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Automatic & Safe Oxytocin Induction of Labor

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Abstract

Aims: To prevent fetal damage by excess oxytocin administration of manually controlled infusion, by automatic and safe increasing infusion setting with monitoring uterine contraction and fetal heart rate. **Methods:** Starting infusion level was 2 milliU/ml, as oxytocin sensitivity of a pregnant uterus is unknown, to avoid hyper contraction and fetal bradycardia caused by unexpected excess oxytocin sensitivity. The infusion automatically increased with automatic monitoring of uterine contraction curve, then the increasing stopped when contraction reached to normal labor level, where the infusion level maintained, which continued until delivery, if there is no trouble. However, the infusion continued until expiring all fluid in case of insensitive uterus, where the induction was performed in another day. The infusion stopped automatically when contraction was too strong, or fetal heart rate is abnormal. Thus, oxytocin sensitive case is protected from excess contraction and fetal asphyxia. **Results**: Normal vaginal delivery was achieved in 28/33 cases (85%), which was more than manually controlled infusion. No case was abnormal in successful oxytocin infusion. **Conclusion:** The automated technique will be applied to oxytocin labor induction.

Keywords

Labor Induction, Oxytocin, Automatic Infusion, Monitoring of Fetal Heart Rate and Contraction, Increasing Infusion

1. Introduction

The author was afraid of fetal damage, looking at fetal bradycardia in manually controlled oxytocin infusion in 1960s-1970s, and invented automatic and safe induction with oxytocin infusion.

As the sensitivity of pregnant uterus to oxytocin was broad, someone was very sensitive, while insensitive in the other case, it is unable to predict the sensitivity to oxytocin in the non-selected pregnant woman, who received labor induction

with oxytocin infusion. The past experience of oxytocin induction developed excessive uterine contraction and fetal heart rate (FHR) bradycardia under 100 bpm in oxytocin sensitive case, where fetal damage or demise was concerned (Figure 1). Thus, it was necessary to start from very low dose oxytocin testing the sensitivity level looking for suitable oxytocin dose to develop normal contraction, thus, oxytocin was gradually increased studying the reaction of myometrium with uterine contraction curve in this study. Oxytocin increasing stopped when normal contraction curve appeared, then the contraction is induced by appropriate dose oxytocin until delivery, while whole oxytocin infusion stopped automatically, if the contraction is too strong, or fetal monitor detects abnormal FHR.

2. Methods

Five U oxytocin was mixed to 500 ml 5% glucose solution preparing the induction material. The liquid volume was determined by a checker set at the fluid bottle. The infusion tube was passed through the injection pump. and air bubble was detected by bubble checker set at the injection tube. Fluid infusion was stopped when the low volume of injection fluid or by the presence of air buble in the tube. An external FHR monitor probe and tocodynamometer probes were set at maternal abdomen and connected the fetal monitor (Figure 2).

The infusion started from 0.2 ml/min (2 mU oxytocin) and increased to twice level every 10 min automatically, checking the contraction curve automatically at the fetal monitor, Injection volume increased until the contraction duration was 1 min and its interval was 2.5 min, then kept the same infusion until fetal delivery (Figure 3).

The infusion fully stopped automatically, when

1) Contraction duration was more than 2 min.

2) Peak to peak contraction interval was less than 1 min. 1 and 2 were the sign of hyper contraction of uterus.

3) FHR monitor sound alarms abnormal FHR (bradycardia etc.), which was

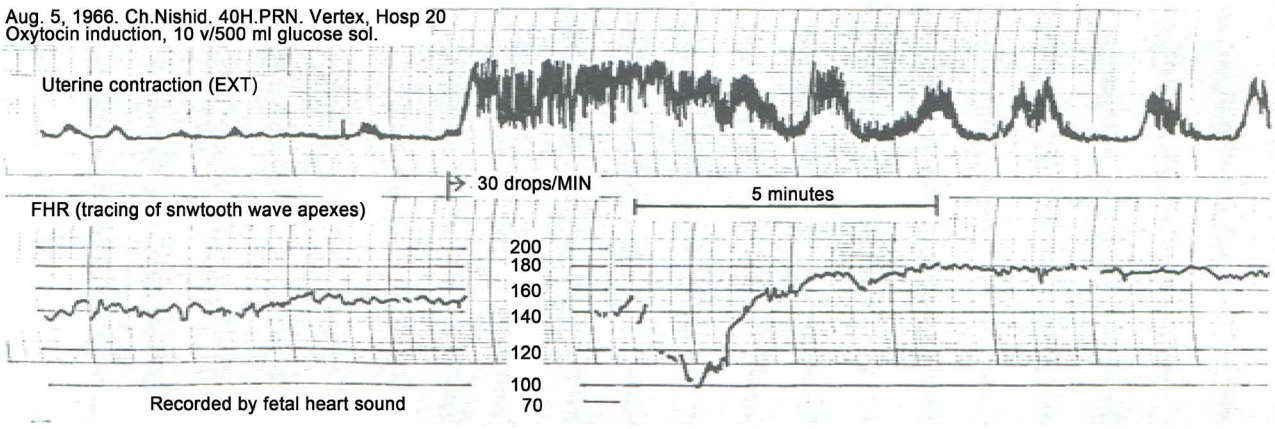

Figure 1. Fetal bradycardia below 100 bpm (lower line) in uterine hyper-contraction (upper lne) due to 40mU/ml manually controlled oxytocin infusion in 1966.

Figure 2. Automatic oxytocin infusion labor induction system programmed by Maeda and provided by T0ITU (Tokyo).

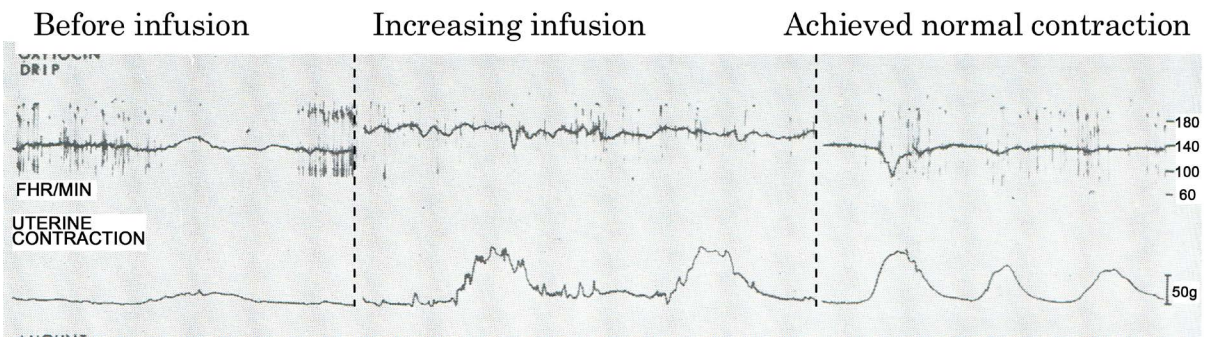

Figure 3. A case of automatic oxytocin labor induction. Fetal heart rate (upper line) and external uterine contraction (lower line). Left, middle and right parts are the progress of labor induction [1].

the sign of fetal asphyxia.

4) No contraction was detected by the infusion until the lowest level of injection fluid that was the sign of no sensitivity of the pregnant uterus, where the induction was stopped, and it is tried again another day.

3. Results

Thirty three non-selected pregnant women received the automatic labor induction, then 28 cases (85%) achieved normal vaginal delivery, that was favorable result because 65% of manually controlled oxytocin labor induction achieved normal vaginal delivery. There was significant difference ($p = 0.048$) between automatic and manual control inductions [1].

4. Discussion

Unselected pregnant women received favorable oxytocin induction without hy-

per-uterine contraction nor fetal hypoxia. Significant difference was found in the comparison to manually controlled oxytocin labor induction, which can be risky due to hyper-contraction and fetal hypoxia, namely, some cases of manually controlled oxytocin induction was sued by the ominous outcomes after termination of the present study. Thus, the abnormalities would be avoided by the automatically controlled oxytocin induction, because the induction stopped by the hyper-uterine contraction and abnormal FHR in our study.

5. Conclusion

Automatically controlled oxytocin induction, which induced normal uterine contraction, avoiding hyper-uterine contraction followed by fetal hypoxia, which was safe to the fetus under oxytocin infusion labor induction.

Disclosure

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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