Second Stage Labor: Understanding Uterine Physiology and Best Pushing Efforts for Better Outcomes for Mom and Baby

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Objectives
- Describe the overall physiology of a uterine contraction and how the three p’s: the powers, the passenger and the passage work together to achieve complete dilation and expulsion.
- List two physiologic benefits of open glottis pushing for both mom and baby.
- State two ways to improve second stage labor support and initial steps to moving away from directed pushing on your labor and delivery unit.

Florence Nightingale

“I attribute my success to this: I never gave or took any excuse”
So Why Do I Care so Much About the Second Stage....

Defining the Second Stage

Two phases to the Second Stage

- **Phase I**: “the lull” or Latent phase: From complete dilatation until the urge to bear down
- **Phase II**: Active phase or pushing phase: From the onset of active pushing efforts to crowning of the presenting part
Defining the Second Stage:
Cardinal movements through the Curve of Carus (we will focus steps 2-4):

1. Head floating, before engagement
2. Engagement, descent, flexion
3. Further descent, internal rotation
4. Complete rotation, beginning extension
5. Complete extension,
6. Restitution (external rotation)
7. Delivery of anterior shoulder
8. Delivery of posterior shoulder

IHI May 2010 Second Stage Labor “Deep Dive”
- Lack of standardization of management of the length of the second stage of labor
- Inconsistent use of operative vaginal delivery bundle
- Fetal heart rate patterns are managed differently in the second stage than in the first stage
- Inadequate fetal monitoring in second stage
- Failure to rescue in the second stage
- Lack of documentation in second stage
Forces of the contractions

- It is dependent on the intense and complex interactions with the variables which make up the mechanical portion of variables, which are known as the three P's:
- The powers (contractions).
- The passenger and the passage. The powers and its companion the contraction work together to achieve complete dilation, but without the continuation the rotation through the birth canal.
- The passenger (fetus) will not be able to navigate the passage (birth canal).

Anatomy of the Uterus

- Fundus—rounded upper part superior to the entrances of the uterine tubes
- Body (corpus) — upper two thirds
- Isthmus—narrower area just above the cervix
- Cervix (neck) — cylindrical inferior part that projects into the superior vagina
Anatomy of Uterine Muscles

Uterine anatomy is comprised of three tissue layers

- **The inner layer**, called the endometrium, is the most active layer and responds to cyclic ovarian hormone changes; the endometrium is highly specialized and is essential to menstrual and reproductive function
- **The middle layer**, or myometrium, makes up most of the uterine volume and is the muscular layer, composed primarily of smooth muscle cells [focus on today]
- **The outer layer** of the uterus, the serosa or perimetrium, is a thin layer of tissue made of epithelial cells that envelop the uterus

How do these tissue layers work together to form a contraction?

The Matrix of Tissue Layers and Muscle Fibers: An inside look

- An outer layer which runs longitudinally and continues through the fallopian tubes and round ligaments,
- A vascular layer which consists of coiled smooth muscle and blood vessels
- Inner layer which comprises mainly smooth muscle fibers arranged both longitudinally and obliquely
The Matrix of Tissue Layers and Muscle Fibers: An Outside Look

Tissue Layers

- The top 2/3 of the uterus (the body) has muscle fibers going different directions. The uterus and heart are smooth muscle cells.
- They are arranged in bundles of 10-15 cells in a matrix of connective tissue.
- This matrix transmits the forces of the contractions, and represents the propulsion behind the ever powerful uterine contraction.

Myometrium: Smooth Muscle

- Calcium, Myosin and Actin
During labor the uterus is divided into two functional segments: the upper and the lower.

- The upper segment or body of the uterus, contracts strongly and with each successive contraction the smooth muscle fibers become shorter and thicker. This powerful segment draws passive lower part of the uterus up over itself and causes the cervix to dilate.
- The lower uterine segment consists of the lower body of the uterus and the cervix and although it can contract it is relatively passive compared to the powerful forces of the upper uterine segment.
Role of the Cervix

The cervix itself is not conducting any contractions; it is reacting to them, allowing the forces to do their job to pull the uterus up over itself, slowly dilating the cervix.

Lower Uterine Segment

*Formation of the LUS

*With increasing gestation, there is increased stretching of the uterine muscle fibres.
*This results in the formation of the lower segment in the 3rd trimester (28 – 40 weeks).

Uterus: Top 2/3 vs The lower 1/3rd

Vertical & Horizontal Uterine Muscles

Source: www.theblessedwitness.co.nz
Currently AWHONN and ACNM encourages the use of physiologic bearing down versus sustained breath holding during expulsive efforts.

“Physiologic bearing down (several short pushes without breath holding), while resulting in a slightly longer second stage, may result in improved maternal/fetal gas exchange and maternal satisfaction with her birth experience.” (Varney, 2004)
The phase of active pushing is usually accompanied by a decline in fetal pH. By allowing an early phase of rest and fetal descent and delaying pushing until the woman has an urge to push only when obstetric conditions are optimal, the decline in fetal pH will be decreased (Roberts, 2003).

Traditionally a woman is encouraged to take one or two cleansing breaths at the start of the contraction and while the contraction is building. Then she is to take a deep breath and hold while she pushes for as long as she can. Two or three good pushes are usual during a contraction.

Physiology of pushing efforts on cardiac output and fetal oxygenation

Current issues in our labor and delivery practice

- Sustained breath holding combined with prolonged bearing down may produce fetal hypoxia and acidosis due to mother’s closed glottis and increased thoracic pressure.

- This combination results in a drop in arterial pressure caused by decreased cardiac output due to diminished fetal return to the heart.

Physiology of pushing efforts on cardiac output and fetal oxygenation

- Decreased arterial pressure has 2 effects:
  1. decreases blood flow to the placenta
  2. decreases oxygen content in the blood which circulates to the placenta

- Fetal hypoxia may be prevented if the woman is given different pushing and breathing instructions. (Varney, 2004)
ACNM and AWHONN: Open-glottis pushing:

- The woman should be told to push simultaneously with a forced exhalation for short periods of time, usually over 5-6 seconds.
- Often accompanied by a grunt...remember the definition of GRIT, the verb or action...
- The glottis is at least partially opened, abdominal muscles are shortened and contracted against the uterus and

*Intrathoracic pressure does not increase to interfere with venous return*

### Habit vs. Best Practice

**WHERE** do labor units go from here?

1. The elephant in the room....
2. Continuation of doing something that all know is not beneficial, but remains habit

**WAYS** to improve labor support and initial steps to moving away from directed pushing on your labor and delivery unit

1. Establish a provider and nurse champion on your unit
2. Educate by both information (physiology) and leadership
3. Be the example in the room, regardless of how uncomfortable....

### References

References
