Anaesthetic management of parturients with severe pulmonary arterial hypertension (pregnancy risk IV WHO) during childbirth

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Background and Goal of Study:

Pregnancy with pulmonary arterial hypertension (PAH) have very high risk of acute right-sided heart failure after delivery and may have a sudden death.¹ Eisenmenger syndrome (ES) carry the greatest risk of maternal mortality due to heart failure.² Increasing heart strain and vascular resistance itself may further complicate delivery and increase the right heart strain resulting in emergency Caesarean section (CS) and possible maternal demise. Uterine contractions, especially associated with forceps delivery, also adversely affects on pulmonary circulation.³ The objective was to identify anesthetic management, management and outcomes as suggestion in similar complicated cases because of absence of accepted recommendation in such high cardiac risk parturient.

Materials and Methods:

A retrospective study included women with PAH which pregnancy risk IV according WHO admitted for delivery into VUH Santaros Clinics from 2014 to 2017 was conducted. Anaesthesia method, process and medical treatment have been analyzed due to medical records. There were 4 women 25-35 years of age with severe PAH due to congenital heart disease, 3 of them with ES, 1 with residual PAH after late closure patent ductus arteriosus.

Results and Discussion:

Decision was made by multidisciplinary team: 1 parturient - vaginal delivery under epidural analgesia, 3 underwent CS under general anaesthesia (GA). All mothers were managed with oxygen, sildenafil and LMWH, 2-diuretics. Two parturient got iloprost inhalations starting from OR. All 4 women treated in ICU for 3-6 days. In one GA case hemodynamic supported with noradrenaline (40h) and milrinone for 51 hours.

Conclusion(s): Successful outcomes was dependant on an individualized approach and multidisciplinary team (cardiologist, obstetrician, anaesthesiologists) collaboration and efforts in operating field and ICU. The clinical situation determined the application of a specific anaesthetic method and GA with adequate pharmacological therapy was the one method in CS.

Learning points: Lower doses of anesthetics have been used in parturients with severe pulmonary hypertension with more pronounced haemodynamic changes during anesthesia. In the time of anesthesia, after the fetal birth, a specific PH treatment with iloprost inhalation was applied. Only a multidisciplinary team can successfully overcome such challenges with pulmonary artery hypertension.

Patient	35 y.o. (2014) CS under GA Gravidity I, 32 weeks	31 y.o (2014) labor with EA Pregnancy II, 36 weeks	25 y.o (2014) CS under GA Pregnancy I, 34 weeks	28 y.o (2017) CS under GA Preterm labor I (II) - 27 w
Newborn	♀ 1400 g 40cm Apgar 9/10	♀ 2790 g 49 cm Apgar 9/9	♀ 2160g, 49cm Apgar 8/9	♀ 900 g 33 cm Apgar 8/9
Diagnosis	Severe pulmonary arterial hypertension due to CHD. Eizenmenger syndrome: general ventricle, transposition of large vessels. Chronic hypoxaemia. ventricular extrasystole.Cardiac insuff. C. NYHA III. Chronic autoimmune thyroiditis, hypothyroidism. WHO-Risk Class IV	Pulmonary arterial hypertension due to congenital heart defect (CHD): residual after open ductus arteriosus bunching (1988). RV dysfunction. NYHA III. WHO-RC IV	Severe pulmonary arterial hypertension due to congenital heart defects. Eizenmenger syndrome: ventricular septal defect. Chronic hypoxaemia. Cardiac insuff C. Breath. Insuff. NYHA III. WHO RC IV	Severe PAH due to CHD. Eizenmenger syndrome: ventricular septal defect, open ductus arteriosus. Ventricular Extrasystole. Chronic hypoxemia. Dysfunction of the left ventricle. Respiratory failure.Cardiac insuff.C. NYHA III. Complicated childbirth due to unstable fetal condition. Thrombocytopenia. Rhinitis WHO Risk Class IV.
Treatment during pregnancy	A specific PAH treatment with sildenafil from 04.2014, oxygen therapy at home from 2014-06.Lately, breathlessness, tachycardia, cyanosis, increasing in BNP. Fetal growth was normal.	Tab Sildenafil 20 mgx3, Mg Fatigue faster, unpleasant feeling in the chest (after eating more). Shortness of breath is not progressive. Get off 2-3 floors	2008 intracard.: Pressure in the pulmonary and systemic circulatory system is equal (Sp PA 100/43/69, PPS (PCW) 19 / 12-15, Ao 100/62 mmHg, PKP 23,6 WV / m2, Vaso-reactivity test with O2 negative. The breathlessness after minor physical activity, blue lips. BNP-14.3 ng / l, SO2-86%. Sildenafil 20 mg x3	2011-11 intracardiac : mean. PAS 90 mmHg, PPS 12 mmHg, PKP 14.36 WV, 3.47 L /min/m2. Sildenafil is being treated since 2015
Post-pregnancy treatment	After surgery, 5 d. treated in ICU. DPV duration 4 h, noradrenaline 40 h, korotrop 51 h. antibiotiks. LMWH. Specific treatment(ST)for PH tab.Sildenafil 20 mg x2, Iloprost inhalation.	After giving birth to ICU for 4d. O2, LMWH,electrolyte correction, diuretics (furosemide peak dose over 24 hours 80 mg), Tab. Sildenafil 20 mgx3	3 days ICU. Sildenafil 20mgx3, tab.KCl 750mgx1, antibiotics, diuretics, Mg, O2.	7 days ICU.Gradually reduce inhalation dose of Iloprost is enhanced by the specific treatment of PAH with the addition of Bosentan 62.5 mgx 2, continuing with Sildenafil 20 mgx 3.
Current state	Observed intense cyanosis, hypoxic nail changes. SpO2 86%. ST for PH, Rivatio (Sildenafil) 20 mg x3, Ambrisentan 5 mg, diuretics, Carvedilol 12.5 mg 1x2 Amiodarone 0.2, L thyroxin 25 micrg, O2	Situation is stable, improved. Fatigue, shortness of breath, not progressing. Full-time work. Tab Sildenafil 20 mgx3 pcs vitamins, trace elements.	2015 Dyspnea remains at a higher physical load, Treatment: Sildenafil 20 mgx3 Spirix 25 mg, trifas 10 mg every 2-3 d	Shortness of breath, faster fatigue. Tired feel more frequent heartbeats, drowsiness. Sildenafil 20 mg x 3,Bosentan 125 mg x 2, Oxygen therapy at home.
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³ESC Guidelines on the management of cardiovasc. dis. dur. pregn. Eur Heart J 2011;32:3147–97

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