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Hypertension in Pregnancy: A Bumpy Ride for the Two Nascent Lives

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ABSTRACT

A huge proportion of pregnancies are convoluted by medical disorders. With greater advances in pediatric care and artificial fertility, the numbers of women who attempt a pregnancy bracketed by serious complications have exponentially increased. High BP during pregnancy has been found to be associated with deterioration of maternal and fetal well-being. Pregnancy associated with hypertension is linked with numerous life-threatening complications. This article provides an overview of already existing as well as fresh onset of hypertension during pregnancy and the role of magnesium in pre-eclampsia.

Keywords: Pre-eclampsia, hypertension, pregnancy, gestational hypertension

THE ENDANGERED STORY OF PREGNANCY

Every passing year welcomes more than 125 million new babies to this world, not all of them swirl through a smooth journey to their existence. A huge proportion of pregnancies are convoluted by medical disorders. With greater advances in pediatric care and artificial fertility, the numbers of women who attempt a pregnancy bracketed by serious complications have exponentially increased. The medical issues that impede the physiological adaptations that occur normally during pregnancy increase the number of conception with poorer outcomes. On other instances, a pregnancy that supervenes an already lingering medical condition can potentiate it to dangerous levels.

THE BURDENED ADAPTATIONS OF PREGNANCY

Pregnancy witnesses a precipitous rise in the cardiac output by as much as 40%, most of which is pertaining to the increase in the stroke volume and partially due to the increased pacing of the heart. The third trimester increases the heart rate by more than 10 beats beyond the baseline. The systemic vascular resistance, which is an important function responsible for the generation of blood pressure (BP), falls during the second trimester and this decline is linked with a fall in the BP. A BP of 140/90 mmHg is considered abnormally high during pregnancy and has been found to be associated with deterioration of maternal and fetal well-being as much as that it has been linked to an increased perinatal morbidity and mortality.

MEASUREMENTS: DO IT THE RIGHT WAY

The measurement of BP in pregnant women is in concert with the guidelines laid down by the American College of Cardiology/American Heart Association and the Canadian Hypertension Education Program. BP should be measured in sitting posture, with back supported, uncrossed feet lying flat on the ground and arms extended, using a properly sized cuff (length and width of which should be 80% and 40% of the arm circumference, respectively). The cuff should be deflated at the rate of 3 mmHg/sec and the column should be read to the nearest of 2 mmHg. A palpatory systolic pressure should be measured prior to the auscultatory measurement to avoid the phenomenon of auscultatory gap, which could lead to a recording of spuriously low BP. A lateral recumbent posture while measurement may result in a falsely low BP, hence should be avoided during pregnancy.

The confirmatory diagnosis of hypertension mandates at least 2 measurements taken at least 4 hours apart. Hypertension of pregnancy is a spectrum of

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ailments which may be caused by a pre-existing chronic hypertension or a newly sprouted gestational hypertension and pre-eclampsia.

RIDE ON AN ALREADY TIRED HORSE

Pregnancy that prevails over an already existing chronic hypertension, which is present even prior to 20 weeks of gestation, is found to be the culprit behind several incidences of intrauterine growth retardation and perinatal morbidity and mortality. These women are predisposed to the relatively more dangerous conditions like placental abruption and pre-eclampsia, which even further may precipitate into life-threatening eclampsia. The National Institute for Health and Care Excellence (NICE) guidelines published on June 25, 2019, like its previous editions of guiding principles, advocate and educate that a detailed evaluation of the modifiable causes of hypertension should be done prior to conception. The women who receive angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), thiazide or thiazide-like diuretics for the management of chronic hypertension prior to pregnancy are informed that there is an amplified possibility of congenital abnormalities if they take these drugs during pregnancy. They are suggested to bring a halt to these drugs if they come to know about their conception, if at all possible, within 2 operational days of notification of pregnancy and they should be offered healthier alternatives. They are advised to shed some extra pounds by engaging in healthy exercise and diet. The extra salt and any puff of smoke should be shown the exit doorway. The goal of BP of 135/85 mmHg should be set for them and to achieve this, first of all, labetalol should be considered. If it fails to deliver, nifedipine should be tried, followed by methyldopa, if both of these fail. The guidelines advocate the use of aspirin 75-150 mg daily from 12th week onwards. Should hypertension get worse during pregnancy, baseline appraisal of renal function is obligatory to help in making a distinction between the effects of chronic hypertension from those of overlaying pre-eclampsia. There are no compelling statistics that suggest that the treatment of mild chronic hypertension prevents the perinatal outcomes from becoming untoward.

GESTATIONAL HYPERTENSION

The progression of elevated BP after 20 weeks of gestation or during the first 24 hours postpartum in the nonattendance of prior chronic hypertension or proteinuria is referred to as gestational hypertension. Milder gestational hypertension that does not evolve into the more malevolent forms of pre-eclampsia has not been allied with adverse pregnancy outcomes or a deleterious and protracted prognosis. There is no additional benefit rendered by offering a planned early birth before 37 weeks to women with either chronic hypertension or gestational hypertension when BP is <160/110 mmHg, with or without antihypertensive treatment, except when there are other co-existing medical indications. If at all a planned early birth is needed in pregnancy with hypertension, a course of antenatal corticosteroids and magnesium sulfate should be offered, if indicated, to manage preterm labor. If a woman has used methyldopa to treat chronic hypertension, gestational hypertension or pre-eclampsia, during pregnancy, it has to be stopped within 2 days after the birth and changed to a substitute antihypertensive treatment. In women with gestational hypertension, assessment should be conceded in a secondary care setting by a doctor who is trained in the management of hypertensive disorders of pregnancy. An obese, older women (>40 years) with gestational hypertension, who is nulliparous or one who is pregnant after an interval of more than 10 years or someone who carries a family history of pre-eclampsia or when she is bearing a multifetal pregnancy, necessitate an additional attention because these are naturally at a higher risk of developing pre-eclampsia. In women with gestational hypertension, who have already given birth, the treatment should be continued if they are still in the hypertensive range. The drug therapy should be titrated down if the BP has been pulled down to below 130/80 mmHg.

THE RENAL MESS

Customarily, pregnancy is characterized by an increase in glomerular filtration rate and creatinine clearance. This augmentation occurs from a rise in renal plasma flow and increased glomerular filtration pressures. Patients with core renal disease and hypertension may anticipate an aggravation of hypertension during pregnancy. If superimposed pre-eclampsia creeps in, the supplementary endothelial injury falls out in a capillary leak syndrome that may craft a management, which is extremely exigent. In general, patients with primary renal disease and hypertension profit from insistent management of BP. Preconception counseling is also indispensable for these patients so that precise risk consideration and medication changes can transpire prior to pregnancy. A pre-pregnancy serum creatinine level of <1.5 mg/dL is coupled with a constructive forecast. When renal disease worsens

during pregnancy, close alliance between the internist and the maternal-fetal medicine specialist is critical so that decisions concerning delivery can be weighed to balance the sequelae of prematurity for the newborn against long-standing sequelae for the mother with admiration for the future renal functions.

HAYWIRED END ORGANS: PRE-ECLAMPSIA

As many as 5-7% of all pregnant women develop pre-eclampsia, which has been defined as the fresh onset of hypertension (with a BP >140/90 mmHg) and proteinuria (this can either be a 24-hour urinary protein of >300 mg/24 h, or else a protein creatinine ratio ≥0.3) that has occurred after 20th week of gestation. The current revisions to the diagnostic criteria have excluded proteinuria from being an unconditional prerequisite for making the diagnosis of pre-eclampsia. Further, the terms mild and severe pre-eclampsia which were used earlier have been refuted and the disease has now been named as pre-eclampsia either accompanied with or without severe features. Fetal growth restriction is no longer a crucial decisive factor for pre-eclampsia with brutal features.

THE PUPPETS BEHIND THE SCENE

The fact is that the accurate pathophysiology of pre-eclampsia still remains unanswered conundrum, a few studies have elucidated the unwarranted excessive placental assembly of antagonists to both vascular endothelial growth factor (VEGF) and transforming growth factor β (TGF-β). These antagonists to VEGF and TGF-β disorganize the finely orchestrated endothelial and renal glomerular function resulting in edema, hypertension and proteinuria. The histological renal picture of glomerular endotheliosis is established during pre-eclampsia. Glomerular endothelial cells are engorged and puffed up and these now attempt to encroach on the vascular lumen. Pre-eclampsia is coupled with fallacies of cerebral circulatory autoregulation, inviting an increased risk of stroke at mildly and moderately elevated BPs. The presence of newly established hypertension and proteinuria is said to be stern if it is accompanied by the end-organ damage. The markers of an end-organ damage may include a ruthless elevation of BP (>160/110 mmHg), substantiation of central nervous system (CNS) disarray (headaches, distorted vision, seizures or coma), renal dysfunction (represented by oliguria or a serum creatinine level >1.5 mg/dL), pulmonary edema, hepatocellular grievances (serum alanine aminotransferase levels jumping more than twofold the upper limit of normal), along with the hematological dysfunctions (with a platelet count <1,00,000/L or establishment of disseminated intravascular coagulation [DIC]). The HELLP syndrome, an acronym used for the Hemolysis, Elevated Liver enzymes and a Low Platelet count, is said to be a unique subtype of severe pre-eclampsia and is found to be a major cause of morbidity and mortality in this disease. The platelet dysfunction and coagulation disorders augment the menace of stroke even further.

NO NEED FOR HURRY

Pre-eclampsia settles down in a few weeks after the termination of pregnancy. For pregnant women with pre-eclampsia, a premeditated delivery prior to 37 weeks of gestation reduces the mothers' morbidity but opens up the fetus to a spectrum of risks of premature birth. The supervision of pre-eclampsia is a sturdy assignment because it requires the clinician to poise the health of the mother and fetus simultaneously. In all purposes, prior to term, women with pre-eclampsia without stern features may be managed conservatively with restricted physical activity, even though bed rest is not recommended, with a close eye on the monitoring of BP and renal function, and a watchful fetal scrutiny. For women with pre-eclampsia only with probable unfavorable outcomes, delivery is recommended, otherwise the patients are lined up for the expectant management in a tertiary hospital setting. Management on tenterhooks for pre-eclampsia with riskier features who are far from term, buys some remuneration for the fetus, but brings significant risks for the mother. Thresholds for considering planned early birth could include: 1) Inability to control BP despite using 3 or more antihypertensives in appropriate doses; 2) SPO_2 <90%; 3) Worsening liver function test (LFT), kidney function test (KFT), platelet count; 4) Neurological features, such as severe intractable headache, repeated visual scotoma or eclampsia; 5) Placental abruption; 6) Reversed end-diastolic flow in the umbilical artery Doppler velocimetry and 7) A non-reassuring cardiotocograph.

Postponing delivery further than 34 weeks gestation in this group of patients is not suggested. In pre-eclampsia without ruthless features, delivery at 37 weeks is recommended. The state-of-the-art treatment of pre-eclampsia is delivery of the fetus and placenta. For women with pre-eclampsia with severe features, aggressive management of BP >160/110 mmHg reduces the risk of cerebrovascular accidents. IV labetalol or hydralazine is most universally used to acutely manage severe hypertension in pre-eclampsia; labetalol is

related with smaller number of episodes of maternal hypotension. It has been advocated to not use volume expansion in women with severe pre-eclampsia unless hydralazine is used; it has been allowed to use up to 500 mL crystalloid fluid before or at the same time as the first dose of IV hydralazine is given in the antenatal period. In women with severe pre-eclampsia, limitation of fluids to 80 mL/hour, unless there are other ongoing fluid losses, has been suggested. Lofty arterial pressure should be abridged unhurriedly to avoid hypotension and a dwindled blood flow to the fetus.

MAGNIFICENT MAGNESIUM

Magnesium sulfate is the favored agent for the deterrence and management of eclamptic seizures. Outsized, randomized clinical trials have established the authority of magnesium sulfate over phenytoin and diazepam in plummeting the risk of seizure and, may be, the risk of maternal death. Magnesium may downsize the seizures by playing with *N*-methyl-D-aspartate (NMDA) receptors in the CNS. The widespread use of magnesium sulfate for seizure prophylaxis in pre-eclampsia devoid of severe features is no longer suggested by most experts. There is accord that magnesium sulfate should be used in all cases of pre-eclampsia with relentless features, or in cases of eclampsia. Women who have had pre-eclampsia emerge to be at an amplified jeopardy of cardiovascular and renal disease soon after in time.

With an ever increasing attempt of playing with already jeopardized pregnancies, the duty and considerations required by the physicians have gone higher right from psychotherapy prior to conception till the streamlining of management post-delivery. This has invited a deeper understanding of the physiology of pregnancy so that the maternal and fetal lives are appropriately cared for.

SUGGESTED READING

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Extreme Heat and Humidity Projected to Affect Areas Home to 1.2 Billion People

Extreme heat and humidity causing heat stress will annually affect areas now home to 1.2 billion people by 2100, according to a new study published in the journal *Environmental Research Letters*.

The figure is more than 4 times the number of people affected currently, and more than 12 times the number who would have been affected without industrial era global warming.

Ibuprofen, a Commonly Prescribed Drug should be Used with Caution

An experimental study suggested that ibuprofen can have an adverse impact on liver health. The changes were different, depending on the gender of the experimental model. In the males, changes occurred in at least 34 metabolic pathways, including those that help regulate some essential components of health like amino acids, hormones, vitamins and the release of reactive oxygen and hydrogen peroxide within cells. On the other hand, in females, administration of ibuprofen increased the activity of some cytochrome P450s…(*Medical News Today*)