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CLINICAL ARTICLE

Antepartum percutaneous renal biopsy

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Abstract

Objective: To assess the value and adverse effects of an ultrasound-guided renal biopsy technique in women with normal and pathologic pregnancies. *Method:* Biopsy samples were taken from 36 women with hypertensive disease (28 with pre-eclampsia) and 18 healthy pregnant women using a thin needle and an ultrasound-guided biopsy device. *Results*: Glomerular endotheliosis, a structural change typical of pre-eclampsia, was found in all hypertensive women, but it was more pronounced in the 28 pre-eclamptic women than in the 8 women with nonproteinuric hypertension. A similar change, however, was seen in 11 of the 18 controls. One serious adverse event occurred, retroperitoneal hematoma, in the woman with the most severe pre-eclampsia. *Conclusion:* Glomerular endotheliosis is not to be considered pathognomonic for pre-eclampsia. Few complications followed renal biopsy in this study, but complications arose in the sickest patient. It is probably not advisable to perform antepartum renal biopsies in pregnant women with a rapidly deteriorating renal function and swollen kidneys. In these women, the biopsy does not facilitate diagnosis and is hazardous.

1. Introduction

Percutaneous renal needle biopsy has been considered the ultimate method to differentiate between the different forms of hypertension in pregnancy.

However, the safety of renal biopsy in pregnancy has been debated and is still a controversial topic [1–3]. It has been suggested that renal biopsy should be considered when renal function suddenly deteriorates for no known reason in a woman with a pregnancy duration of less than 32 weeks [4]. The diagnosis of an underlying renal disease in pregnant women with hypertension could lead to treatment and the postponement of delivery whereas the diagnosis of pre-eclampsia (PE) would call for immediate delivery. Glomerular endotheliosis, which consists of endothelial swelling and vacuolization with obliteration of endothelial fenestrae and encroachment of the capillary space area, has been considered pathognomonic for PE [5,6].

To the authors' knowledge, there are no previous studies on the glomerular endothelium of the kidneys of healthy pregnant women although modern techniques, with thinner needles and ultrasonographically guided biopsy device, have considerably reduced the risks of antepartum renal biopsy.

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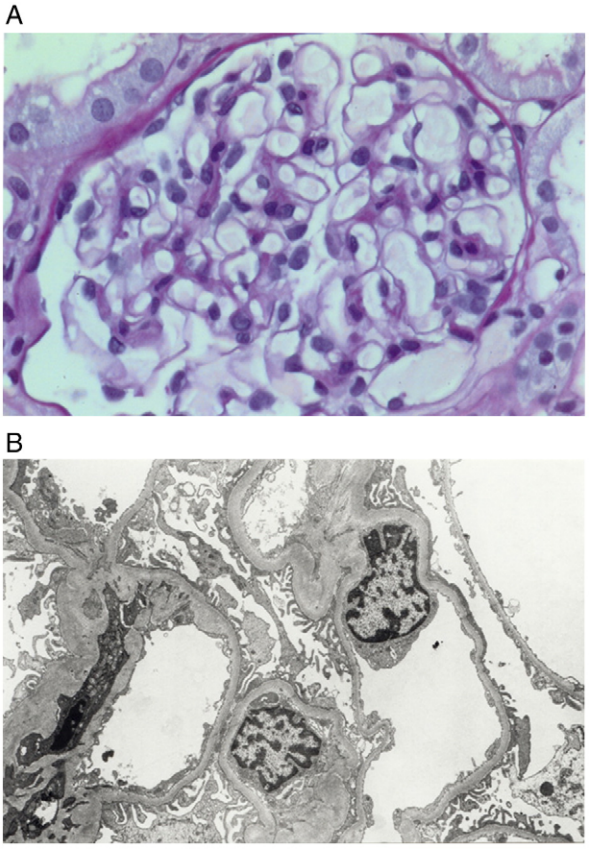

Figure 1 Normal pregnancy. (A) Light microscopy of a normal glomerulus with open capillary lumens (PAS ×350); and (B) electron micrograph of the same glomerulus, showing fenestration of the endothelium (×3000).

This study assesses the effects and value of ultrasound-guided antepartum renal biopsy in women with normal and pathologic pregnancies.

2. Methods

During a 2-year period, from November 1999 to December 2001, 54 antenatal renal biopsies were performed at the Department of Obstetrics and Gynecology of the University Hospital in Lund, Sweden. The inclusion criteria were a diastolic blood pressure no higher than 105 mm Hg and a blood platelet count of no less than 100×10^9/L at the time of the biopsy. The control group consisted of 18 healthy pregnant women recruited from the hospital's maternal care clinics during the study period.

Pregnancy-induced hypertension was defined as a diastolic blood pressure higher than 90 mm Hg on 2 or more consecutive occasions more than 4 h apart, and rising after 20 weeks of pregnancy; mild PE was defined as hypertension with a proteinuria of more than 300 mg/L on 2 random clean-catch midstream specimens collected 4 h or more apart; and severe PE was defined as hypertension with a proteinuria of more than 3000 mg/L under the same conditions. All pregnancies were dated according to routine ultrasonographic measurement of the fetal biparietal diameter and femur length in the 17th or 18th week of gestation. Blood coagulation values (plasma-activated partial thromboplastin time, plasma prothrombin complex activity, blood platelet count, and blood hemoglobin concentration) were checked for normality in the 4 h prior to the biopsy. A blood compatibility test was performed for all enrolled women as well as a dip-stick test to ensure that there was no bacteriuria.

2.1. Renal biopsy procedure

All biopsies were performed according to a standardized procedure by the same highly experienced physician. Both kidneys were examined by ultrasonography (Acuson Sequoia 512; Mountain View, CA, USA or General Electric Logiq 700; General Electric Healthcare, Milwaukee, WI, USA). The participant was positioned laterally, with her right or left side facing upwards. Usually the biopsy was taken from the right kidney, but a few patients underwent a left-sided biopsy because of pronounced hydronephrosis of the right kidney. Local anesthesia was achieved with 10 to 20 mL of a 20 mg/mL solution of bupivacaine (Marcain; AstraZeneca, Södertälje, Sweden) deposited subcutaneously and toward the kidney. An incision of 4 to 5 mm was made in the skin and the sample was taken with a 1.2-mm needle (outer diameter) using a "biopsy pistol" device (Bard Biopsy Systems, Tempe, AZ, USA) fitted with an ultrasonographic transducer mounted with a suitable biopsy adapter. The biopsy guidelines on the ultrasonography platform facilitated the choice of biopsy areas within the kidneys. As a rule, the caudal pole of the kidney or a renal column (renal cortex between 2 pyramids) in the caudal half of the kidney was chosen. Two

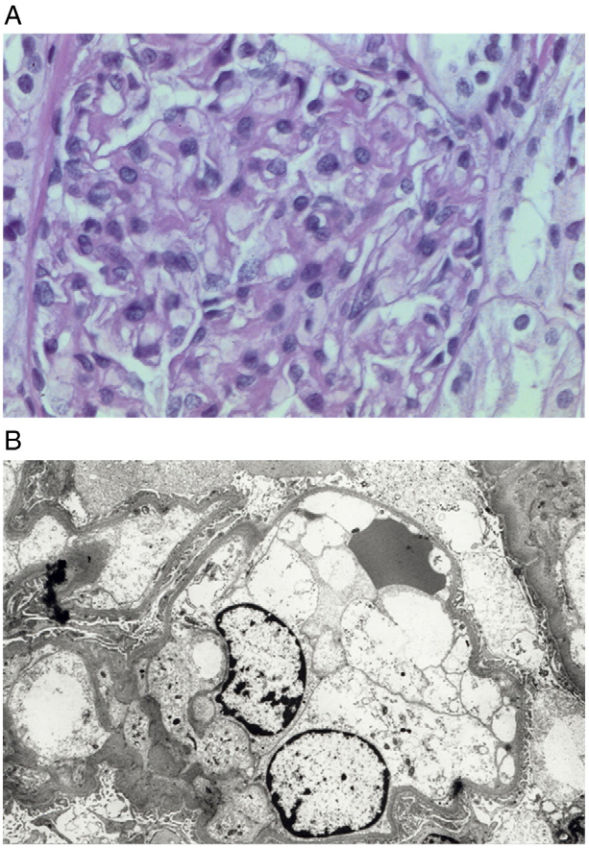

Figure 2 Normal pregnancy. (A) Light microscopy of a glomerulus with swelling and vacuolization of endothelial cells (PAS ×350); and (B) electron micrograph showing swollen, defenestrated endothelial cells (×3000).