The Effect of Pregnancy on Diabetic Retinopathy

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In an era of super-sizing and increasing obesity, the incidence of diabetes mellitus (DM) is approaching pandemic proportions. Approximately 6.3% of the United States and 4% of the world population have DM.[1] Diabetic retinopathy (DR) affects about half of all people with DM and is the leading cause of visual loss and new-onset blindness in the United States for those ages 20 through 74 years.[2] Proliferative diabetic retinopathy (PDR) is a major cause of preventable and potentially irreversible vision loss. Given long enough duration of DM, approximately 60% of patients will develop PDR; without intervention, nearly half of eyes with PDR will experience profound visual loss.[3]

DM is preexisting in about 1% of all pregnancies in the United States. In the setting of pregnancy, hormonal and systemic insults can accelerate microvascular diabetic damage. Progression of DR during pregnancy can be rapid with potentially devastating consequences for the patient and baby. In these high-risk patients, screening for DR with prompt intervention for PDR before conception as well as during and after pregnancy is critical for optimal patient outcomes.[4]

RISK FACTORS FOR DR PROGRESSION DURING PREGNANCY

Four factors have been identified that influence the risk and rate of progression of DR during pregnancy.

Worse metabolic control at conception predicts a higher rate of progression of DR. Interestingly, however, a greater magnitude of improvement in glycemic control during pregnancy has been correlated with a higher risk of DR progression;[5] therefore, ideally female diabetics of childbearing age should achieve normoglycemia (HbA1c < 7%) at least 6-8 months prior to conception.

More severe DR at the time of conception increases the risk of worsening DR, as was shown in the Diabetes in Early Pregnancy Study[5]; if a woman has no DR at conception, she has a 10% risk of developing some nonproliferative DR (NPDR). If a woman has mild NPDR at conception, she has a 21% risk of progression and a 6% risk of developing PDR. If a woman has moderate NPDR at conception, she has a much higher risk of progression, 55%, with a 29% risk of developing PDR.[5] In a separate study, while 26% of patients with no DR at conception developed any DR, 78% of pregnant patients with early DR at conception experienced worsening of their DR during pregnancy, and 23% developed PDR.[6] A longer duration of DM prior to pregnancy correlates with a greater risk of worsening of DR.

Coexisting hypertension increases a woman's risk of worsening DR from 25% to 55%.[7] Furthermore, the development of preeclampsia during pregnancy increases a woman's risk of progressive DR.

REGRESSION OF DR POSTPARTUM

Fortunately, DR that progresses during pregnancy has a high-rate of spontaneous regression postpartum. Despite this, some patients' disease will not regress and can conversely continue to progress postpartum, sometimes rapidly and unpredictably. The more mild the DR the more likely it is to regress. Although macular edema and background changes often resolve, it is important to note that PDR is unlikely to regress postpartum.[8]

TREATING AND SCREENING FOR DR DURING PREGNANCY

Treatment of DR during pregnancy is guided by the same criteria applied to patients who are not pregnant, with 2 major caveats. First, studies suggest that delaying treatment because of a hope that DR will regress after delivery may lead to worse outcomes.[8] Second, follow-up of any pregnant woman, and particularly high-risk pregnancy patients, can be challenging. Such women are more likely to develop adverse preg-

nancy outcomes, and even 1 missed ophthalmic clinical appointment can be critical.

Therefore, all pregnant patients with DR, but particularly those with higher-risk DR or rapid progression, need close ophthalmic follow-up and early intervention. Panretinal photocoagulation (PRP) should be applied earlier rather than later once indicated by clinical criteria. Furthermore, PRP is often recommended in the setting of severe NPDR because waiting until the early proliferative stage may lead to complications that may have otherwise been avoided if PRP had been applied earlier in the disease course.[4,8] A lower threshold for PRP is often used for the fellow eye when PDR is seen in 1 eye, especially when rapid progression is noted in either eye.

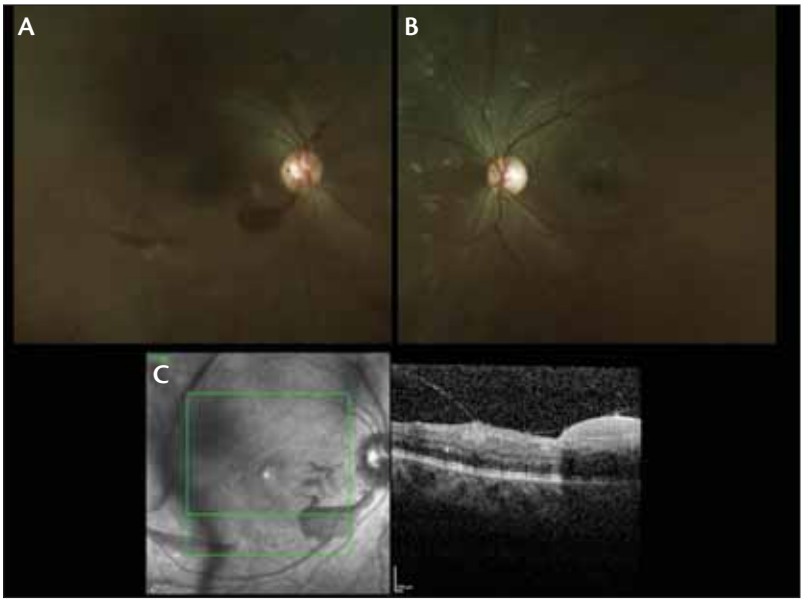

Figure 1. Preretinal hemorrhage with neovascularization of the optic nerve, cotton wool spots, and intraretinal hemorrhages are seen on fundus photography of the right eye (A). Cotton wool spots are seen in fundus photography of the left eye (B). Preretinal hemorrhage in the right eye is seen on OCT (C).

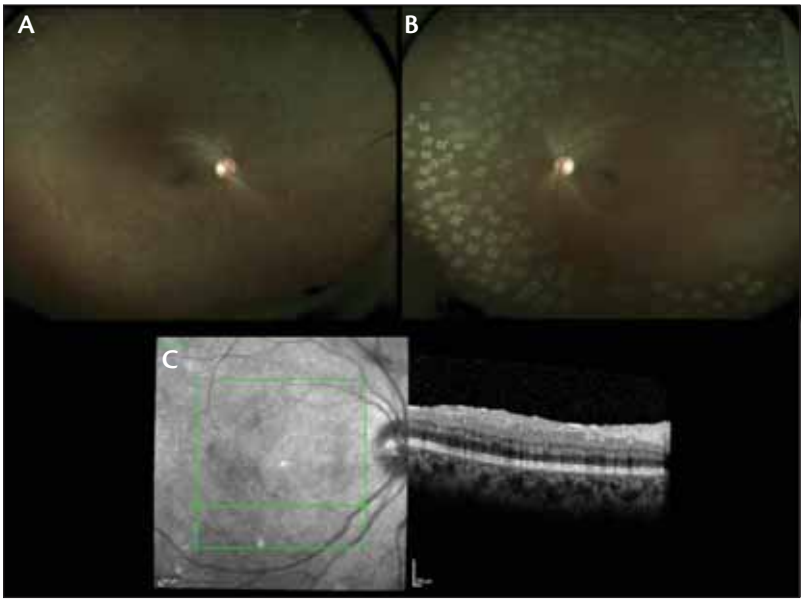

Figure 2. One month following PRP, preretinal hemorrhage with peripheral PRP spots is seen on fundus photography in the right eye (A). Improvement of cotton wool spots is seen in the left eye (B). OCT shows that preretinal hemorrhage is resolved in the right eye (C).

The diagnosis of sight-threatening retinopathy can usually be made with ophthalmic examination alone. Although fluorescein angiography is not believed to be teratogenic,[9] most physicians defer its use until after delivery. Similarly, anti-VEGF medications are avoided due to potential risks to the developing fetus.

CASE REPORT

A woman aged 26 years with DM presented to us at 26 weeks gestation, noting acute onset floaters and vision loss in her right eye. Visual acuity was 20/40 in her right eye and 20/30 in her left eye. Fundus photography of her right eye (Figure 1A) showed preretinal hemorrhage with neovascularization of the optic nerve head and in the midperiphery with cotton wool spots and intraretinal hemorrhages. Fundus photograph of her left eye (Figure 1B) showed cotton wool spots. Optical coherence tomography (OCT) of her right eye (Figure 1C) showed preretinal hemorrhage.

One month following complete PRP of her right eye and immediately following the final PRP session for her left eye, the patient's vision improved to 20/30 in her right eye and remained 20/30 in her left eye. Fundus photograph of her right eye (Figure 2A) showed resolution of preretinal hemorrhage with peripheral PRP spots. Fundus photograph of her left eye (Figure 2B) showed improvement of cotton wool spots with

peripheral PRP spots. OCT of her right eye (Figure 2C) revealed resolution of preretinal hemorrhage.

SUMMARY

Management of pregnant women with DM requires a team approach. Close cooperation and communication among the patient and her obstetrician, ophthalmologist, and other physicians, as necessary, is essential to develop an individual-based management plan for optimal outcomes. Ideally, diabetic women should be examined comprehensively, including a dilated fundus exam by an ophthalmologist, prior to conception. If this window of opportunity is missed, this exam should occur as soon as possible in the first trimester. Follow-up then depends on the severity of retinopathy.[1,10] For example, if the patient has minimal to no DR she may be able to be examined approximately every 3 months and within 3 months postpartum. If the patient has moderate DR, examination every 4 to 6 weeks may be required; if more advanced DR is noted, the patient may require examination every 1 to 2 weeks with intervention as needed. Continued monitoring and management postpartum is also important. ■

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