

## Hypertension in Pregnancy

The following section is entitled “**Hypertension in Pregnancy.**” This section deals with some of the basic concepts important in caring for women with chronic hypertension who may become or are pregnant. The section begins with a *learner handout* with space for the learner to make their own notes. The *learner handout* is followed by the *teaching script* for the educator. A table reviewing the use of specific antihypertensive agents in pregnancy is included in the *learner handout* and *teaching script*. Relevant *cases* for discussion and a *bibliography* of related articles can be found in the section entitled “Preeclampsia”.

# HYPERTENSION IN PREGNANCY

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## CHRONIC HYPERTENSION IN PREGNANCY

**Hypertension is the most common chronic medical problem seen in pregnancy. Hypertensive women can expect good pregnancy outcomes. Most of the problems associated with chronic hypertension during pregnancy are actually due to superimposed preeclampsia.**

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## Physiologic Changes in Blood Pressure During Pregnancy

**Systolic and diastolic blood pressure decreases 10-15 mmHg during the first two trimesters and increases 10 mmHg during the last trimester, returning to baseline towards term.**

**Chronic hypertension can therefore be masked during the first half of a pregnancy.**

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# HYPERTENSION IN PREGNANCY

## **Classification of Hypertension in Pregnancy Class I: Preeclampsia-eclampsia**

**Disease of 1st pregnancy, typically after 20 wk gestation.**

**Multisystem disorder characterized by hypertension, proteinuria, and varying degrees of thrombocytopenia, hemolytic anemia, abnormal liver function tests, reduced renal function and hyperuricemia.**

**Edema is not a reliable sign.**

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## **Class II: Chronic Hypertension**

**If previously undiagnosed, the usual evaluation for underlying causes and end organ damage should be carried out.**

**Pheochromocytoma and moderate to severe renal disease present the most serious risks.**

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## **Class III: Preeclampsia-eclampsia Superimposed Upon Chronic Hypertension**

**Diagnosis should not be based solely upon increases in blood pressure.**

**Criteria should include new-onset proteinuria, hyperuricemia, or thrombocytopenia.**

**Associated with substantially increased risk to mother and fetus.**

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## HYPERTENSION IN PREGNANCY

### **Class IV: Transient or Late Hypertension**

**Increased blood pressure near term without other evidence of preeclampsia.**

**Rapid resolution postpartum.**

**May be a harbinger of chronic hypertension.**

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### **Options for Management of Chronic Hypertension in Pregnancy**

- 1. Continue present medication if “safe” and follow BP regularly.**
- 2. Stop medication and follow BP regularly. Medicate only if BP rises above 160/100.**
- 3. Switch to “safer” medications and follow BP regularly.**

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### **Antihypertensive Agents**

**Aldomet and Labetalol are probably the best agents for the management of chronic hypertension in pregnancy.**

**ACE Inhibitors and Angiotensin II antagonists should not be used in pregnancy.**

**An accompanying table summarizes data about other common antihypertensive.**

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**Table 1. Preferred antihypertensive agents for use in pregnancy**

Medication	FDA pregnancy classification	Known maternal and fetal effects
methyldopa	B	-antihypertensive agent most extensively studied for use in pregnancy, -main side effect is maternal somnolence, -up to 15 % of women will not tolerate the doses of this medication necessary to control blood pressure
labetalol	C	-theoretical benefits to uteroplacental flow are postulated due to the alpha blocking properties of this alpha beta blocker; -appears to be no increased incidence of fetal growth restriction seen with other beta blockers in several randomized control trials

**Table 2. Other Antihypertensive Agents That May Be Used in Special Circumstances in Pregnancy**

Agent	FDA classification	Known maternal and fetal effects
<b>atenolol, metoprolol, oxprenolol, pindolol</b>	All C except for pindolol which is B	-small for date infants ( especially if used throughout gestation), neonatal bradycardia, hypoglycemia have all been reported -Pindolol believed by some to be the preferred agent in this group
<b>nifedipine</b>	C	-teratogenic in rats when given in doses 30 times the maximum recommended -limited data regarding its use throughout gestation in humans but reasonable experience with its use in the third trimester; -avoid concurrent use of magnesium
<b>clonidine</b>	C	-increased incidence of night terrors and somnambulism in children -embryopathy in animals but not humans
<b>hydralazine</b>	C	-pregnancy data extensive and favorable (second only to that available for methyldopa) -however use as an oral agent for control of chronic hypertension not advisable given high incidence of reflex tachycardia, palpitations, flushing and headaches on this medication
<b>hydrochlorothiazide</b>	B	-use generally discouraged in pregnancy because diuretics decrease the normal plasma volume expansion that occurs in pregnancy (however the significance of this is not known)
<b>diltiazem and verapamil</b>	C	-experience with use in pregnancy for chronic hypertension is very limited and these agents should be used rarely if ever for this indication in pregnancy
<b>all ACE inhibitors and angiotensin II antagonists</b>	X	-although not known to be a teratogen, fetal toxicities suggest use in pregnancy almost never justifiable

# HYPERTENSION IN PREGNANCY

## Teaching Script

Hypertension is the most common chronic medical problem seen in pregnancy. This is hardly surprising given the fact that up to 20% of the North American population has hypertension.

### **Risks Associated with Chronic Hypertension in Pregnancy**

The most important message to give to pregnant women with chronic hypertension is that, in general, they can expect good pregnancy outcomes.

Although chronic severe hypertension has been associated with IUGR and placental abruption, the majority of problems associated with chronic hypertension are actually due to superimposed preeclampsia. Chronic hypertension is one of the major risk factors for the development of preeclampsia and between 10- 20 % of chronic hypertensive women will develop preeclampsia during their pregnancy. There is no way however of predicting which chronic hypertensive will develop preeclampsia. Good control of blood pressure does not decrease the risk of a hypertensive woman developing preeclampsia and there is presently no way of intervening to prevent preeclampsia from occurring.

### **Normal Physiologic Changes of Blood Pressure in Pregnancy**

When interpreting blood pressures during pregnancy, it is important to know that both systolic and diastolic blood pressure will normally decrease by 10 to 15 mmHg in the first two trimesters reaching a nadir at 18-22 weeks gestation. Both systolic and diastolic blood pressures then tend to increase by 10 mmHg in the last trimester and return to baseline near term. This has important implications in assessing blood pressure during pregnancy because in the first two trimesters, mild to moderate chronic hypertension may be masked by pregnancy. Since many young women will never have their blood pressure measured prior to becoming pregnant, new

development of blood pressures above 140/90 in the third trimester can be due to either the development of preeclampsia or presentation of chronic hypertension that was previously masked in the first two trimesters.

### **Classification of Hypertension in Pregnancy**

Due to the confusing and overlapping nature of the diagnoses of chronic hypertension and preeclampsia or pregnancy induced hypertension, most clinicians use the American College of Obstetrics & Gynecology's (ACOG) classification system for hypertension in pregnancy. This system classifies all hypertension in pregnancy into one of four categories.

**Class I hypertension** is that disorder which is unique to pregnancy, the constellation of preeclampsia/eclampsia. This is a disease that is seen mostly in first pregnancies and typically presents only after 20 weeks gestation. The majority of cases of preeclampsia are mild and present close to term. Although preeclampsia/eclampsia will be discussed in more detail in another lecture in this curriculum, it can be mentioned here that preeclampsia is a multi-system disorder characterized by hypertension, proteinuria, and varying degrees of thrombocytopenia, hemolytic anemia, abnormal liver function tests, reduced renal function, and hyperuricemia. Edema is common in preeclampsia but is not a reliable sign because it can be present in up to 30% of normal pregnancies.

**Class II hypertension** in pregnancy is that disorder which is completely unrelated to pregnancy, chronic hypertension. In this class, chronic hypertension of any etiology is included. If the chronic hypertension is previously undiagnosed, the usual evaluation for underlying causes of hypertension and assessment for any evidence of end organ damage should be carried out. Chronic hypertension unassociated with preeclampsia usually carries with it a minimal risk to the pregnant woman. However, secondary causes of hypertension such as pheochromocytoma and hypertension associated with moderate to severe renal disease can present significant risks to both mother and fetus.

**Class III for hypertension** in pregnancy is the combination of preeclampsia/eclampsia superimposed upon chronic hypertension. Because of the normal rise in blood pressure that occurs in the third trimester in pregnancy, diagnosis of this entity should never be based solely upon increases in blood pressure. Rather, criteria for this diagnosis should include such findings as new onset proteinuria, hyperuricemia and thrombocytopenia. Preeclampsia/eclampsia does represent a risk to the mother and fetus. Fetal complications of pre-eclampsia include intrauterine growth restriction, placental abruption and fetal distress. Pre-eclampsia often necessitates preterm delivery, and rarely can lead to fetal demise.

**Class IV hypertension in pregnancy** is a rare entity known as transient, gestational or late hypertension of pregnancy. Patients with this class of hypertension have blood pressures > 140/90 toward term but never develop any other evidence of preeclampsia and their blood pressure resolves rapidly postpartum. To make the diagnosis of class IV hypertension, documentation of normal blood pressures both prior to and after pregnancy is required. Many clinicians believe that transient or late hypertension of pregnancy is a harbinger of the development of chronic hypertension in the future.

### **Management of Chronic Hypertension in Pregnancy**

While one of the most important aspects of managing the chronic hypertensive in pregnancy is watching for the onset of signs and symptoms of preeclampsia/eclampsia, management of the hypertension itself is obviously also a concern. Currently, the medical provider has three different acceptable options for the management of chronic hypertension in pregnancy.

The first option is for patients to continue their present antihypertensive medication if it is one that is deemed “okay” for use in pregnancy. The blood pressure should be followed regularly, as adjustments to the antihypertensive dosing may be necessary. The need for antihypertensive medication dosing adjustments in pregnancy is due not only to the effects of pregnancy on blood pressure but also due to the effects of pregnancy on drug pharmacokinetics.

Hepatic metabolism, renal clearance, and the volume of distribution of medication are all increased in pregnancy.

The second option is for patients to try stopping their medication and have their blood pressures followed regularly. In this case, it is advised that medications only be resumed if the blood pressure rises above 160/100. There is no evidence to suggest that tighter blood pressure control than 160/100 over the course of the nine months of gestation provides any specific benefits to mother or fetus. Surprisingly, despite the simplicity of this management choice, many women who have accepted the diagnosis of chronic hypertension find the idea of coming off their medication for nine months very difficult.

The third option is to switch the patient from a medication without a good track record in pregnancy to one that is safer and follow the blood pressure regularly.

### **Specific Antihypertensive Agents in Pregnancy**

What information exists about antihypertensive drugs in pregnancy? Those medications that have the best track record and are favored by our group of obstetric internists are alpha methyldopa (Aldomet®) and Labetalol (Normodyne®). Both of these medications have been used and studied extensively in pregnant women for the control of hypertension, and they appear to be relatively free of fetal or maternal complications. Labetalol is, in our opinion, the best tolerated, safest and most effective antihypertensive for use in pregnancy. However, Aldomet is the only antihypertensive for which there has been long term follow up of children of those mothers who took the medicine during pregnancy. However, unfortunately it often leaves women feeling fatigued and mentally "slowed down," as well as having an association with hemolytic anemia.

Information regarding other agents that may be used to control blood pressure in pregnancy are summarized in the table accompanying this lecture.

The angiotensin converting enzyme (ACE) inhibitors and the Angiotensin II antagonists are absolutely contraindicated in pregnancy. Although there is little evidence of teratogenesis associated with the ACE inhibitors, there are multiple case reports of fetal renal dysfunction, fetal renal and collecting system hypoplasia and fetal loss associated with these medications.

### **Postpartum Issues**

All antihypertensive medications are compatible with breast-feeding. It is important to remember that blood pressure changes postpartum may necessitate closer follow up. In particular, if doses of antihypertensives have been increased during pregnancy, patients will likely need to be switched back to their prepregnancy dosing in the days following delivery.

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