WHAT IS RENAL STONE MATRIX?

S Öhman, L Larsson, and H-G Tiselius

Departments of Clinical Chemistry and Urology
Linköping University
Linköping, Sweden

INTRODUCTION

The interest concerning the composition of urinary calculi has been focused on the crystalline components since these constitute a major part of the stone. Important studies of organic matrix have been carried out by Boyce and King (1). In immunological experiments, they found mucoproteins to be present both in stones and in urine. Since then, the "matrix" has been considered to consist of mucoproteins. However, mucoproteins represent less than 3% of the stone weight, whereas the organic matter approximates 10-20% (1-3).

The presence of fibers in stone material has occasionally been reported in the literature, but just as a mere curiosity (4). As early as 1684, von Heyde observed such fibers (4). When we received stone material after extracorporeal shock-wave lithotripsy, we found it to contain fibers which looked like dust, textile fibers, or hair. After examination of such material and intact stones obtained by operation or spontaneous passage, we found that the fibers were included in the inorganic material. Thus, we had to accept that the fibers really were a part of the stone. It is likely that the shock-wave procedure cracked the stones in such a way that the fibers were revealed. In this study, we report some morphological and chemical features of these fibers.

MATERIALS AND METHODS

Urinary stones were obtained following spontaneous passage, operation, or extracorporeal shock-wave lithotripsy. The mineral components were determined by a wet-chemical method (2). The material was morphologically characterized by light microscopy (Zeiss stereo microscopy) in ordinary and in ultra-violet illumination, and by scanning-electron-microscopy (SEM) (Jeol 840 microscope). X-ray emission analysis was used in the SEM study.

Several qualitative tests were performed on the material by studying the reaction with reagents under stereo microscope. For amino-acid analysis, pooled fibers were heated in 6-M HCl at 110°C for five days in a hydrolysis tube after removal of the air. The content was filtered through a 0.22-μm Millipore filter. The filtrate was analyzed with a Kontron Liquimat III amino-acid analyzer. The residue on the filter was studied with SEM and
Figs. 1 and 2. SEM photographs of a renal stone that had been punched with a needle in order to show the fiber content.