ГІПЕРТЕНЗІЯ І ВАГІТНІСТЬ

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HYPERTENSION AND PREGNANCY

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Treatment of preeclampsia

Gestational Hypertension

· A patient must be admitted to hospital.

· The blood pressure must be measured every 8 hours.

· Patients must be weighed daily.

· 24-hour urine must be studies for protein twice weekly.

· Fetal movements must be counted and recorded twice daily.

· Patients with a diastolic blood pressure of 100 mm Hg or higher oral anti hypertensive drugs must be given (alpha methyldopa is the drug of choice).

· If the cervix is favourable, a surgical induction of labour is performed at 38 weeks' gestation. If not, one may wait until the cervix is more favourable if the maternal and fetal conditions good. The pregnancy must not be allowed to continue beyond 40 weeks' gestation.

Mild Preeclampsia

· The treatment of preeclampsia is bed rest and delivery.

· The patient is usually hospitalized upon diagnosis, since this diminishes the possibility of convulsions and enhances the chance of fetal survival, and to prevent premature delivery.

· The blood pressure is measured every 6 hours.

· Patients are weighed daily.

· Urine testing for protein and 24-hour urine for protein are performed daily.

· Liver function, liver enzymes, serum albumin, uric acid, electrolytes, urea creatinine are determined on admission and every 3 days.

· Coagulation studies such as prothrombin clotting time, partial thromboplastin time, fibrinogen, and platelet count should be done every 3 days.

· Consultation of the ophthalmologist, cardiologist, therapeutist, neurologist.

· Assessments of gestational age and estimated foetal weight are performed by ultrasonic examination on admission and thereafter as indicated.

· The fetal movements must be monitored daily.

· Foetal status is evaluated by twice-weekly nonstress tests and ultrasound assessment of amniotic fluid volume. Nonreactive nonstress tests require further evaluation with either a biophysical profile or an oxytocin challenge test.

· Amniocentesis to determine the lecithin/sphingomyelin ratio is not frequently used in preeclampsia, since early delivery is usually for maternal indications, but it may be useful as the fetus approaches maturity.

· Oral anti-hypertensive drugs must be given to control the blood pressure. Alpha methyldopa is the drug of choice.

· Sedatives were used in the past but have become disfavored because they interfere with fetal heart rate testing and because one of them - phenobarbital - impaired vitamin K-dependent clotting factors in the fetus.

· Patients with mild preeclampsia are often started on magnesium sulfate therapy for seizure prophylaxis (4 g load and 2 g/h maintenance) during labour and delivery and should be continued for 12 to 24 hours after delivery.

· Corticosteroids (betamethasone 24 mg, dexamethasone 24 mg) should be used intramuscularly to accelerate fetal lung maturity in patients with preeclampsia.

· With rapidly worsening preeclampsia, fetal monitoring should be continuous because of the risk of abruption placentae and uteroplacental insufficiency. In these cases, vaginal delivery may be attempted with the assistance of prostaglandins, oxytocin, or amniotomy as needed. Caesarean delivery need only be performed for obstetric indications.

Severe Preeclampsia

The goals of management of severe preeclampsia are prevention of convulsions, control of maternal blood pressure, and initiation of delivery.

1. If the patient is 34 weeks' pregnant or more, labour must be induced.

2. If she is less than 34 weeks' pregnant, she must be managed as followed:

· Hospitalization for bed rest without physical and mental stress.

· The blood pressure is measured every hour.

· Urine testing for protein is performed every 4 hours.

· Liver function, liver enzymes, uric acid, electrolytes, serum albumin, urea, creatinine and coagulation studies must be done every day.

· Consultation of the ophthalmologist, cardiologist, therapeutist, neurologist.

· The fetal movements must be monitored daily, antenatal cardiotocography must be done twice or more daily. An ultrasound examination is done to assess fetal weight, and fetal viability.

· Antihypertensive medications - alpha methyldopa is the drug of choice. If the diastolic blood pressure remains at 110 mm Hg or higher, a second or even a third antihypertensive drug is added. Nifedipine is the drug of choice, if a second antihypertensive drug is required. Prazosin or labetalol may be added, if a third drug is required.

· The goal of antihypertensive drugs is to bring the diastolic blood pressure into the 90-100 mm Hg range.

· Corticosteroids must be given intramuscularly to accelerate lung maturity.

Fluid therapy for preeclampsia

The basis of pathogenetic therapy of preeclampsia is the infusion therapy aimed at eliminating hypovolemia and anemia, stabilizing the main indicators of the central and peripheral hemodynamics, improve rheological properties of blood, removal of hypo- and dysproteinemia, prevention of DIC syndrome. Adequate infusion therapy is used under the strict control imposed by the volume and fluids, diuresis, hematocrit and central venous pressure. The level of diuresis should not be less than 60 ml / hr. The total amount of fluid that is introduced must meet daily physiological needs of the patient (an average of 30-35 ml/kg). Drugs of choice for infusion therapy until delivery are Ringer's lactate, normal saline, solutions hydroxyethylchrohmaly 6 or 10 % (Refortan), fresh frozen plasma to correct hypoproteinemia (indicators of plasma protein <55 g/l), the normalization of relations anticoagulants/procoagulants that is prevention of bleeding during labour and the postpartum period.

Additional fluid volumes, in the order of 1000-1500 ml, may be required prior to use of epidural anaesthesia or vasodilator

therapy to prevent maternal hypotension and fetal distress. Severely hypertensive patients receiving vasodilator therapy may require careful volume preloading to prevent an excessive hypotensive response to vasodilators. Abrupt and profound drops in blood pressure lading to fetal bradycardia and distress may occur in severe preeclampsia when vasodilator therapy is not accompanied by volume expansion.

Intravenous fluids are known to cause a decrease in colloid-oncotic (COP) pressure in labouring patients. In addition, baseline COP is decreased in patients with preeclampsia and may decrease further postpartum as a result of mobilization of interstitial fluids. This may be clinically relevant with respect to the development of pulmonary oedema in preeclamptic patients. Therefore, close monitoring of fluid intake and output, hemodynamic parameters, and clinical signs must be undertaken to prevent an imbalance of hydrostatic and oncotic forces that potentiate the occurrence of pulmonary oedema. Thus, in the absence of a firm clinical indication for colloid infusion, carefully controlled crystalloid infusions appear to be the safest mode of fluid therapy in severe preeclampsia.

The modern blood substitute with a unique oxygen-transporting function Perftoran. It belongs to a new class of infusion therapy produced by perfluorocarbonic compounds. Perftoran is used as an antishock and anti-ischemic agent. The preparation provides for gas-transporting, rheological, hemodynamic, diuretic, membrane-stabilizing, heart-protecting and sorptive effects. Perftoran restores the central and peripheral hemodynamics, improves rheology of blood. Circulating blood Perftoran provides a more complete extraction of oxygen from the hemoglobin of red blood cells, accelerates the diffusion of oxygen into the tissue and increases the relative proportion of oxygen consumption. Due to submicron size (0,03-0,15 microns) emulsion particles that 50-70 times smaller than the erythrocyte, Perftoran can deeply penetrate into the hypoxic tissue and provide additional oxygenation. By our method infusion of previous oxygenation Perftoran transmitting at speeds of 50 ml/h in doses of 2-3 ml/kg a day during of 3-5 times.

In order to improve microcirculation and rheological properties of blood, along with the infusion therapy appoint desagregants and anticoagulants (Trental, Complamin, Aspirin and Heparin). Violation of the functional state of liver in preeclampsia, which causes HELLP-syndrome, requiring hepatoprotectors (Hofitol, Esentsiale, Solkoseryl, Erbisol, Lipin). These drugs also have a property to improve hemomicrocirculation and trophic function of the placenta.

Vaginal delivery is preferable to cesarean section and labour induction should be aggressive. A clear endpoint for delivery should be determined, usually within 24 hours. If delivery is not achieved within the set time frame, cesarean is warranted. If the maternal condition deteriorates or foetal distress develops the caesarean section must be done immediately. If the gestational age is less than 22 weeks, the patient should be offered induction of labour to terminate the pregnancy.

Management of a patient with severe preeclampsia or imminent eclampsia

Step 1

· An intravenous infusion of Ringer's lactate and giving magnesium sulphate.

· Initial loading dose of magnesium sulphate - give 4 g slowly intravenously over 15 minutes (prepare the 4 g by adding 16 ml 25 % magnesium sulphate to 12 ml sterile water).

· Then give 1 g (3,33 %) magnesium sulphate/h the intravenous infusion (prepare the 3,33 % magnesium sulphate by adding 30 ml 25 % magnesium sulphate to 220 ml 0,9 % NaCl or Ringer's lactate) until 24 hours after delivery.

Step 2

· After the magnesium sulphate has been given, insert a Foley's catheter to monitor the urinary output.

Step 3

· If the diastolic blood pressure is 110 mm Hg or more, it must be reduced with hydralazine: adding 20 mg (1 ml) hydralazine to 20 ml 0,9 % NaCl and give slowly intravenously 5 ml (5 mg hydralazine) every 10 minutes; or 5-10 mg nifedipine orally.

· The patient's blood pressure is taken every 5 minutes for the next 30 minutes. If the blood pressure drops too much, intravenous Ringer's lactate is administered rapidly, until the diastolic blood pressure returns to normal (90-100 mm Hg).

· Patients who have received 10 mg nifedipine, can be given a second dose of 10 mg nifedipine orally if the diastolic blood pressure remains 110 mm HG after 30 minutes. If necessary, it can be repeated half hourly up to a maximum dose of 50 mg.

Step 4

· The patient must be delivered immediately after the patient's condition stabilizes.

Parenteral magnesium sulfate has become the drug of choice for therapy and prophylaxis of eclampsia. Magnesium causes relaxation of smooth muscle by competing with calcium for entry into cells at the time of cellular depolarization, but its exact mechanism of action in the control of eclamptic seizures is unknown. Central nervous system depression and suppression of neuronal activity are postulated as mechanisms. Additional theories about the efficacy of magnesium sulfate therapy for seizure prophylaxis include its role as a cerebral vasodilator (particularly acting on the smaller diameter vessels). The potential for magnesium to relieve cerebral ischemia through its antagonism of calciumdependent arterial constriction may explain its antiseizure activity. Conversely, once widespread cerebral vasoconstriction has occurred in severe preeclampsia, the resultant cerebral ischemia could lower the threshold for seizure activity in those affected areas.

Clinical findings associated with elevated serum magnesium levels will help in monitoring therapy (Table 1). The following guidelines may help to prevent magnesium toxicity:

· monitor hourly urine output;

· evaluate deep tendon reflexes hourly;

· monitor respiratory rate;

· monitor serum magnesium levels regularly.

If magnesium toxicity is suspected, the magnesium infusion should be discontinued, supplemental oxygen administered, and a serum magnesium level obtained. Pharmacologic treatment of magnesium toxicity includes administration of 10 ml of 10 % calcium gluconate (1 g in total) as a slow intravenous push. Respiratory arrest secondary to magnesium toxicity requires intubation and assisted ventilation. Magnesium sulfate may inhibit uterine contraction, causing uterine atony. Magnesium sulfate therapy appears to prolong bleeding time, to increase blood loss at delivery, and to be associated with increased postpartum hemorrhage. Magnesium sulfate may also decrease the fetal heart rate, and signs of neonatal hypermagnesemia have been reported after only 24 hours of intravenous therapy.

Anesthesia in delivery

Sudden increase in blood pressure may occur in general anesthesia during either intubation or extubation, leading to a cerebrovascular event. An increase in arterial blood pressure accompanies laryngoscopy performed with or without trache-

Table 1. Clinical response to serum magnesium sulfate concentrations

Serum concentration $MgSO_4$ (mg/ml)	Clinical response
4,8 – 8,4	Therapeutic seizure prophylaxis
8	Central nervous system depression
10	Loss of deep tendon reflexes
15	Respiratory depression/paralysis
17	Coma
20-25	Cardiac arrest

al intubation. Therefore, blood pressure should be reduced prior to intubation or extubation. This hypertensive response is prevented with a short-acting antihypertensive agent, such as nitroglycerin, sodium nitroprusside, or labetalol.

Decreased sympathetic activity due to regional anesthesia leads to dilatation of the capacitance vessels that cause hypotension. Adequate intravascular volume repletion (fluid preloading) performed before initiating regional anesthesia avoids this relative hypovolemia. Management of volume status varies according to the severity of the patient's disease. Hypotension can also occur with intravenous administration of antihypertensive medication. This effect is more pronounced if the mother has been in a supine position for a long period; hence, the need to have the patient in a "tilted" position to avoid compression of the vena cava by the uterus.

There is some difficulty with intubation in severe preeclampsia. Preeclamptic women may have pharyngeal and laryngeal oedema rendering intubation and ventilation difficult. A laryngeal mask airway may be a useful alternative in cases of difficult airway management and should be anticipated in severe preeclampsia.

Decreased platelet count and function occur in up to 18 % of women with preeclampsia. Epidural anesthesia is safe for women with platelet counts e"?100000/мl. The rate of fall in platelet count is equally important because a rapid fall in platelet count may be indicative of severe disease. Estimation of bleeding time and other indicators of coagulopathy is also necessary as a routine test in severe preeclampsia, especially if there are clinical signs of coagulopathy. Postpartum hemorrhage secondary to uterine atony may be due to magnesium sulfate (a tocolytic agent) and/or anesthetic agents (especially the inhalational agents) used in general anesthesia. Platelet dysfunction or thrombocytopenia, as in HELLP-syndrome, will increase the risk of bleeding. Platelet dysfunction is related to the severity of preeclampsia.

Regional anesthesia is now established as the preferred mode of anesthesia for preeclampsia patients as long as there is no contraindication to regional anesthesia such as coagulopathy. Epidural analgesia reduces maternal plasma catecholamine levels in labouring women. This may benefit preeclamptic women who are already exhibiting increased vascular reactivity to circulating catecholamines.

Ergometrine may provoke extreme hypertension in the preeclamptic patient; it can cause headaches, convulsions or even death. For this reason oxytocin, not ergometrine, should be used in the management of the third stage.

Treatment of eclampsia

Nonenhanced CT scan of the brain of a woman following an eclamptic seizure showing hypodense areas involving the white matter of occipital lobes and high frontal/parietal lobes.

Treatment strategy for eclamptic patients includes seizure management, blood pressure control, and prophylaxis against further convulsions. Hypertension management can usually be achieved using labetalol, hydralazine or nifedipine to lower the blood pressure. For seizure control and prophylaxis, eclamptic patients are treated with mag-nesium sulfate to decrease hyperreflexia and prevent further seizures. Mag-nesium has been found to better than phenytoin, carbamazepine, and phenobarbital in the prevention of recurrent seizures in eclamptic patients.

Step 1

Prevent aspiration of the stomach contents by:

· Turning the patient immediately on her side.

· Keeping the airway open by suctioning (if necessary) and inserting an airway.

· Administering oxygen.

Step 2

· Stop the convulsion and prevent further convulsions by putting up an intravenous infusion of Ringer's lactate and giving magnesium sulphate as described in severe preeclampsia.

Step 3

· The patient must be delivered immediately after the patient's condition stabilizes.

In eclampsia, mag-nesium sulfate therapy is initiated at the time of diagnosis and continued for 12 to 24 hours after delivery. Patients may have seizures while receiving magnesium sulfate. If a seizure occurs within 20 minutes after the loading dose, the convulsion is usually short, and no treatment is indicated. If the seizure occurs more than 20 minutes after the loading dose, an additional 2-4 g of magnesium sulfate may be given. Usually a magnesium level drawn acutely reveals subtherapeutic levels, but occasionally this is not so. In such cases, diazepam 5-10 mg given intravenously, may be used. Diazepam causes respiratory depression, hypotonia, poor feeding, and thermoregulatory problems in the newborn.

Delivery should only be initiated after the eclamp-tic patient has been stabilized and convulsions have been controlled. In the case of eclampsia, the best way to treat the fetus is to stabilize the mother. Cesarean delivery should be reserved for obstetric indications. If there is no evidence of fetal compromise (by fetal heart rate criteria), if there is no coagulopathy present, if the patient is prehydrated, and if a segmental activation technique is used by an experienced anesthesiologist, epidural anesthesia may be used for labour and delivery or for cesarean section. If these criteria are not met, then balanced general anesthesia is preferred for cesarean section. Spinal anesthesia is considered contraindicated for women with severe preeclampsia.

Since 25 % of eclamptic seizures occur postpartum, patients with preeclampsia are maintained on magnesium sulfate for 24 hours after delivery. Phenobarbital, 120 mg/d, is sometimes used in patients with persistent hypertension in whom spontaneous postpartum diuresis does not occur or in whom hyperreflexia persists after 24 hours of magnesium sulfate. Alternatively, magnesium sulfate may not be continued for 36-48 hours. Hypertension may not resolve until 6 weeks postpartum. If the diastolic blood pressure remains consistently above 100 mm Hg for 24 hours postpartum, any number of antihypertensive agents could be given, including a calcium channel blocker, angiotensin-converting enzyme inhibitor, central alpha agonist or beta-blocker.

Prevention

Patients with an obstetric history of preeclampsia that developed late in the second or early in the third trimester, or chronic hypertension must receive 75 mg aspirin daily from a gestational age of 14 weeks and calcium 2 g/24 h from 16 weeks of pregnancy. This only will reduce the risk that preeclampsia may develop.

Maternal morbidity and mortality related to preeclampsia are principally associated with eclampsia and HELLP syndrome. Fetal morbidity and mortality are associated mainly with second-trimester severe preeclampsia and preterm delivery. Greater understanding of the pathophysiology of preeclampsia is the key to improving both fetal and maternal outcomes. In the present state of knowledge, women with severe disease should be referred to a tertiary center with the experience and facilities to manage maternal complications and provide intensive care for a preterm infant. In the future, it may be possible to identify factors that clearly distinguish between pregnant women at low risk of developing hypertensive complications and those at high risk. This would allow for appropriate antenatal care and maternal–fetal monitoring.

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