FINE NEEDLE ASPIRATION BIOPSY OF ABDOMINAL SUBCUTANEOUS FAT TISSUE FOR
THE DIAGNOSIS AND TYPING OF AMYLOIDOSIS

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ABSTRACT

Systemic amyloidosis was diagnosed in 150 patients by fine needle aspiration biopsy of subcutaneous abdominal fat tissue. The method has turned out to be rapid, safe and totally free of complication and is useful in all types of systemic amyloidosis. Subcutaneous abdominal fat tissue can also be used for typing of amyloid.

At the International Symposium in Helsinki 1974 we reported our results with a new method for the diagnosis of systemic amyloidosis, the fine needle aspiration biopsy of subcutaneous fat tissue [1]. The method, which at that time has been used in 10 cases of systemic amyloidosis, promised to be a simple and reliable method. We hereby report our experience of the method in different types of systemic amyloidosis. We now also use abdominal fat tissue for the determination of amyloid type.

METHOD

The method is based on the almost constant appearance of amyloid deposits around fat cells and in the walls of small vessels in the abdominal fat tissue in AL, AA and prealbumin type of systemic amyloidosis. Aspiration biopsy of such fat tissue is easily performed with an ordinary syringe (10-20 ml) equipped with a long needle, which should have a diameter between 0.9 and 1.2 mm. Thicker needles have been used with good result but in that case local anesthesia often is necessary. After aspiration of fat tissue at 1-3 locations of the abdominal subcutis, smears are made. These are allowed to air dry and are then stained with alkaline Congo red without any prior fixation. After mounting in Canada balsam or equal, the smears are examined in a polarization microscope between crossed polars. In cases of systemic amyloidosis, a green birefringence is found, usually in all or most tissue fragments. In rare cases, only a few tissue fragments contain amyloid and therefore a careful examination of all obtained material is recommended.
TABLE 1. Ten Year Material of Patients with Systemic Amyloidosis Diagnosed by Fine Needle Aspiration Biopsy

<table>
<thead>
<tr>
<th>Clinical type of amyloidosis</th>
<th>Number of patients</th>
</tr>
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<tbody>
<tr>
<td>Secondary amyloidosis</td>
<td>114</td>
</tr>
<tr>
<td>Rheumatoid arthritis 96</td>
<td></td>
</tr>
<tr>
<td>Other causes 18</td>
<td></td>
</tr>
<tr>
<td>Primary amyloidosis</td>
<td>25</td>
</tr>
<tr>
<td>Myeloma associated amyloidosis</td>
<td>6</td>
</tr>
<tr>
<td>Senile systemic amyloidosis</td>
<td>1</td>
</tr>
<tr>
<td>Familial systemic amyloidosis</td>
<td>4</td>
</tr>
</tbody>
</table>

Experience

Since we introduced the method [1, 2] we have been able to diagnose 150 cases of systemic amyloidosis (Table 1). Although developed for secondary amyloidosis, we have found the method equally valuable in AL amyloidosis. The value of the method has been confirmed by others [3] who also found it useful in familial amyloidosis. We have recently tested the method in four patients with known familial systemic amyloidosis, Swedish type, with positive result in all four cases.

During the decade that we used fine needle biopsy of subcutaneous fat tissue, we have seen no falsely positive result. Falsely negative results have occurred in about 5%. These have usually been due to inadequate material or inexperience of the diagnostician. Very rarely, no amyloid is found in an adequate material in spite of a systemic amyloidosis.

Conditions for Good Results

It is almost always easy to get an adequate material for an experienced person. It is necessary to assure that tissue fragments are obtained and not only fat droplets. A reliable Congo red staining is extremely important in this type of biopsy since over-stained specimens easily are judged as positive. A polarization microscope equipped with strong light is also necessary.

Advantages with the Method

The greatest advantages with the method is that it is extremely easy, rapid and free of complications. It can be repeated in one patient as often as wanted. There is no need of preparation of the patient and no special equipments are necessary. Since no embedding and cutting of material is needed, the method can be used and the specimens read by any interested clinicians, provided that he has experience in the microscopic diagnosis of amyloid.

Typing of Amyloid

We use subcutaneous fat tissue also for the typing of amyloid. In local anesthesia about 1 cm³ of fat tissue is removed after a small incision. The specimen tissue specimen is put into normal saline and sent to the laboratory. After that the material has been defatted with acetone and allowed to dry, it is extracted with 6 M guanidine HCl in 0.1 M Tris HCl buffer, pH 8.0 containing 0.1 M dithiothreitol. After centrifugation,