A CASE OF SEVERE HYPERTRIGLYCERIDEMIA, SYSTEMIC LUPUS ERYTHEMATOSUS AND ANTIPHOSPHOLIPID ANTIBODY SYNDROME IN PREGNANCY

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ABSTRACT

There is a physiologic hormone-induced increase of lipids during pregnancy. Pregnancy-related hypertriglyceridemia, on the other hand, can be life threatening especially in some patients with genetic susceptibility. Known complications include acute pancreatitis, hyperviscosity syndrome, and preeclampsia. This is a case of a 40-year old Gravida 2 Para 1 (0101) term patient, diagnosed with gestational diabetes mellitus, Systemic Lupus Erythermatosus and Antiphospholipid Antibody Syndrome, presenting with severe hypertriglyceridemia and fetal intrauterine growth restriction. Patient previously tested positive with a rare autoantibody called anti-Glycosylphosphatidylinositol-binding protein 1 (anti-GPIHBP1), which prevents the action of lipoprotein lipase. A multidisciplinary approach was done during the admission and the patient underwent normal labor and delivery.

KEYWORDS: Hypertriglyceridemia, Systemic Lupus Erythematosus, Antiphospholid Antibody Syndrome, Anti-GPIHBP1

INTRODUCTION

The hormonal milieu of pregnancy may involve alteration of plasma lipid concentrations, but this rarely has clinical consequences. Pregnancy-related hypertriglyceridemia, on the other hand, can be life threatening in some patients with genetic susceptibility. Complications can include acute pancreatitis, hyperviscosity syndrome, and preeclampsia. Recent studies have shown that severe hypertriglyceridemia is caused by autoantibodies against a specific protein that alters the normal lipolysis. To date, there are only 6 patients with triglyceridemia detected to be positive with GPIHBP1 autoantibodies, which blocks the ability of GPIHBP1 to bind and transport lipoprotein lipase, thereby interfering with the lipoprotein lipase-mediated processing of triglyceride-rich lipoproteins and causing severe hypertriglyceridemia. The antibody was detected using a combination of Western blot analyses and immunocytochemical studies.

This report aims to discuss the case of a gravid patient with severe hypertriglyceridemia, systemic lupus erythematosus, and antiphospholipid antibody syndrome, to discuss its epidemiology and pathology and effects in pregnancy, to gain additional information into the frequency of antiphospholipid autoantibody syndrome in patients with unexplained hypertriglyceridemia, and to compare different management to prevent possible complications. Consent was obtained from the patient that her case would be used for presentation and for learning purposes only.

CASE DESCRIPTION

This is a case of a 40-year old Gravida 2 Para 1 (0101), 37 weeks age of gestation, diagnosed case of diet-controlled gestational diabetes mellitus at 24-weeks age of gestation, Systemic Lupus Erythermatosus, Antiphospholipid Antibody Syndrome,

idiopathic hemolytic anemia and hypertriglyceridemia, who was admitted for labor induction due to intrauterine growth restriction and low normal amniotic fluid index finding on ultrasound. Patient had regular prenatal check-ups, laboratory tests and ultrasound for close antenatal surveillance. At the time of admission, the patient had no perceived uterine contractions, vaginal bleeding or watery vaginal discharge.

Biophysical profile scoring showed pregnancy uterine at 34 weeks and 2 days age of gestation, with an estimated fetal weight of 2,042 grams (below the 5th percentile for age), and a low normal amniotic fluid index of 7.93 cm. The placenta was positioned in the right lateral area, is grade 3 in character. Overall biophysical profile score was 8/8. Compared to her ultrasound 3 weeks prior, there was only an estimated fetal weight growth of 213 grams (from 1,829 grams to 2,042 grams). Meanwhile, there was also an abrupt decrease in the amniotic fluid volume index from 13.15 cm to 7.93 cm, considering that the patient had no watery vaginal discharge in the interim.

The patient is a known case of autoimmune idiopathic hemolytic anemia since 1997, which initially presented as fever, jaundice and decreased hemoglobin. She has had 4 flares prior to the current pregnancy, some of which required blood transfusion support for hemoglobin of 5 g/dL. All the said flare-ups were managed with course of steroids. The patient started taking Prednisone late in December 2014. On work-up for the hemolytic anemia, she was subsequently diagnosed with systemic lupus erythematous presenting as positive ANA and anti-dsDNA tests and she was maintained on Hydroxychloroquine and Prednisone 30 mg once daily.

Patient was first diagnosed with severe hypertriglyceridemia during her first pregnancy in 2015, wherein she developed acute pancreatitis due to severely elevated triglycerides level of up to 6,000 mg/dL and underwent a total of 3 sessions of

plasmapheresis. At 34 weeks age of gestation, labor was then induced due to uncontrolled triglycerides. Patient was given neuroaxial anesthesia and successfully delivered vaginally to a healthy baby girl. Upon work up, patient tested positive for a specific autoantibody, called anti-GPIHBP1 (anti-glycosylphosphatidylinositol-anchored high-density lipoprotein binding protein), which blocks the action of lipoprotein lipase and prevents metabolism of triglycerides. Upon delivery, the baby presented with severe triglyceridemia and was also tested to be positive with anti-GPIHBP1. Patient was prescribed with Gemfibrozil 600 mg 1 tablet per orem twice daily and Omega-3 polyunsaturated fatty acid ethyl esters 1000mg 1 capsule twice daily.

The patient is also diagnosed with gestational diabetes mellitus at 24 weeks age of gestation due to elevated 75-gram oral glucose tolerance test. Since then, the patient was advised daily CBG monitoring 4 times a day. No medications were given and her blood sugar was diet-controlled with fasting CBG of less than 90 mg/dL and 2-hour post-prandial CBG of less than 120 mg/dL.

The patient had regular prenatal check up every 2-4 weeks. Regular monitoring of serum lipid levels (triglycerides, total cholesterol, HDL, VLDL and LDL) was done every trimester. Close antenatal surveillance using biophysical profile scoring was done starting 32 weeks age of gestation and then every week until term. Previous ultrasounds did not show evidence of possible intrauterine growth restriction or oligohydramnios yet.

During the admission, a multidisciplinary team approach was done and the patient was co-managed with perinatology, rheumatology, cardiology, hematology, and endocrinology services. After labor induction using dinoprostone vaginal suppository, the patient eventually underwent labor and delivered via normal spontaneous delivery under continuous labor support and local anesthesia. Neuroaxial anesthesia was not given due

to abnormal bleeding parameters (prolonged prothrombin and partial thromboplastin time). Assessment of the hematology service was elevated prothrombin and partial thromboplastin time due to the lipemic specimen that possibly have caused interference with the photoelectric method assay of determining the said blood parameters. The SLE-induced hypercoagulable state and the treatment-related qualitative platelet dysfunction secondary to use of aspirin 80 mg once a day from the first trimester up to 32 weeks age of gestation might have also contributed to the severely elevated results. Clotting time and bleeding time were otherwise normal. Three units of platelet concentrate were prepared for possible use in case of severe blood loss during delivery. Aside from that, the course of labor and delivery were unremarkable. Blood transfusion was not indicated. The patient delivered to a live baby with an APGAR score of 9,9, ballard's score of 37 weeks, birth weight of 2,468 grams and a birth length of 47 cm, which is appropriate for gestational age.

Compared to her first pregnancy, there is a more aggressive management of lipid levels during this pregnancy in order to prevent development of complications such as pancreatitis. Oral anti-lipid medication was given and regular monitoring of lipid levels was done. However, as seen in table 1 (Appendix A), the patient's triglyceride level during the pregnancy was as high as 4,901 mg/dL despite anti-lipid medications given during the entire pregnancy. Figure 1 shows the presence of white depositions in the surface of the placenta and figure 2 shows the lipemic blood 30 minutes after delivery. The presence of lipemic blood is consistent with the elevated serum triglyceride concentration of the patient. Blood transfusion was not indicated during labor and postpartum since the hemoglobin was 13.2 and there was minimal blood loss during the delivery. The patient was just given ferrous sulfate as oral medication postpartum.

As shown in figure 3 (Appendix A), the placenta and the diameter of umbilical cord

of the patient were noted to be grossly smaller than that of normal pregnancies. At term, the normal placenta weighs 470 grams and measures 22-cm in diameter, while the umbilical cord measures 40-70 cm long. This patient's placenta weighs only 360 grams at term while the umbilical cord length was normal at 45-cm. The placenta, however, was not sent for histopathology. Moreover, there were no structural deformities noted that might have contributed to intrauterine growth restriction.

DISCUSSION

Hypertriglyceridemia is defined as plasma triglyceride above the 95th percentile for age. According to Knopp et al (2006)[1], plasma triglyceride concentration normally increases up to four-fold during late gestation. The concentration of all lipoprotein fractions increases physiologically during pregnancy. Very low density lipoprotein (VLDL) cholesterol and triglycerides increase approximately 2.5-fold over pre-pregnancy levels, and low-density lipoprotein (LDL) cholesterol increases approximately 1.6-fold, all with peak levels at term. High-density lipoprotein (HDL) cholesterol peaks at mid-gestation at approximately 1.5-fold and subsequently declines to approximately 1.2-fold elevated at term. These biochemical changes appear to be primarily hormonally mediated, particularly due to estrogen increase. This normal increase in triglycerides, including the abrupt increase during late gestation, was evident in this case. As we can see in table 1 (Appendix A), the triglyceride level of the patient was erratically high during the late trimester despite taking the same dosage of statin during the pregnancy. During the 3rd trimester, there was an abrupt 3-fold increase in the triglyceride level compared to the 1st trimester level of triglyceride. There was also an at least 50% increase in the levels of the total cholesterol, HDL, VLDL and LDL, from the 1st and 2nd trimester values compared to the 3rd trimester.

In the first two trimesters, the effect of hormonal changes is to direct lipids toward

storage depots for use in later gestation. In the third trimester, estrogen stimulates production of hepatic VLDL, reduces removal of triglycerides by lipoprotein lipase in the liver and adipose tissue, and reduces post-heparin lipolytic activity. In contrast, endogenous triglyceride substrates, free fatty acids, and adipose tissue lipolysis are augmented by human placental lactogen (Desoye, 1997)[2]. Aside from this physiologic increase occurring in pregnancy, increases in exogenous triglyceride related to increased appetite and hyperphagia also contribute to increased triglyceride plasma concentrations, with a presumed teleological role of ensuring adequate substrate for normal fetal development.

For women with normal baseline triglyceride levels and has no compromise in metabolic pathways, such increase during pregnancy is well tolerated. However, in rare instances associated with genomic alterations that affect key metabolic entities, women can develop hypertriglyceridemia. In particular, the rare subgroup of pregnant women that develops severe hypertriglyceridemia, defined as triglycerides greater than 1000 mg/dl, show an increased risk of acute complications and are at risk of expressing hyperlipidemia in the future.

Glycosylphosphatidylinositol-anchored high-density lipoprotein binding protein (GPIHBP1) is a 28-kDa protein located on the luminal surface of endothelial cells in tissues where lipolysis occurs: heart, skeletal muscle, and adipose tissue. It binds lipoprotein lipase, shuttles it to its site of action in the capillary lumen and is essential for the margination of triglyceride-rich proteins along capillaries so that lipolysis can proceed. It also reduces the unfolding of lipoprotein lipase's catalytic domain, thereby stabilizing lipoprotein lipase. This patient tested positive for a specific autoantibody, called anti-GPIHBP1, which prevents the binding and transport of lipoprotein lipase, thereby interfering the intravascular metabolism of triglyceride-rich lipoproteins resulting to severe hypertriglyceridemia (chylomicronemia). In a study done by Beigneux et al (2017)[3], they have identified GPIHBP1 autoantibodies in six

patients with chylomicronemia and that these autoantibodies blocked the binding of lipoprotein lipase to GPIHBP1. This patient was one of the six subjects included in the said study. One of her children, who presented with severe but transient chylomicronemia, also tested positive for plasma containing maternal anti-GPIHBP1 after birth. In addition, three of the six patients in the study had systemic lupus erythematous.

In another study, they also detected GPIHBP1 autoantibodies in one of the 33 patients with unexplained chylomicronemia. This patient had no history of autoimmune disease, but his plasma was positive for antinuclear antibodies. (Hu et al, 2017). Although there are no studies directly correlating anti-GPIHBP1 with SLE, the increased incidence of anti-GPIHBP1 in patients with SLE is something that should be studied further.

In a study done by Abdalla et al in 2016, wherein they studied the lipid profile of SLE patients, 47.9% had hypercholesterolemia (>200mg/dL) while 33.3% had hypertriglyceridemia. There was also no significant difference in the triglyceride levels of patients taking steroids compared to those who are not taking steroids. Furthermore, there was no significant difference in the level of cholesterol, triglycerides, LDL, HDL, and VLDL in patients receiving hydroxychloroquine compared to those not receiving the drug. In this patient, the presence of SLE possibly contributed in the hypertriglyceridemia. Although the mechanism is unclear, there is said to be a decreased activity of endothelial lipoprotein lipase and impaired chylomicron removal from the plasma.

Aside from the presence of gene mutations or antibodies, hypertriglyceridemia in pregnancy can also be exacerbated by non-genetic secondary causes such as diabetes, excessive alcohol intake, metabolic syndrome, renal disease, and certain medications, such as oral estrogen therapy, non-cardioselective β-blockers, thiazide diuretics, retinoic acid derivatives, antirejection medications, and corticosteroids. As for this patient, she was maintained on aspirin and prednisone for her SLE, which may have further exacerbated her

hypertriglyceridemia.

As mentioned earlier, acute pancreatitis is one of the complications of severe hypertriglyceridemia. This patient developed acute pancreatitis during her first pregnancy, which led to the diagnosis of severe hypertriglyceridemia secondary to anti-GPIHBP1. Severe pancreatitis was reported to have approximately 21% and 20% mortality for both mother and fetus, respectively (Montgomery, 2010)[4]. During her first pregnancy, the acute pancreatitis eventually caused preterm labor and delivery at 32 weeks age of gestation. Goldberg and Hegel (2012) compared eight cases of severe gestational hypertriglyceridemia in the literature since 2002 and the interventions used to prevent chylomicronemia from proceeding to pancreatitis. Patients who received fibrates had no adverse teratogenic effects. However, fenofibrates and home diet regimen alone were never sufficient to prevent progression to pancreatitis. Patients who were admitted for intensive dietary control did not develop pancreatitis. In one case wherein hospital admission for intensive dietary control, which means dietary fat below 20% of caloric intake, was done at the time of diagnosis of subclinical pancreatitis, delivery was delayed by 1 week but early cesarean section was still required. In three of the cases where pancreatitis occurred, management included: fenofibrate plus niacin initiated at 10 weeks age of gestation, 90% omega-3-acid ethyl esters initiated at 20 weeks age of gestation, and gemfibrozil and topical sunflower oil initiated at 29 and 31 weeks gestation, respectively. Administration of oral medium chain triglycerides and omega-3 fatty acids was associated with positive outcomes, although this is not insufficient to recommend one type of fat supplement over another. This patient did not take fenofibrates nor was she admitted for intensive dietary control. However, she was maintained with statins although out the pregnancy.

There has been only a single report of successful use of therapeutic plasma exchange or heparin in the prevention of pregnancy-associated pancreatitis since 2002. One of the

cases demonstrated that prophylactic use of therapeutic plasma exchange for the prevention of pancreatitis is possible. However, the short-lived therapeutic benefit of this more invasive intervention limits its utility. In addition, heparin use without insulin was not recommended because it causes a rebound triglyceride rise after therapy that may be harmful than therapeutic. Insulin therapy, on another hand, may be utilized as long as the patient will be in a setting wherein hypoglycemia could be monitored, such as hospital admission.

Unlike her first pregnancy, this patient did not develop acute pancreatitis during this pregnancy. However, fetal intrauterine growth restriction was noted and is evident in the gross examination of the small placenta. The presence of severe hypertriglyceridemia, as seen in figures 1 and 2 (Appendix A), may have caused impaired blood flow, causing growth restriction.

Inadequate birth weight is regarded as a surrogate measure of poor fetal nutritional status. It has been shown that maternal malnutrition, defined as prepregnancy underweight and/or insufficient body mass gain during gestation, may result in intrauterine growth retardation. In a study done by Szostak-Wegierek D (2014)[6], underweight women gave birth to significantly smaller babies. The mean birth weight of the offspring of undernourished mothers was about 300 grams lower than that of the progeny of mothers with normal body mass and about 600 grams lower than that of babies of overweight mothers. However, undernutrition and maternal poor weight gain can be ruled out as a cause in this case since there was no evidence of maternal malnutrition during the pregnancy. Furthermore, there is a growing body of evidence that improper intrauterine nutrition, either undernutrition or overnutrition, may negatively influence vascular health in later life by both an increase in their cardiometabolic risk factors and direct influence on vascular structure and function. Fetal undernutrition may result from maternal malnutrition or placental dysfunction that is often related to hypertensive disorders of pregnancy or poorly controlled maternal diabetes. Fetal overnutrition, on the other

hand, may result from maternal excessive nutrient intake and maternal diabetes. Thus, one of the possible causes of the intrauterine growth restriction noted in this case can be the patient's gestational diabetes. In addition to that, this patient had a very restricted diet, involving less sugar and fat for both her gestational diabetes mellitus and hypertriglyceridemia so this might have also contributed to the small fetal birth weight.

Traisrisilp et al.[7] carried out a study of pregnancy outcomes in women complicated by anemia, majority of which is thalassemia cases, and found out that 27.3% of these women had fetal growth restriction and 44.1% had low birth weight (<2,500 grams). Moreover, the most common fetal complication noted was low birth weight, which was found in 27 out of 37 cases (67.5%), followed by birth asphyxia (22.5%), septicemia (15%), jaundice (7.5%) and stillborn (7.5%). The study also concluded that inspite an attempt to keep hemoglobin levels above 7.0 g/dL, pregnancy with thalassemia is likely to be associated with an increased rate of fetal growth restriction, preterm birth and low birth weight. Similarly, Bajoria et al (2009)[8] observed that the incidence of preterm labor and growth restriction were 3-fold higher as compared to the background population. In our patient, both fetal growth restriction and low birth weight were not seen. The birth weight of her baby was 2,468 grams, which is between the 10th and 25th percentile based on Hadlock criteria.

Aside from severe hypertriglyceridemia, this patient is also a diagnosed case of systemic lupus erythematosus (SLE). During pregnancy, about one third of patients with SLE experience exacerbation mostly postpartum or during the last trimester of the pregnancy. The risk of exacerbation for patients with active disease at the time of conception was double that of patients with inactive disease. Neonatal mortality of babies born by women with SLE was 2%. In a study done by Laeger in 1998[10], wherein 1,164 pregnancies was compiled, 54% of the pregnancies were normal, 15% of the babies were born premature, and 29% of the pregnancies resulted in fetal wastage. In a background population of 50,000 women the

corresponding figures were 80, 4 and 16 percent, respectively. In addition, cardiolipin-antibody may be a marker of fetal wastage and Ro-antibody may be a marker of fetal heart block in babies borne by women with SLE. For this patient, she did not experience exacerbation since she was already maintained with oral prednisone and hydroxychloroquine.

In another study done by Tareeva (2004)[11] wherein the course of SLE was analyzed retrospectively in pregnancy and after delivery for 34 patients (44 pregnancies). Aggravation of the disease was registered in 6 cases (13.5%). Only two of the patients received prophylactic corticosteroid maintenance. Two patients with unaffected kidneys had no pregnancy-related SLE exacerbations though they developed nephropathy. After delivery the disease aggravated in 12 patients (27.3%). Five patients had moderate exacerbations within half a year after the delivery, 7 patients developed severe exacerbations within 3 to 11 months postpartum. Three women had renal damage after the delivery as initial condition. SLE exacerbations were reported more frequently in young patients (under 30 years of age), which was seen in 15 of 31 pregnancies, than in older ones (over 30 years of age), which was seen in 3 of 13 pregnancies. Postpartum SLE aggravations can be prevented by large doses of prednisolone (20-30 mg/day) administered for 2-3 weeks. Given these findings, close postpartum follow-up is warranted to prevent such complications.

In addition to having triglyceridemia and systemic lupus erythematosus, this patient is also a diagnosed case of antiphospholipid antibody syndrome (APAS), which may also be related to the interplay of antibodies in her autoimmune state. Antiphospholipid antibodies promote activation of endothelial cells, monocytes and platelets, with complement activation having a possible central pathogenic role, leading to overproduction of tissue factor and thromboxane A2. Patients with APAS may have a variety of clinical features, including venous and arterial thrombosis, recurrent fetal losses, and thrombocytopenia. The characteristic pathologic change is a thrombotic microangiopathy with minimal vascular or perivascular

inflammation. Abnormalities in placentation have been described in pregnancy loss related to antiphospholipid antibodies. According to Hoy et al (2000), APAS has a diversity of presentations and not just recurrent pregnancy loss. This is because the syndrome involves antibodies that are directed against phospholipids or against any plasma proteins that are bound to anionic phospholipids. She reported a patient who had acute appendicitis and normochromic normocytic anemia. In another study done by Lee et al (2000), they reported a patient who had mesenteric and portal venous obstruction. Obstetric manifestations of APAS are not restricted to fetal loss (Nodler et al, 2009; Sammaritano et al 2005)[14]. Neonatal complications, such as prematurity, which occurs in 30-60% and is more common in SLE patients, can also be manifested. This patient was diagnosed with SLE and APAS, hence, both may have also contributed for the fetal intrauterine growth restriction. Other manifestations may include early delivery, oligohydramnios, prematurity, fetal distress, placental insufficiency, and maternal complications such as preeclampsia, eclampsia and HELLP syndrome.

According to Prima et al (2011)[15], when diagnosed in patients with an underlying autoimmune disease, such as this patient's SLE, APAS is termed secondary APAS. In patients with SLE and APAS, intrauterine growth restriction and placental insufficiency are more common manifestations.

Several potential new therapeutic approaches for APAS are being studied. Among the new drugs, dipyridamole and hydroxychloroquine are the ones that can be used during pregnancy. This patient was maintained with hydroxychloroquine for her SLE and this was continued during the pregnancy. According to Kaiser et al (2009), hydroxychloroquine has an anti-thrombotic effect in patients with antiphospholipid antibodies, most of whom have SLE. It directly inhibits the binding of antiphospholipid antibody- 2-glycoprotein-1 complexes to phospholipid surfaces. It also has a protective effect by inducing formation of annexin A5 shield over phospholipid bilayers from damage induced by antiphospholipid antibodies.

Because of its safety profile, including the absence of any adverse effects on the fetus-neonate, and the absence of associated bleeding, hydroxychloroquine is used as an adjuvant antithrombotic therapy in patients with SLE who are positive for antiphospholipid antibodies. It is classified as a pregnancy category C drug. Moreover, studies have shown a dose-dependent reduction by hydroxychloroquine of platelet activation and clotting induced by antiphospholipid antibodies (Espinola RG et al (2002)[16]. For our patient, she was maintained with hydroxychloroquine for her systemic lupus erythematosus and this might have contributed for the successful pregnancies despite having a concomitant antiphospholid antibody syndrome.

This patient was admitted due to the finding of possible intrauterine growth restriction and low normal amniotic fluid index on routine ultrasound. Her comorbidities all might have contributed to the finding of intrauterine growth restriction. During her first pregnancy wherein she developed acute pancreatitis, patient was diagnosed to have severe hypertriglyceridemia with a presence of a rare autoantibody, anti GPIHBP1. During this pregnancy, patient was monitored closely and was maintained on maintenance medications. Plasmapheresis was not indicated for this pregnancy since her triglyceride levels are not as high compared to her first pregnancy. Since plasmapheresis was not done, this might have caused her falsely elevated prothrombin and partial thromboplastin time that prevented the administration of neuroaxial anesthesia. However, aside from that, the course of the labor was unremarkable and the baby had a good outcome.

CONCLUSION

Anti-GPIHB1 is a rare autoantibody that causes severe hypertiglyceridemia. In patients diagnosed with this antibody, especially in pregnant patients, close monitoring of lipid level, diet control, and maintenance with statin medications are warranted as to prevent

complications. Systemic lupus erythematosus, Antiphospholipid Antibody Syndrome, and presence of elevated triglyceride levels may have caused intrauterine growth restriction. The presence of these three conditions—Systemic lupus erythematous, Antiphospholipid Antibody Syndrome, and severe hypertriglyceridemia—is what made this case rare, especially that there was a good pregnancy outcome and that compared to her first pregnancy, this pregnancy was carried to term given a different approach to management. In patients with multiple comorbidities, provided a multidisciplinary team is available, pregnancy can be safe and usually has a favorable outcome. For her subsequent pregnancies, close monitoring of hemoglobin, diet, triglyceride levels, fetal growth and fetal status is again warranted.

RECOMMENDATIONS

This study recommends further investigation regarding the incidence rate of severe hypertriglyceridemia in patients with antiphospholipid antibody syndrome and systemic lupus erythematosus. The level of triglyceride in correlation to the fetal weight can also be investigated to determine if there is correlation between them. The cut-off level of triglycerides as to when to do plasmapheresis can also be studied in order to help plan the labor of the patient and what anesthesia to use. Furthermore, the baby can also be tested for the presence of antibodies and the incidence of babies with triglyceridemia born of mothers with severe triglyceridemia and positive anti-GPIHBP1 can be determined.

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APPENDIX A

Table 1. Lipid profile levels during the pregnancy

Date	Triglycerides (mg/dL)	Total Cholesterol	HDL	LDL	VLDL
July 21, 2017	4,901	321	24	88	980
June 24, 2017	1,659	230	14	56	332
March 12, 2017	1,570	163	12	45	314
September 1, 2016	1,558	98	13	37	312

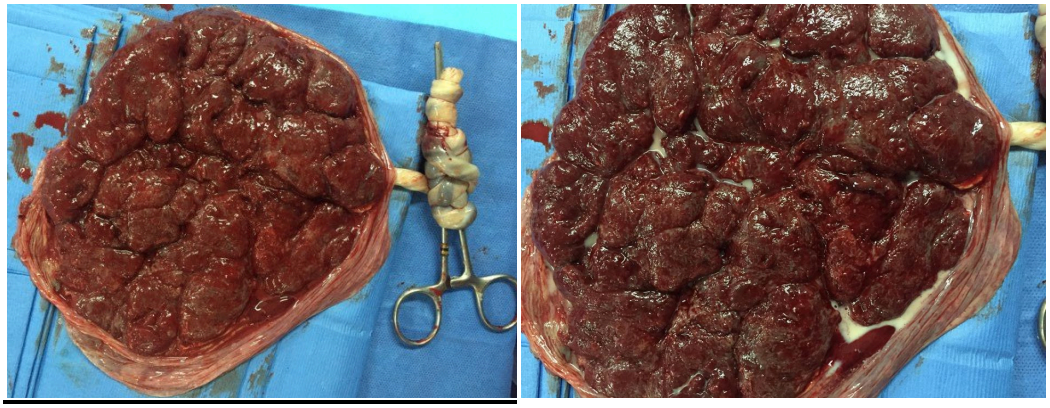


Figure 1. (A) Placenta right after delivery. (B) Placenta 30 minutes after delivery



Figure 2. Blood. These images were taken a few minutes after delivery.

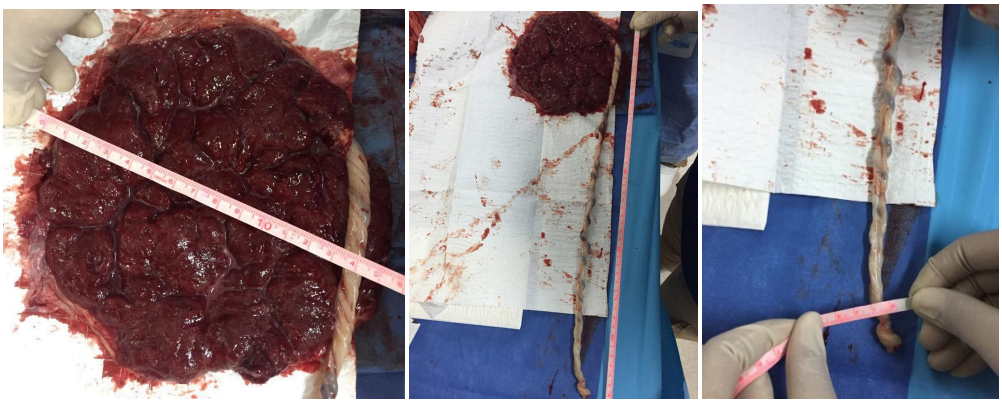


Figure 3. (A) Placenta. (B) Umbilical Cord.