Original Communications

The Placenta: A Diagnostic Tool in Sickle Cell Disorders

Randall D. Bloomfield, MD, Jorge R. Suarez, MD, and Ansenio C. Malangit, MD
Brooklyn, New York

Examination of the placenta for the presence of sickling is an accurate, simple, inexpensive, and readily available technique for determining the presence of sickle cell disorders. There were 24 placental specimens out of 904 which showed evidence of sickling. The importance of this confirming procedure can be seen in the uncovering of two cases of false negative reports from conventional testing.

The multifaceted sickle cell disorders were first described by Herrick[1] in 1910 when he cited the peculiar sickle-shaped red blood cell in a West Indian student with a cardiac murmur and severe anemia. Subsequent investigators added to our knowledge.[2-4] Among American blacks, the occurrence at birth of sickle cell disease is 1:111-1:204, and the trait appears in 1:400.[5]

Requests for reprints should be addressed to Dr. Randall Bloomfield, Department of Obstetrics & Gynecology, Kings County Hospital Center, 451 Clarkson Avenue, Brooklyn, NY 11205.

The deleterious effects of pregnancy on the disorders and the adverse impact of the disorders on pregnancy have been reported.[6] The continued need for diagnosis coupled with the neglect of a readily available source for confirmation, the placenta, prompted this study.

Materials and Methods

The basis for this study was the 904 placentas and placental tissue specimens collected at the Brooklyn Cumberland Medical Center. The specimens were fixed in ten percent aqueous formalin, processed in the usual manner, and stained with hematoxylin and eosin. The slides were examined microscopically for the presence of sickling (Figures 1,2). Whenever possible, hemoglobin electrophoresis was performed in patients with evidence of sickling in the placenta. To evaluate the efficacy of the method, historical and laboratory data pertaining to the sickle cell status of the patient were withheld until after the diagnosis was made by microscopic examination.

Results

Out of a total of 904 patients, 496 were known to be black. It was in this group that the 24 patients with sickling were found, and positive sickle cell preparations were present in 18 of

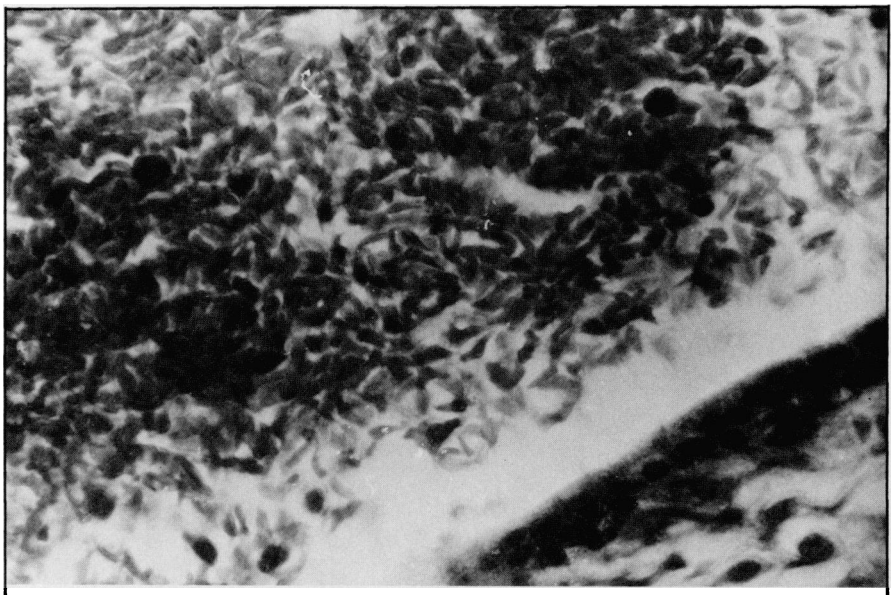

Figure 1. Sickled erythrocytes in intervillous space.

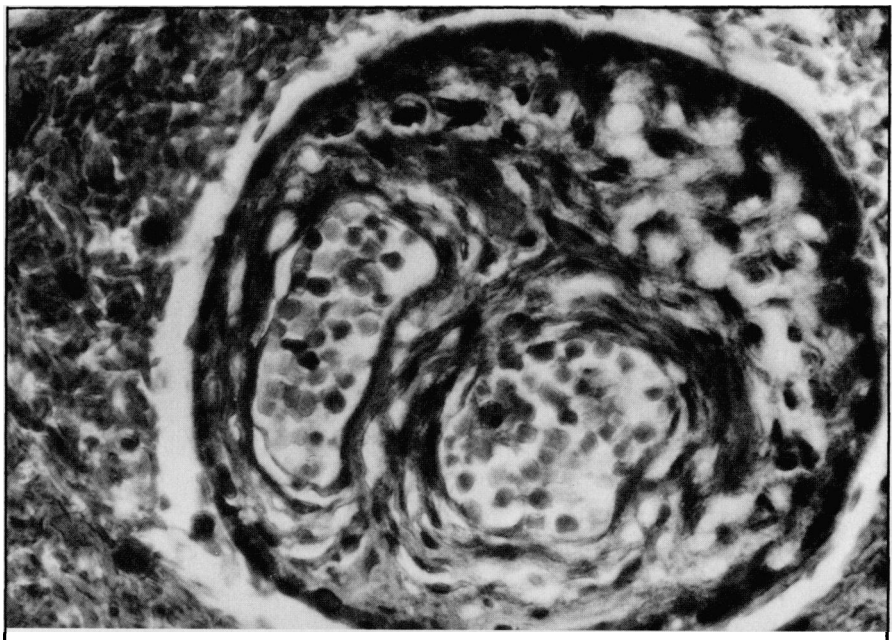

Figure 2. Chorionic villus with fetal blood vessels containing normal erythrocytes and adjacent intervillous space with sickled erythrocytes.

Table 1. Results of Sickle Cell Determinations in Patients with Placental Sicklemia

Sickle Cell Determinations	Number
Negative	2
Positive	18
Not done	4
Total	24

these (Table 1). There was one patient whose initial sickle cell preparation was reported negative. After the finding of sickling in the placenta, the test was repeated and was reported as positive. A second patient whose repeated test remained negative was found to have sickle cell disease on hemoglobin electrophoresis. The trait form was the most common, occurring in 13 of the 24 patients.

Discussion

While strides have been made in the diagnosis of sickle cell disorders, the need still remains for an accurate, inexpensive means of detection. Microscopic examination of the placenta is one such method. Since these specimens were submitted for routine examination, the only added factor was the slight additional time spent in looking carefully at the red cells present in the vessels. The placenta has rarely been studied in this fashion, but Benirschke and Driscoll,[7] and Hoger,[8] have described the presence of sickle cells in the intervillous space. Their findings were confirmed in this study. There was no instance where the fetal capillaries within the villi were found to have sickle cells. This is due to the predominant fetal hemoglobin content of fetal erythrocytes. Thus, the fetal erythrocyte served as a control for the microscopic confirmation of sickling in each case.

In this series, there were two patients with false negative sickle cell reports who had placental sicklemia, confirmed by hemoglobin electrophoresis. Because such errors have been reported in the performance and interpretation of conventional tests,[9] it is suggested that the placenta method of detection can serve as a check on these.

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