

Commentary

The habilitation thesis documents the author's long-term systematic work focused on procedures contributing to increasing the safety of natural vaginal birth. The work is based on the extensive research activities of the Perinatology Center of the University Hospital Brno and the Medical Faculty of Masaryk University, which is involved in a number of projects both at the national and international level. The results of the author's current activities can be demonstrated by a number of presentations given at national and international professional conferences. Within the Czech Republic, the author is an active member of the Section of Perinatology and Fetomaternal Medicine of the Czech Gynecological and Obstetrical Society, a member of the committee of the Association of Hospital Gynecologists and Obstetricians and a member of the Scientific Board of the Ultrasound Diagnostics Section of the Czech Gynecological and Obstetrical Society.

The results and conclusions of the presented studies are based on original work and ideas that demonstrate the importance of selected procedures to support natural vaginal delivery and increase its safety. Performing an external cephalic version of the fetus after the 36th week of pregnancy makes it possible to reduce the percentage of women who undergo a caesarean section only due to the indication of breech presentation of the fetus. It is an effective and safe procedure that has a beneficial effect on perinatal outcomes.

Cardiotocography remains the basic method for intrapartum fetal monitoring. The introduction of the new FIGO 2015 classification represents the first step to increase the effectiveness of the method for detecting fetal hypoxia during childbirth and to reduce variability in the evaluation of cardiotocographic records. The next step is the systematic teaching of cardiotocography evaluation with an emphasis on modern knowledge of the pathophysiology of intrapartum fetal hypoxia. ST analysis of the fetal ECG curve has the potential to effectively supplement the information on the state of oxygenation of the fetus in the uterus and possible activation of

anaerobic metabolism. The aim, in the near future, is the technical improvement of cardiac and ECG fetal sensing systems and the further use of this information to create a fully automatic computerized record evaluation. The results of computer analysis of the heart rate and ECG of the fetus will serve as support in the clinical decision-making of the obstetrician. In the future, the determination of selected biomarkers from the mother's peripheral blood could also contribute to an earlier and more accurate diagnosis of fetal hypoxia during childbirth. From the results of previous research, micro RNA-210 appears to be a suitable marker. Further large-scale studies will be needed to verify the potential use in clinical practice.

Mechanical pre-induction by synthetic osmotic dilators enables an efficient and safe way of preparing the cervical canal before the planned induction of labor. The presented results demonstrate a number of advantages over pharmacological methods of pre-induction, especially a significantly lower risk of excessive uterine activity.

Further scientific research development in the field of perinatology, with a focus on the management and course of childbirth, is seen by the author in the development of methods used to obtain information about the condition of the fetus in the uterus. There is especially an emphasis on signal quality in eliminating the risk of confusion between mother and fetus and, at the same time, also with regard to increasing comfort for mothers. The storage of information in electronic form, interconnection and emphasis on obtaining information in real time create the conditions for the development of scoring systems to estimate the risk of fetal hypoxia and other complications during childbirth, based on online evaluation. Another task will be to enable a more accurate identification of risk groups of mothers before the birth itself, with regard to the health of the mother and fetus. Such scientific research will necessarily be based on interdisciplinary cooperation, modeling and also basic research. The resulting goal is a healthy and satisfied mother and a healthy newborn baby.

I have chosen 15 articles related to my thesis. My contribution to these articles is summarised in the following tables with special attention to the study design, data collection, data analysis and interpretation and manuscript preparation.

1. Hruban L, Janků P, Jordánová K, et al. Obrat plodu zevními hmaty z polohy podélné koncem pánevním po 36. týdnu gravidity - hodnocení úspěšnosti a komplikací. Ceska Gynekol. 2017;82(6):443-449.

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
90	80	50	90

2. Wágnerová K, Hruban L, Janků P. Zevní obrat plodu z polohy podélné koncem pánevním po 36. týdnu gravidity - Analýza subjektivního hodnocení rodiček. Ceska Gynekol. 2017;82(5):355-361.

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
70	30	20	50

3. Hruban L, Janků P, Jordánová K, et al. The effect of transient fetal bradycardia and other heart rate changes during and after external cephalic version on perinatal outcomes. Eur J Obstet Gynecol Reprod Biol. 2020;245:39-44. (IF: 1,868)

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
90	70	40	90

4. Měchurová A, Velebil P, Janků P, Hruban L. Interpretace intrapartálního fetálního kardiogramu - FIGO 2015. Ceska Gynekol. 2016;81(2):89-91.

Research direction (%)	Manuscript (%)
20	20

5. Měchurová A, Velebil P, Hruban L, Janků P. Současné možnosti a doporučení pro intrapartální monitorování ozev plodu. Ceska Gynekol. 2016;81(2):112-124.

Research direction (%)	Manuscript (%)
20	30

6. Spilka J, Chudáček V, Janků P, Hruban L, et al. Analysis of obstetricians' decision making on CTG recordings. J Biomed Inform. 2014;51:72-79. (IF: 2,126)

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
30	30	20	20

7. Hruban L, Spilka J, Chudáček V, et al. Agreement on intrapartum cardiotocogram recordings between expert obstetricians. J Eval Clin Pract. 2015;21(4):694-702. (IF: 1,053)

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
70	30	60	70

8. Chudáček V, Spilka J, Burša M, Janků P, Hruban L, Huptych M, Lhotská L. Open access intrapartum CTG database. BMC Pregnancy Childbirth. 2014;14:16. (IF: 2,190)

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
30	60	40	20

9. Burša M, Lhotská L, Chudáček V, Spilka J, Janků P, Hruban L. Information retrieval from hospital information system: Increasing effectivity using swarm intelligence. Journal of Applied Logic. 2015;13:126-137. (IF: 0,524)

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
10	30	10	10

10. Hruban L, Janků P, Zahradníčková J, et al. Význam ST analýzy fetálního EKG při intrapartálním monitorování plodů s předpokládanou růstovou retardací. Ceska Gynekol. 2006;71(4):268-272.

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
50	70	50	90

11. Janků P, Hruban L, Kuřecová B, Roztočil A, Kachlík P, Zahradníčková J. ST analýza fetálního EKG u předčasných porodů ve 30.-36. týdnu těhotenství. Ceska Gynekol. 2006;71(3):163-168.

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
30	50	30	30

12. Vonkova B, Blahakova I, Hruban L, Janku P, Pospisilova S. MicroRNA-210 expression during childbirth and postpartum as a potential biomarker of acute fetal hypoxia. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub. 2019;163(3):259-264. (IF: 1,0)

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
30	80	10	30

13. Gupta J, Chodankar R, Baev O, Bahlmann F, Brega E, Gala A, Hellmeyer L, Hruban L, Maier J, Mehta P, Murthy A, Ritterd M, Saad A, Shmakov R, Suneja A, Zahumensky J, Gdovinova D. Synthetic osmotic dilators in the induction of labour-An international multicentre observational study. Eur J Obstet Gynecol Reprod Biol. 2018;229:70-75. (IF: 1,868)

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
60	30	10	10

14. Saad AF, Gupta J, Hruban L, Hankins GD, Saade GR. Predictors of vaginal delivery after cervical ripening using a synthetic osmotic dilator. Eur J Obstet Gynecol Reprod Biol. 2020;246:160-164. (IF: 2,024)

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
30	30	20	20

15. Hruban L, Janku P, Gerychova R, Jouzova A, Tesarikova T. Mechanical pre-induction in women with premature rupture of membranes. *Eur J Obstet Gynecol Reprod Biol.* 2020;247:265-266. (IF: 1,868)

Study design (%)	Data collection (%)	Data analysis (%)	Manuscript (%)
90	50	80	90