

Pregnancy-Related Thromboembolism

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Abstract- The risk of venous thromboembolism (VTE) during pregnancy is 4- to 5 times higher than it is in the non-pregnant condition. [1, 2] Deep vein thrombosis (DVT) and pulmonary embolism are the two signs of VTE (PE). While most publications claim that VTE can happen at any stage of pregnancy, research indicates that the first half of pregnancy is when it happens most frequently. Complications including pulmonary hypertension, post-thrombotic syndrome, and venous insufficiency are examples of DVT and PE sequelae. The diagnosis can be aided by a number of diagnostic techniques, including compression duplex ultrasonography of the leg veins, echo, ventilation-perfusion scan, and computed tomographic pulmonary angiography. A proper course of treatment can benefit the mother and the fetus. To ensure a thorough explanation of the subject, the many literature sources documenting thromboembolic diseases during pregnancy are reviewed and methodically analyzed[2].

Index Terms- edema, hyperemesis, puerperium, thromboprophylaxis, hemorrhage, embolism, warfarin.

I. INTRODUCTION

Blood clots (thrombi) occur in blood vessels as a result of thromboembolic diseases. A blood clot that spreads through the bloodstream and narrows an artery is called an embolus. Thromboembolic diseases are a significant reason for pregnancy-related deaths in the US. During around six weeks following delivery, there is an increased chance of developing a thromboembolic condition. The majority of blood clot issues are brought on by birth trauma. Compared to vaginal delivery, the risk is significantly increased after cesarean delivery. One of the major causes of maternal morbidity and mortality throughout the world is venous thromboembolism. Pulmonary embolism is now one of the main causes of maternal mortality, according to studies on maternal mortality conducted in India [3, 4].

II. PATHOPHYSIOLOGY-

The coagulation profile is significantly altered during pregnancy. Fibrinogen, clotting factors VII, VIII, X, and XII, the VWF (von Willebrand factor), the ristocetin cofactor, and protein S all exhibit enhanced activity. Throughout pregnancy, protein C levels are constant, antithrombin III levels are stable, fall after childbirth, and then rise again throughout the postpartum period. Pregnancy-related increases in oestrogen levels have the impact of increasing protein synthesis, which is the cause of all these alterations. Pregnancy is a prothrombotic condition as a result of all these changes. Pregnancy-related enhanced activity of factors V Leiden and VIII with decreased protein S levels may result in activated protein C resistance[6]. After birth, these modifications may take up to six weeks to revert to their pre-pregnancy state.

EPIDEMIOLOGY

- One in one hundred thousand women of childbearing age experience VTE.
- 2 Compared to non-pregnant women of the same age, it occurs up to 10 times more frequently in pregnant women.
 - 3 Around 1 in 1,000 pregnancies involving women under the age of 35 have it. 1.4/1,000 pregnancies in women over the age of 35 experience it.
- Thirty to forty percent of women with pregnancy-related VTE had inherited thrombophilia.

THROMBOEMBOLIC DISORDERS AND RISK FACTORS DURING PREGNANCY

Pregnancy-related VTE risk is enhanced by a number of variables. These elements may be obstetric causes or preexisting conditions (hereditary or acquired). As the gestational age increases, the risk of several deadly prenatal occurrences increasing throughout the first trimester. The first three weeks following delivery are when there is the greatest risk. Although there is a minimal absolute risk of VTE in pregnant women, it is nonetheless appropriate to take a thorough medical history and screen patients at higher risk carefully[7]. Following a risk-benefit analysis, prophylactic anticoagulation must be started.

HIGH-RISK ELEMENTS

1. Personal experience with VTE
- VTE combined with high risk thrombophilia
3. current pregnancy with VTE
4. Individual VTE history with hormonal risk factor
5. A first-degree relative who has a family history of VTE and antithrombin deficiency
6. Multiple thrombophilias
7. Continual unprovoked VTE
8. The need for hospitalization for ovarian hyperstimulation syndrome (given up to 13 wks)
9. Congenital thrombophilia
10. Major non-obstetric surgery while pregnant
11. Overweight (BMI > 40 kg/m²)
12. Present medical condition, such as cancer, nephrotic syndrome, sickle cell disease, pre-existing diabetes with vascular complications, or a systemic inflammatory illness, such as heart or lung disease.
13. Present-day sepsis necessitating IV antibiotics

Low-risk elements

1. Older than 35
2. Overweight (40kg/2)
3. Parity 3
4. Smoker
5. Noticeable varicose veins
6. Current pregnancy-related preeclampsia
7. ART/IVF
8. Many pregnancies
9. Caesarean section, mid-cavity delivery, or rotational operation
10. Longer than 24 hours of work
11. PPH (more than 1 L or transfusion)
12. Early delivery
13. A stillbirth during the present pregnancy
14. Lack of movement and dehydration
15. First-degree relatives with a history of unprovoked or estrogen-related VTE
16. Recognized thrombophilia at low risk.

Clinical attributes

Clinical DVT and PE presentations are comparable to those seen in non-pregnant women. In more than 80% of cases, DVT in women is accompanied with pain and edema in the affected extremity. Lower limb DVT is suggested by a calf circumference difference of more than 2 cm.

Women who are pregnant and have PE can exhibit tachycardia and acute-onset dyspnea. Moreover, they could experience pleuritic chest pain. Epigastric discomfort, nausea, vomiting, unexplained hypotension, and excessive exhaustion are examples of unusual presentations. Only a small percentage of them are asymptomatic and are unintentionally discovered during

standard prenatal exams. Large PE can cause shock and even death in expectant mothers.

DIAGNOSTIC METHODS FOR PREGNANT WOMEN WITH PULMONARY EMBOLISM AND SUSPECTED DEEP VEIN THROMBOSIS-

It takes a high index of suspicion to diagnose PE in pregnant women. False explanations for breathlessness include uterine growth that compromises breathing or pregnancy-related anemia. Tachycardia necessitates a more thorough investigation than the regular physiological increase in heart rate. It is important to test women with a history of thromboembolism for thrombophilia and antiphospholipid antibody syndrome.

D-dimer levels that are elevated are frequently seen during pregnancy, so they are less useful for identifying PE and DVT in pregnant women. Modified Well's scores and trimester-specific D- dimer levels can improve diagnostic accuracy without the need for radiation exposure, according to a small study[8,9].

When evaluating DVT in expectant women, compression duplex ultrasonography with color Doppler (CUS) is the procedure of choice. Due to the tendency of pregnant women to develop thrombus in the pelvic veins and proximal veins, which carry a higher risk for pulmonary thromboembolism, the use of color Doppler increases the yield of diagnosis. This test is risk-free, devoid of ionic radiation, and repeatable in cases when the initial results are negative but the level of suspicion is high.

CHEST X-RAY

Typically, a standard chest X-ray (CXR) is not performed during pregnancy. To examine for signs of any alternative diagnosis, such as pneumonia or pneumothorax, a chest X-ray with a posteroanterior (PA) view can be performed safely with the necessary measures to reduce fetal exposure to ionizing radiation when necessary. PE may be diagnosed by the presence of pulmonary oligemia, an enlarged main pulmonary artery, and wedge-shaped infarcts. Further testing, such as a computed tomographic pulmonary angiography (CTPA) or a ventilation- perfusion scan (V/Q scan), is warranted in the case of a normal CXR and a high index of suspicion

Electrocardiogram

Atrial arrhythmias, I III III nonspecific ST alterations, sinus tachycardia, complete or incomplete right bundle branch block (RBBB), right ventricular (RV) strain, right axis deviation, tall R in V, S Q T, and pulmonale can all be indicators of PE.

Echocardiography

You can utilise a two-dimensional (2D) echocardiography (echo) with colour Doppler to assess the prognosis and therapy response. PE may be suggested or identified by the presence of enlarged right-sided heart chambers, tricuspid regurgitation, evidence of pulmonary artery dilatation, sporadic detection of thrombus in the pulmonary arteries, and RV dysfunction. Estimated pulmonary artery pressure can indicate how severe pulmonary hypertension is, and serial evaluation can help determine how well a treatment is working. This is exceedingly safe and non-invasive during pregnancy[10].

Venous Magnetic Resonance Imaging

Compression ultrasonography Doppler in expectant women with suspected DVT may be typical. The risk of PE is higher for these women since they frequently have pelvic vein thrombosis. According to the recently released European Society of Cardiology (ESC) 2018 guidelines, magnetic resonance venography may be used to rule out pelvic thrombosis in women with high suspicion in whom the initial CUS is negative

CT Angiogram of the Pulmonary System Low-exposure computed tomographic pulmonary angiograms (CTPA) can be performed safely with little chance of causing cancer in the developing foetus and with the protective protection of mother breast tissue to lessen ionizing radiation absorption. A negative CTPA scan excludes PE because it is diagnostic. Ineffective anticoagulation can be avoided and a different diagnosis, such as pneumonia, can be made[11,12].

Scan of ventilation-perfusion

Due to higher radiation exposure, V/Q scans are not frequently conducted. They have limited diagnostic utility since they can produce intermediate and low probability results in individuals who have a high clinical suspicion of PE. By omitting the breathing component in patients with normal perfusion and halving the radiation dosage, radiation exposure can be reduced. A V/Q scan is not appropriate for patients who have asthma or underlying lung illness to identify PE.

Imaging Using Magnetic Resonance

A good diagnostic tool, magnetic resonance imaging (MRI) is safe for both the mother and the fetus. As MR angiography of the pulmonary artery techniques advance, one effective diagnostic tool. However, the safety of using gadolinium contrast during pregnancy and its impact on the fetus are not well known.

Optimal Imaging Technique

DVT can be diagnosed with excellent sensitivity and specificity using compression duplex ultrasound with Doppler. As a result, it is advised as the primary line of inquiry[13,14]. The diagnosis of pelvic vein thrombosis can be made by magnetic resonance venogram in pregnant patients with negative CUS and a high index of suspicion for VTE.

Acute deep vein thrombosis treatment

After a diagnosis has been made, in-patient treatment should start right away. At the start of treatment on an outpatient basis, there are no safety studies available. The preferred anticoagulant is LMWH. Although UFH can be utilised, there is a chance that it can cause skin reactions and thrombocytopenia due to heparin. Warfarin is not preferred because of the potential risk of embryopathy linked with vitamin K antagonists.

Low-Molecular-Weight Heparin Dose

Pregnant women should get a higher dose of LMWH than nonpregnant women of the same age due to the weight gain associated with pregnancy and the altered renal excretion of LMWH. Monitoring factor Xa levels is ideal for treating acute DVT and severe PE since recurrence is more frequent during the first trimester. Nevertheless, not all centres in India have easy access to the factor Xa assay. The suggested dosage is 150 to 200 U/kg of UFH twice day, or full-dose enoxaparin twice daily. In conjunction with a haematologist, pregnant women who are intolerant to heparin compounds can utilise fondaparinux 7.5 mg. Patients with a high risk of developing DVT should start anticoagulation therapy as soon as possible after learning they are pregnant[15,16]. Individuals with no family history of VTE and asymptomatic thrombophilia should be closely watched. Anticoagulation must be continued for 10 days after birth in patients who are highly obese (BMI > 40) or who have more than two risk factors. Individuals with prior VTE must take anticoagulants for at least 6 weeks, but with sufficient bridging, warfarin can be begun 5 days after delivery.

Care for Pulmonary Embolism

Women who are pregnant and have acute PE need to be hospitalized for emergency care. First, UFH should be administered, and the dose should be adjusted based on the aPTT. Massive PE in pregnant women is treatable with thrombolytic therapy, as shocks in patients. Recombinant tissue plasminogen activator (TPA), streptokinase, and urokinase are all safe to use while pregnant[17,18]. The risk to the fetus is quite low because they do not cross the placental barrier. With LMWH or UFH, post-thrombolysis anticoagulation must be maintained. Once the ideal dose of anticoagulation is reached, oral anticoagulation should be used to bridge LMWH therapy in postpartum PE women. It is unknown whether using newer oral anticoagulants while pregnant or nursing is safe[19].

III. CONCLUSION-

Even though they are uncommon, thromboembolic diseases during pregnancy carry a high risk of morbidity and mortality. Maternal and fetal outcomes can be improved by risk assessment, accurate diagnosis, and effective management. Management of these women has become simple thanks to proper guidelines and appropriate preconception counseling.

PEs, which account for 10 to 20 percent of VTEs, are the major causes of VTE mortality. They account for one-third of maternal deaths and are the main direct cause of maternal mortality in the UK

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