THE STERNAL MARROW ASPIRATION OF AMYLOID IN MULTIPLE MYELOMA

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THE OCCURRENCE of amyloidosis in multiple myeloma has been long recognized and the association of the two conditions well established. In 1931, Magnus-Levy wrote: "When I, at first purely out of interest in the clinical and metabolic aspects of myeloma, dug deeper into the literature, I was surprised to find a rather large, constantly growing body of data on amyloid in the morphologic publications." Unusual tumor formation and localization of the amyloid-like material in the bone marrow and in the plasmocytoma tissue has been cited. However, the unusual finding of amyloid substance in the marrow aspirate of a patient with multiple myeloma prompted this report.

CASE REPORT

A 57 year old white man (Case 9103) was admitted to the hospital in October 1948 with the diagnosis of multiple myeloma. His illness began in the autumn of 1947 with dyspnea on exertion. Soon, low back pain became prominent and in June 1948, bilateral ankle edema, pain in both flanks and right hip appeared. At that time anemia was discovered. A marrow examination led to the diagnosis of myeloma and the presence of Bence-Jones protein in the urine.

On admission the patient appeared chronically ill, pale and slightly dyspneic. There was an obvious uriniferous odor about him. His blood pressure was 150/90. There was limitation of flexion of the trunk due to severe right flank pain.

The hemoglobin was 6.6 grams per 100 cc.; the red blood cell count 3,100,000 per cu. mm. The white blood cell count was 3,000 per cu. mm. with a differential count of 37 per cent polymorphonuclear leukocytes, 55 per cent lymphocytes, 3 per cent monocytes and 5 per cent eosinophils. The platelets, on smear, appeared decreased. The sedimentation rate (Wintrobe) was 80 mm. in one hour. The specific gravity of the urine was 1010 and found to be fixed at this level on a Fishberg test. Albuminuria (3+) and granular casts were found. The plasma proteins were 6.4 Gm. per cent; albumin 4.7 Gm. per cent and globulin 1.7 Gm. per cent. Bence-Jones protein was present in the urine. The congo red test was negative for amyloid with but 26 per cent of the dye absorbed. The NPN was 72 mg. per cent. X-ray examination of chest showed destructive changes in the right eighth rib and spotty demineralization of entire rib cage, scapulae and pelvis.

The diagnosis of multiple myeloma was confirmed by sternal marrow aspiration. The sternum was punctured at the second intercostal space and about 0.1-0.3 ml. of marrow was withdrawn. Smears of the unmodified marrow were prepared in the usual manner on glass slides and then stained with Wright’s stain and counter stained with Giemsa stain. The aspirate so obtained was highly cellular and consisted almost wholly of myeloma cells (fig. 1). The impressive feature of the specimen was the presence of varying sized globules of pink, eosinophilic-staining, amorphous material lying at random throughout the preparation (fig. 2). On closer inspection, smaller spherules of similar material were found within the cytoplasm of the polymorphonuclear cells (fig. 4). The intra- and extracellular material appeared morphologically and tinctorially identical on preparations stained by Giemsa, hematoxylin-eosin and periodic acid Schif techniques. Morphologically, this material could not be distinguished from that substance.
STERNAL MARROW ASPIRATION OF AMYLOID

Fig. 1—Sternal marrow aspirate (X 1040). Large cluster of myeloma cells.

Fig. 2—Sternal marrow aspirate (X 1040). Extracellular amyloid, which has been designated as amyloid or para-amyloid in multiple myeloma.† No metachromatic staining was attempted.

The patient was obviously uremic on admission. His condition grew gradually worse and in December he lapsed into coma and died. Postmortem examination confirmed the diagnosis of multiple myeloma and the presence of amyloid in the bone marrow (fig. 3).
FIG. 3.—Sternal marrow, section (X 420). Mass of amyloid deposits.

FIG. 4a.—Sternal marrow aspirate (X 1380). Polymorphonuclear cell with number of small spherules of amyloid.

DISCUSSION

The presence of amyloid in the marrow aspirate is an unusual finding, and to our knowledge has not been reported previously. The material was seen lying
extracellularly as large globules. Of great interest was the presence of similar pink amorphous staining material within the polymorphonuclear cells. These polymorphonuclear cells were strikingly similar in appearance to the "L. E." cell described by Hargraves.7 Although "L. E." cells have been found almost exclu-
sively in disseminated lupus erythematosus, their presence in a single case of multiple myeloma has been reported by Hargraves. The nature of the inclusion body in Hargraves' case of myeloma was not given. It was postulated, on purely speculative grounds, that the intracellular material in our case represented amyloid which had been ingested by the polymorphonuclear cells. There is evidence that phagocytosis takes place in secondary amyloidosis. Dick and Leiter described active phagocytosis by the polymorphonuclear cells of experimentally induced amyloid. It is highly unlikely, in light of present knowledge, that the amyloid originated within the leukocytes.

**Summary**

1. A case of multiple myeloma is presented in which the diagnosis of amyloidosis was established by means of the sternal marrow aspiration.
2. The polymorphonuclear leukocytes probably play a role in the removal of amyloid deposits.

**References**

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