Labor Contraction is a Biological Oscillatiom

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Abstract

Aims: To clarify developing mechanism of regular labor uterine contraction.

Methods and Results: Labor uterine contraction curves are similar among researchers, countries, years and recording methods. Labor contraction curve were similar to electric oscillations. Regular labor contraction developed by the positive feed-back system composed of uterus-hypothalamus- hypophysis-oxytocin. Preterm labor should be treated with tocolysis in very early stage.

Conclusion; Regular labor uterine contraction is biological oscillation of pregnant uterus.

Keywords: Labor; Uterus; Contraction, Oscillation, Preterm labor;
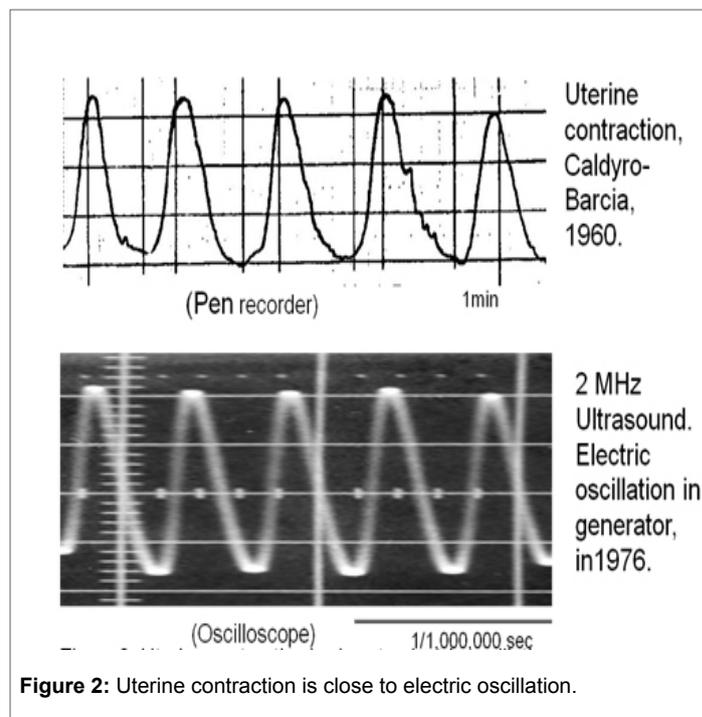
Introduction

Uterine contraction curves recorded in regular labor are similar, and indifferent among researcher, recorded country, year and recording method (Figure 1). The author intended to clarify the reason of the similarity.

Figure 1: Uterine contraction curves in labor are uniform in different countries, years and recording methods
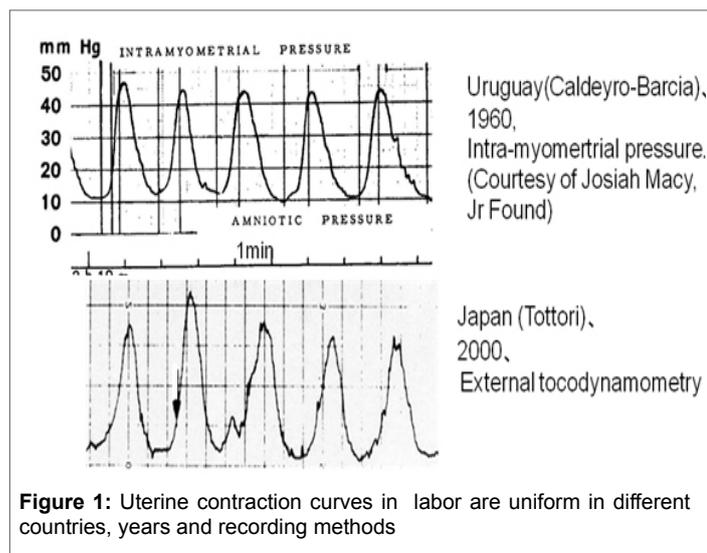
Methods

The author compared the curves of typical uterine contraction and electrical oscillation (Figure 2), where the shape of ultrasound wave in experimental

generator was close to the typical labor contraction. Thus, the author studied mechanism of electrical oscillation. That was positive feed-back system, where the output signal of an amplifier was fed back to the input of the amplifier, where the system oscillated waves of fixed frequency determined by the time constant of the feed-back system (Figure 3). There was amplifying system in hypothalamus–hypophysis, which excretes oxytocin to intensify uterine contraction. Positive feed-back loop was the nerve between the uterus and brain [1-4]. Thus, a positive feed-back loop was formed by uterus–nerve–hypothalamus–hypophysis–oxytocin, which was excreted into circulation stimulating uterus, where the contraction signal was conducted whole uterus through myometrial cell gap junction slowly in 2 minutes, that was the time constant of uterine contraction (Figure 4).

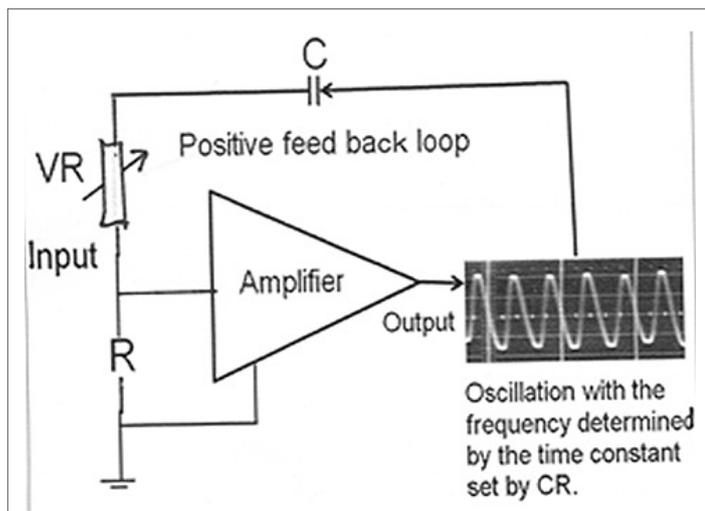**Figure 2:** Uterine contraction is close to electric oscillation.

Figure 3: Electric regular waves are oscillated by positive feed-back of amplifier output to its Input with the frequency determined by the time constant guided by CR.
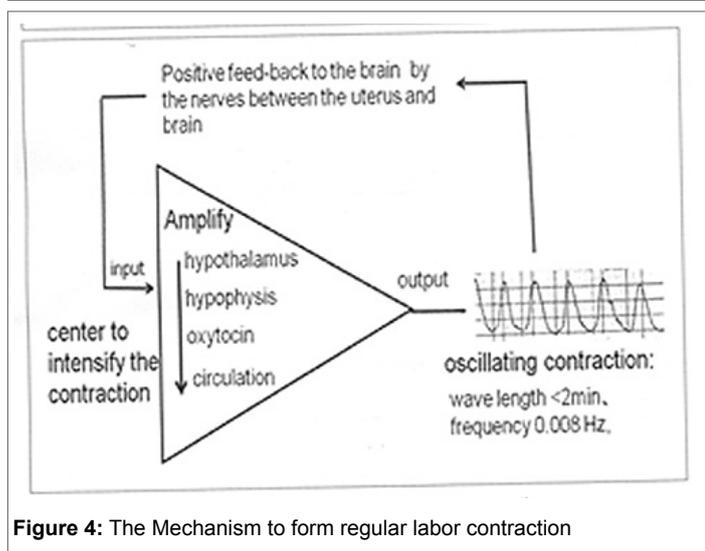

Figure 4: The Mechanism to form regular labor contraction

Results

Thus, uterus contracted in less than 2 minutes and interval was the same repeatedly, until expulsion of fetus and placenta. The contraction is saturated with high intensity in the oscillation. Oxytocin secretion is useful to secrete breast milk and promote uterine recovery after the delivery.

Discussion

As preterm regular contraction is strong oscillation in preterm delivery, common tocolysis tends ineffective to prolong pregnancy, while it will be effective in early stage of preterm labor before the oscillation. Particularly in very early stage detected with vaginal scan B-mode or soft cervix detected by ultrasound [5]. As Braxton-Hicks contraction is transient contraction after 30 gestational weeks, and it is ineffective to deliver fetus, thus, its study will be useful to treat preterm labor to prolong pregnancy to full-term delivery.

Conclusion

Normal regular labor contraction is a biological oscillation developed by uterus-brain positive feed-back system. Its study will be useful in the treatment of preterm delivery.

References

1. Wiesel O, Toth IE, Boldokoi Z, Homyak A. Bokor V, HalaszB, et al. Comparison of transsynaptic viral labeling of central nervous system structures from the uterine horn in virgin, pregnant, and lactating rats. Microsc Res Tech. 2004;63:244-252. DOI: 10.1002/jemt.20034.

2. Yellon SM,Grushan LA, Rambau GM, Leshuga TJ, Kriby MA. Pregnancy-related changes in connections from the cervix to forebrain and hypothalamus in mice. Reproduction. 2010;140(1):155-164. DOI: 10.1530/REP-10-0002.

3. Gnanamanickam GJ, Liewellyn-Smith IJ. Innervation of the rat uterus at esterus: a study in full-thickness, immunoperoxidase-stained whole-mount preparations. J Comp Neurol. 2011;519(4);621-643. DOI: 10.1002/cne.22515.

4. Poletini MO, McKee DT, Szawa RE, Bertram R, Helena CV, Freeman ME. Cervical stimulation activates A1 and locus coeruleus neurons that project to the paraventricular nucleus of hypothalamus. Brain Res Bull. 2012;88(6):566-573. DOI: 10.1016/j.brainresbull.2012.06.004.

5. Carlson LC, Hall TJ, Rosado-Mendez IM, Palmeri ML, Feltovich H. Detection of changes in cervical softness using shear wave speed in early versus late pregnancy. Ultrasound Med Biol. 2018;44:515-521. DOI: 10.1016/j.ultrasmedbio.2017.10.017.

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