



Pregnancy in a Patient with an Intrauterine Device, and with Two Laboratory-Confirmed SARS-CoV-2 Infections during the Pregnancy Resulting in the Birth of a Healthy Baby

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Abstract

The exclusivity of the presented case report lies in a rare complication: A pregnancy with an intrauterine device, and with two laboratory-confirmed SARS-CoV-2 infections during the pregnancy. Finally, the pregnancy resulted in the birth of a healthy baby without any complications during pregnancy and childbirth.

Introduction

The usage of Intrauterine Contraceptive Devices (IUD) has gained great popularity among women, thus becoming an acceptable form of birth control worldwide [1,2].

Despite holding a high rate of efficacy in preventing pregnancy with the two types of IUDs (up to 99%), failures (pregnancies) occur in 0.5% to 5% of cases in 100 women within the first two years of placement. According to some research, failure rates within the first year after the placement are around 0.2% for the levonorgestrel-releasing IUDs, and around 0.8% for the copper IUDs [1,3]. This is a case study of a 39-year-old female in her 5th pregnancy, with the copper IUD, and with two laboratory-confirmed SARS-CoV-2 infections during the pregnancy. Research so far shows that pregnant women infected with this virus are at higher risk for severe disease and death, as well as complications in their pregnancies [4]. The pregnancy and outcome in the presented case study show that the health of the female was not endangered during the pregnancy, and resulted in the birth of a healthy baby.

Case Presentation

This is a case study of a 39-year-old female, multiparous, whose pregnancy was confirmed in her 6th week of pregnancy with the copper IUD previously placed, utilized for the second time in her life. Anamneses show that the outcome of 5 pregnancies produced 4 healthy children by vaginal delivery, while the 5th pregnancy at the mother's age of 35 resulted in a miscarriage - the pregnancy happened a year after placing the copper IUD. As this pregnancy did not develop, removal of the IUD and Revisio Cavum Uteri Instrumentalis (RCUI) was performed. At the age of 39, the patient had the copper IUD placed again despite having been advised that a mechanical contraceptive method was not a wise decision for pregnancy prevention due to the prior failure. Nevertheless, the patient decided to have a new IUD placement, which was performed following all medical procedures. Seven months after placing the IUD the patient became pregnant. An ultrasound confirmed 6 weeks of pregnancy, the presence of the IUD, and a vital fetus. The patient was completely informed about the status of her pregnancy. With her consent, and following all medical and ethical procedures, in the gynecology and obstetrics department, the IUD was removed in her 6th week of pregnancy, and the fetus remained vital. The pregnancy was observed according to the protocols. The patient refused to get vaccinated against COVID-19, despite the fact that her gynecologist highly recommended it and explained the possible consequences both for her and the fetus in case of infection. In her 14th week of pregnancy, the patient reported symptoms - nose and throat aches, occasional cough, headache, especially in the frontal area, enervation, bone ache, and

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Table 1: Biochemical serum analyses.

Gestation week	GLUCOSE mmol/L	UREA mmol/L	CREATININE μ mol/L	AST IU/L	ALT IU/L	LDH IU/L	CRP mg/L
12	5.5	5.12	51.2	19.99	17.48	245.7	-
14 real-time PCR	4.9	4.18	61.1	18.34	21.11	233.4	9.8*
16	4.4	3.11	63.3	19.92	18.88	243.1	3.5
28 real-time PCR	4.3	4.12	52.1	16.7	18.41	321.2*	11.4*
29+4 days	5.1	4.04	66.6	20.07	31.32	123.2	4.4
37+4 days	5.2	4.21	56.2	11.11	21.21	211.2	1.1
reference values	4.56-6.38	2-8	44-80	0-32	0-33	0-250	0-5

*above the reference values

AST: Aspartate Aminotransferase; ALT: Alanine Transaminase; MCV: Mean Cell Volume; MCH: Mean Cell Hemoglobin; LDH: Lactate Dehydrogenase; CRP: C-Reactive Protein

Table 2: Erythrocyte blood count/test.

Gestation week	Erythrocyte $10^{12}/L$	Hemoglobin g/L	Hematocrit L/L	MCV fL	MCH pg
12	6.17	137	0.409	83.5	28
14 real-time PCR	4.64	130	0.395	85.2	28.1
16	4.46	129	0.387	84.4	26.9
28 real-time PCR	4.9	141	0.415	92.3	31.6
29+4 days	5.1	140	0.412	91.1	30.5
37+4 days	4.8	133	0.401	86.7	28.8
reference values	3.9-5.2	120-153	0.35-0.47	80-96	27-32

Table 3: Leukocyte blood count/test.

Gestation week	Leukocyte $10^9/L$	Neutrophil granulocyte $10^9/L$	Lymphocytes $10^9/L$	Monocytes $10^9/L$
12	8.7	5.1	2.8	0.6
14 real-time PCR	11	7.1	1.2	0.8
16	10	6.2	1.6	0.5
28 real-time PCR	9.8	6.3	2.2	0.8
29+4 days	8.8	5.5	1.8	0.6
37+4 days	8	5	2	0.7
reference values	4-10	2-7.5	0.8-4	0-1

general weakness. The patient was laboratory-tested and confirmed positive for COVID-19. She was admitted to the COVID Center at Community Health Center for further treatment. Given her health status, which was good, with no complications and clinical features, as well as the lack of hospital beds, the patient was transferred to home treatment to be observed according to prescribed guidance for COVID patients. She was intensively monitored and given treatment by the COVID community-nurse unit together with the gynecologist. The patient was treated with Amoxicillin caps 500 mg 1 x 1 every 6 h, Paracetamol tab 500 mg as needed, Premama-duo supplements 1 x 1. A tabular view of her status and the pregnancy monitoring parameters are listed herein to present the monitoring process. Three weeks after testing positive for COVID, another PCR test was done, which was negative.

In her 16th week of pregnancy, the patient visited a perinatologist at KCCG (Clinical Center of Montenegro) in Podgorica to have a perinatology-subspecialist's examination as a precautionary measure due to the prior COVID infection. The patient had no complaints at the time. Clinical examination, expert ultrasound, and a fetal biophysical profile were done, which showed a normal status of pregnancy. It was concluded that the SARS-CoV-19 infection was well-treated, and both the patient and the fetus were without complications. The PCR

Table 4: Erythrocyte sedimentation rate.

Gestation week	SE mm/h
12	15
14 real-time PCR	50*
16	20
28 real-time PCR	35*
29+4 days	15
37+4 days	12
reference values	<15

*above the reference values

test was also negative.

The perinatologist recommended the gynecologist continue monitoring the pregnancy. In her 28th week of pregnancy, the patient reported similar symptoms she had had when previously infected with COVID-19. She was laboratory-confirmed COVID-19 infected again. Since the patient generally felt good, with no complications, and the fetus status was good, after clinical examination she was transferred to home treatment. The decision was discussed and made together with the perinatologist of the Clinical Centre of Montenegro (KCCG) – Podgorica due to the high numbers of infected in Montenegro at the

Table 5: URINE.

Gestation week	description	PH	spec. density	Bilirubin	Glucose	P	LE
12	clear	5.6	1022	neg.	neg.	neg.	up to 20
14 real-time PCR	light yellow	5.5	1025	neg.	neg.	neg.	up to 30
16	yellow	5.8	1028	neg.	neg.	neg.	up to 10
28 real-time PCR	light yellow	5.3	1011	neg.	neg.	neg.	up to 10
29+4 days	yellow	5.8	1022	neg.	neg.	neg.	up to 30
37+4 days	yellow	6.2	1030	neg.	neg.	neg.	up to 35

P: Proteins in Urine; LE: Leucocytes in Urine

Table 6: Other analyses for the patient.

Gestation week	TORCH	CB. MUT	UK	TSH	HBSAG	TA	EKG	T
12	neg.	neg.	sterile	2.01	neg.	105/60	-	-
14 real-time PCR	-	-	-	-	-	110/65	NAD	37.3
16	-	-	-	-	-	100/60	NAD	36.1
28 real-time PCR	-	-	-	-	-	105/65	NAD	37.5
29+4 days	neg.	-	-	-	-	110/70	-	36.0
37+4 days	-	neg.	sterile	-	-	115/80	-	-

TORCH. Microbiological cervical smear test for microorganisms: toxoplasmosis, rubella cytomegalovirus, herpes simplex

CB. MUT- CB cervical smear. M: *Mycoplasma hominis*; U: *Ureaplasma urealyticum*, T: *Trichomonas vaginalis*

UK: Urine Culture; TSH: Thyroid-Stimulating Hormones; HBSAg: Hepatitis B virus Antigen; TA: Blood Pressure; EKG: Electrocardiogram; T: Body Temperature; NAD: No Abnormality Detected

Table 7: Body weight and BMI-body mass index during the pregnancy.

Gestation week	TTkg	BMI kg/m ²
14 real-time PCR	84	27.1
26	89	28.7
37NG	92	29.7

Table 8: Laboratory results after the first PCR positive test.

Gestation week	D-DIMER ng/mL	SaO ₂ %
12	-	-
14 real-time PCR	322	97
16	580	98
28 real-time PCR	680	96
29+4 days	1128	98
37+4 days	-	-
reference values	I trim. 167-721 ng/mL	94-99%
	II trim. 298-1653 ng/mL	
	III trim. 2640-6560 ng/mL	

SaO₂: Oxygen Saturation of Blood

time. It was advised the patient be monitored by the gynecology and obstetrics department until the estimated due date of delivery. The patient was home-treated in the same manner with basically the same therapy as the first time she was infected with the virus. Three weeks after the infection, the patient was PCR tested and the results were negative. She felt well and the pregnancy was regular. The ultrasound and fetal biophysical profile were regular as well. The findings during pregnancy surveillance are given in Tables 1-9.

In her 39+ weeks of pregnancy, the patient reported labor pains. She was admitted to the gynecology and obstetrics department where she gave vaginal birth to a healthy boy TT 3580/57/35/cm, without any complications. The boy is now 7 months old, healthy, and vaccinated as prescribed. The patient is also healthy, and feeling good, without any post covid symptoms.

Anamnesis vitae of the patient show that she had an appendectomy when she was 16 years old, nasal polyp surgery when she was 30 years old, that she has been obese from her teenage years, and that she has had high blood pressure and used ACE inhibitory tablets once a day. However, during the pregnancy, her blood pressure was not high and she didn't take any medications except supplements and prescribed therapy during COVID-19 infections.

Biochemical serum analyses, Table 1, show that during two COVID-19 infections, CRP was increased. In her 28th week of pregnancy concentration of LDH was significantly increased, but after negative PCR tests, the values were within the limits of reference values.

All parameters of erythrocyte blood count/test, Table 2, for every control check, were within the limits of reference values.

All parameters for leukocyte blood count/test for every control check were within the limits of reference values (Table 3).

The erythrocyte sedimentation rate, as shown in Table 4, was significantly above the reference values in the 14th and 28th week of pregnancy, which were the periods the patient tested positive for Coronavirus. Two weeks after the first positive PCR test (16th week of pregnancy) sedimentation was a bit above reference values for the parameter (<15).

Biochemical urine analyses for every control check were within the normal limits, as shown in Table 5.

All other analyses during the pregnancy for every control check were mainly within the normal limits, except for the weeks when the patient PCR tested positive and her body temperature was slightly increased (Table 6).

Body weight and (BMI) Body Mass Index of the patient were increased during the whole pregnancy (Table 7).

After the first positive PCR test, D-DIMER and Oxygen Saturation of blood (SaO₂) parameters were measured. Both parameters were

Table 9: Ultrasound findings of the fetus.

Gestation week	sa+pp	CRL	NT	BPD	FL	AC	CTG
12+2	yes	62	1.2	19.3	-	-	0
14+2 real-time PCR	yes	-	-	24.1	11.4	104.8	0
16+3	yes	-	-	35.1	19.2	111.8	0
16+3 experts US	yes	-	-	35.1	19.2	111.8	0
28+2 real-time PCR	yes	-	-	73.8	51.6	239.9	reactive
30+1	yes	-	-	78.5	56.4	264.9	reactive
37+2	yes	-	-	91.1	7.1	330.1	reactive

sa: Heartbeat of Fetus; pp: Movements of Fetus; CRL: Crown -Rump Length (from the top of their head to the bottom of their buttocks); NT: Nuchal Translucency (the sonographic appearance of a collection of fluid under the skin behind the fetal neck in the first trimester of pregnancy); BPD: Biparietal Diameter (a measurement of the diameter of a developing baby's skull); FL: Femoral Diaphysis Length (the length of the thigh bone); AC: Abdominal Circumference; CTG: Cardiotocography (continuous recording of the fetal heart rate and contractions in the womb)

within the reference limits for the surveilled gestation week (Table 8).

Ultrasound findings of the fetus are presented in Table 9 in the parameters measured in gestation weeks and days. Additional findings were obtained by the expert ultrasound in the 16th week of pregnancy.

All the parameters were within the normal limits: no abnormality was detected in the four-chamber cardiac view, umbilical cord insertion, blood vessels, cerebral structures, and all extremities-with no deformities or ultrasound visual anomalies.

Discussion

Research has shown that usage of the Intrauterine Device (string) is a widely used contraceptive device, however, there is a small percentage (0.8) failure rate that can lead to pregnancy with the device placed. There is a small number of case reports describing procedures for removing the IUD when there was no desire to stop the pregnancy. According to some authors, there have been 9 cases described so far [5].

It is well known that pregnancies with IUDs placements carry a high risk for complications such as ectopic pregnancy, miscarriage, premature birth, and chorioamnionitis [6-9]. After all complications were considered regarding pregnancies with IUD in place, it can be said that pregnancy and development of pregnancy with the device are extremely rare [1]. Removal of the IUD at an early stage of pregnancy that is desired to be continued bears many difficulties and risks. Some authors suggest that a better choice is to not remove the device, especially when the device cannot be seen [10,11]. However, grave complications can occur if the pregnancy continues with IUD placed in the cavum uterus since the complications can have negative effects both on the mother and fetus [12].

Removing the device in the 6th week of pregnancy is a highly delicate procedure, which was performed without any complications for the patient and the fetus, as it is presented in this case report. Sanders et al. [13], presented a video on the successful removal of an IUD at an early stage of pregnancy in 2018.

The patient in this study decided to have an IUD placed, although 4 years prior to this case she experienced a miscarriage of pregnancy which occurred with an IUD in place. Meta-analyses conducted in 2021 in Ethiopia assessed post-partum intrauterine contraceptive device placement. The analyses showed that the prevalence of post-partum IUD among women in Ethiopia was 21.63%. It was established that occupation, level of education, partner's support, age, prior experience in antenatal care, and awareness of IUDs were



Figure 1: Pregnancy with IUDs.



Figure 2: Intrauterine device & GS.

crucial factors in deciding on the placement of an IUD [14].

As many authors suggest, the IUDs are ideal contraceptive devices for some women in the postpartum period, since they don't interact with lactation, and they are appropriate for women and their health support by enabling safe, long-lasting and highly efficient contraception while still in the medical system [15,16] (Figures 1-4).

During the observation of the stated pregnancy, SARS-CoV-2 infection in the general population was intensive. The pregnant women were included as well.

The impact of Coronavirus on reproduction is complex and can have damaging effects on the increase of unwanted pregnancies, especially in socioeconomic disadvantaged places, which can lead to multiple negative consequences [17].



Figure 3: Removal of the IUD at an early stage of pregnancy.



Figure 4: Removal of the IUD.

The patient in this study was not vaccinated against the COVID-19 virus. Vaccines against Coronavirus and booster doses were recommended in 2019 for pregnant, women in the peripartum period and lactating women with the aim to prevent serious disease [17]. Gray et al. [18], analyses showed that pregnant and lactating women produced comparable vaccine-induced humoral immune response compared with the control group of non-pregnant women, and as well they generated higher vaccine-induced antibody titers than women after natural SARS-CoV-2 infection during pregnancy.

Several studies show that pregnant women infected with COVID-19 are at higher risk for severe illness, admittance to an intensive care unit, invasive ventilation, and death compared with non-pregnant women [19,20]. The newest research emphasizes the importance of higher-level surveillance of pregnant women after vaccination against COVID-19 [21].

The only detected symptom during twice laboratory-confirmed SARS-CoV-2 infections in the patient's gestation weeks of regular monitoring was fever, with slightly increased temperature. Analyses so far have shown that infection with this virus during pregnancy is mainly asymptomatic, or typically manifested as fever-increased temperature, dyspnea and myalgia [22].

There are studies that cite the possibility of SARS-CoV-2 transmission in utero or intrapartum, but it has also been confirmed that most neonatal infections have occurred in the postnatal period. According to similar reports in the literature, it can be concluded that COVID-19 infection in pregnancy can result in grave perinatal consequences regardless of the initial symptomatology of a pregnant

woman [22,23]. However, the newborn baby in this study did not have any negative symptoms in the postnatal period.

The patient's health state indicators adduced herein and obtained by systematic biochemical analyses indicate that at the time of COVID-19 infections CRP values and erythrocyte sedimentation were significantly increased. It was also established that during the pregnancy the patient's blood pressure was within normal limits despite the anamnesis that witnessed hypertension prior to the pregnancy. It was established during the surveillance of gestation weeks she had increased BMI, which showed obesity. Urine and all other analyses were within the reference values.

Pregnant women infected with SARS-CoV-2 are at higher risk for complications in their pregnancies, and also for grave diseases and even death. Overweight women who previously suffered from high blood pressure and diabetes are more susceptible to severe forms of COVID-19 [4]. Obesity is a serious challenge when it comes to mechanical ventilation, as it decreases respiratory compliance, increases airway pressure, and impairs cardiac function, which is a great obstacle regarding infection with COVID-19 [24].

Conclusion

It can be concluded that the patient in her 14th and 28th week of pregnancy, after the successful removal of an IDU in her 6th week of pregnancy, was infected with SARS-CoV-2 and that it was a mild form of infection without adverse consequences for her and the fetus. This case is specific regarding the occurrence of pregnancy with an IUD in place as well as the reactions and consequences of COVID-19 infection which were an individual immunology response aligned with many other factors important for the level, flow and outcome of contamination. Which factors were crucial for this outcome would require a much wider, multidisciplinary analysis.

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