries sustained during childbirth and provide urogynecologic input and appropriate tertiary referral.

Recommendations

- Assume a greater responsibility in counseling about the risk of POP, SUI and FI after pregnancy and delivery to improve the health literacy of target pregnant population.

- ACTIVELY involve women to :
  1- Understand the mechanisms of pregnancy- and childbirth induced injuries.
  2- Self-manage their reproductive and birthing choices.
  3- Comply with prophylactic measures.
  4- Select appropriate treatment options for post-natal pelvic floor dysfunctions.

Recommendations

- Participate in public health education programs aiming to modify the potential life-style risk factors that increase the effect of pelvic floor trauma during labor such as constipation and obesity.

- Support government strategies and community outreach programs that promote women's education, emancipation, reproductive rights and engagement in childbirth-induced pelvic floor dysfunctions.

Conclusions

- Routine episiotomy is OBSOLETE because it does NOT decrease the risk of direct trauma to pelvic floor muscles.
- Pregnancy may be an independent risk factor for developing childbirth-related pelvic floor dysfunctions.
- PFMT during pregnancy or postnatal period can prevent SUI in late pregnancy or postpartum SUI and FI.
- The Urogynaecologist is the PERFECT women health care provider to lead public health efforts for reducing the burden and impact of childbirth and pregnancy-related SUI,FI, POP.

Key Messages

- 65% of incontinent women will recall that incontinence began either during pregnancy or after childbirth.

- The first vaginal delivery, especially at OLD age, is the time for the most significant pelvic floor damage .

- The potential BUT NOT YET PROVEN benefits of cesarean delivery for prevention of pelvic floor damage must be weighed against the potential morbidity for the mother and child.

Future Research

- **Accurate and reliable identification of women at risk:**

  a- Taking a detailed history in the antenatal clinic for pre-pregnancy SUI and POP and other demographic risk factors.

  b- Ultrasound or MRI measurement of urethral sphincter volume, bladder neck mobility and levator hiatus area during the third trimester.

  c- Genetic biopsy studies of collagen content, extracellular matrix proteins and genes involved in the function of muscular and connective support systems (Not possible during pregnancy).

  d- Measurement of joint hypermobility and striae (Not very predictive).

  e- Asian or Black ethnicity.

  f- Measurement of perineal length or anal position index in labour.

- **Studying the visco-elastic properties and deformation of pelvic floor supportive tissue at vaginal delivery**:

  a- 3-dimension computational biomechanical (finite) element models.

  b- Animal (rat) models of vaginal birth.

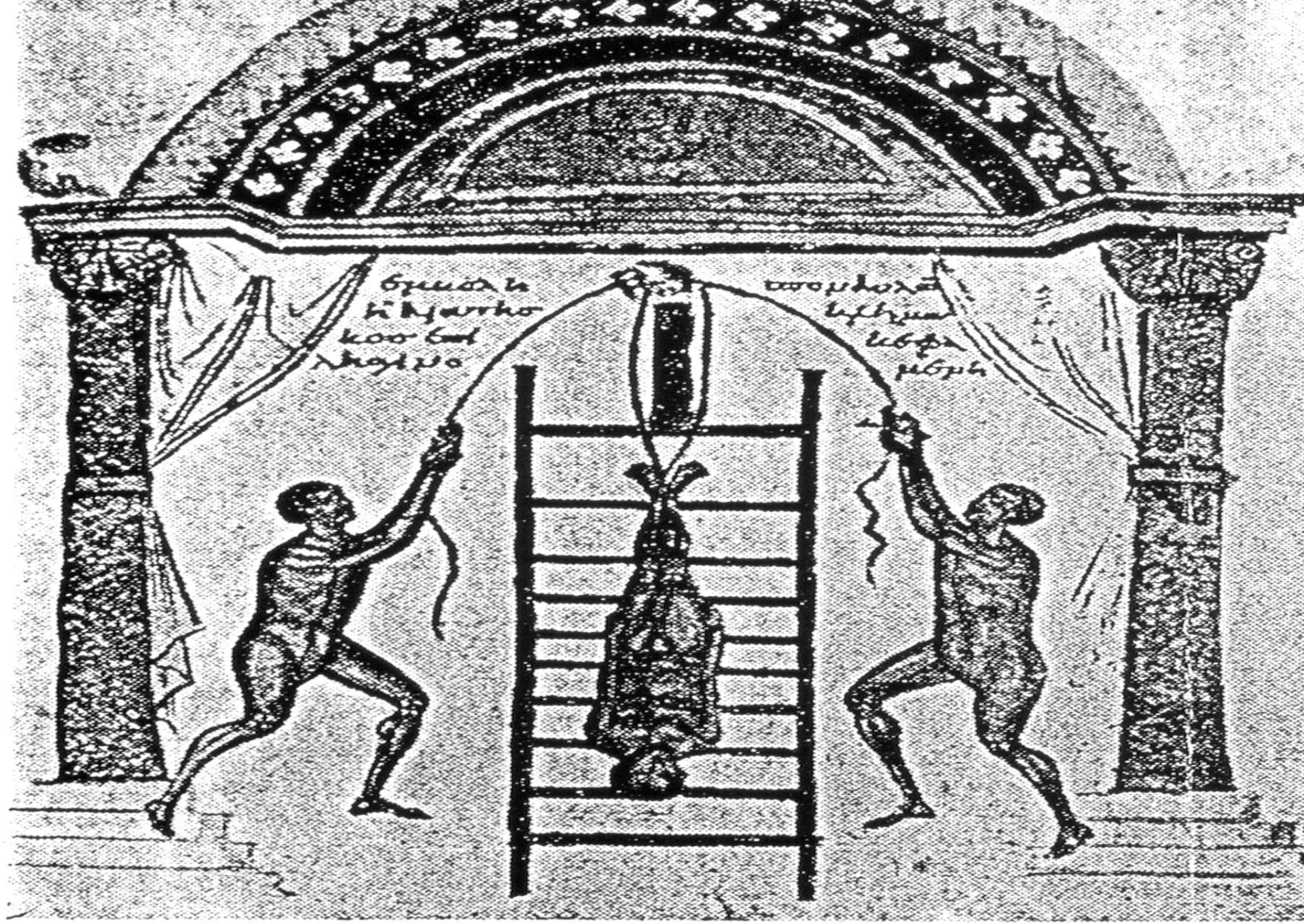

Fig. 1. Example of hippocratic succussion. (From Appolonius of Kitium.[2])