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Splenic Lymphangioma: Luminal Surface Ultrastructure; A Scanning Electron Microscopic Study

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Summary

A splenic lymphangioma removed from the abdominal cavity during an exploratory laparotomy in a 16 year old girl was studied by light microscopy and scanning electron microscopy (SEM). The tumor was composed of numerous vascular channels some of which were filled with clotted lymph. SEM revealed these channels to be lined with an uniform endothelial lining composed of two morphologic cell types: one with a smooth surface; the other with numerous microvilli. The literature on the SEM of lymphatic vessels and lymphangiomas is reviewed and compared to the splenic lymphangioma.

Lymphangiomas are benign vascular tumors composed of lymphatic spaces which vary in size and number. They are commonly found in the soft tissue of the head and neck in childhood. Lymphangiomas account for 6% of benign tumors in childhood and 5% of all vascular tumors (1). Lymphangiomas are only rarely found in the spleen, although in this site they are one of the most common benign tumors. This is the first recorded study on the scanning electron microscopy of a splenic lymphangioma.

History and Materials

A 16 year old girl with mediastinal Nodular Sclerosing Hodgkin's Disease underwent an exploratory laparotomy for evaluation of abdominal disease. Multiple liver biopsies and a splenectomy were done. No evidence of Hodgkin's Disease was found; however, on the posterior inferior surface of the 230 gram spleen, a slightly elevated cystic lymphangioma measuring 2 x 1.5 x 1 cm. was noted. The cut surface demonstrated several thin walled vascular channels most of which were filled with uniform gelatinous whitish grey material consistent with clotted lymph.

Portions of the lymphangioma were immersion fixed in Trump's solution (2) for at least 24 hours. They were rinsed, dehydrated in graded ethanol and then ethanol-amyl acetate solutions, critical point dried, mounted and coated with carbon 200 Å (3). The lymphangioma was examined and photographed using a Cambridge S4–10 Scanning Electron Microscope. An accelerating voltage of 20 kilovolts was used. Portions of the lymphangioma were also fixed in a 10% formalin solution, processed in the usual fashion for light microscopic evaluation and stained with Hematoxylin and Eosin.

Results

Light microscopy demonstrated numerous cystic spaces of variable diameter containing an amorphous proteinaceous hyalin material interspersed with occasional red blood cells, lymphocytes, neutrophils and histiocytes. The cystic spaces were lined by plump slightly raised endothelial cells overlying a delicate fibrous supporting stroma. Hemosiderin pigment, focal calcification and occasional neutrophils were found in the adjacent tissue.

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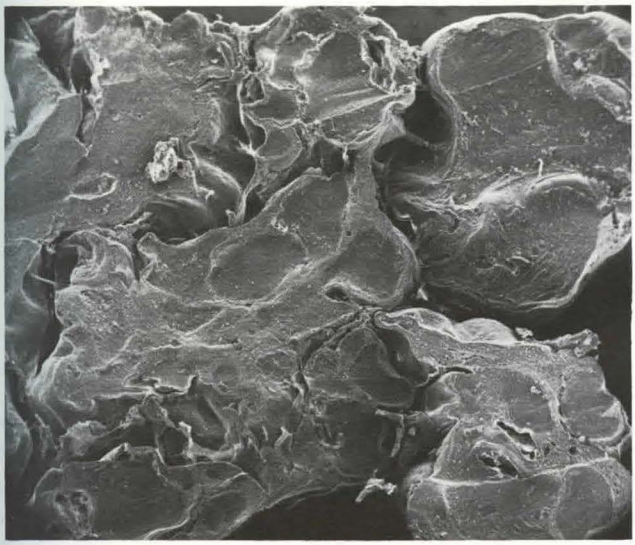

Fig. 1 SEM of splenic lymphangioma demonstrating numerous irregular thin walled vascular channels filled with clotted lymph. 20x magnification

Scanning electron microscopy (SEM) demonstrated many vascular channels filled with clotted lymph (Fig. 1). A few of these channels were not clotted. In these, SEM revealed an uniform endothelial covering (Fig. 2) with occasional red cells, lymphocytes and histiocytes lying on the surface. The lymphangioma endothelial nuclei were slightly raised and ovoid in shape with their longitudinal axes focally parallel to each other. At higher magnification two types of endothelial cells became apparent (Fig. 3). The first had a smooth surface with only rare microvillous projections. The surface of the second type was almost totally covered by numerous uniform microvilli (Fig. 4). Intercellular spaces were also present in many areas (Fig. 4 arrows). The intercellular nature of these spaces was confirmed by the observation of small cytoplasmic projections and microvilli extending into these spaces.

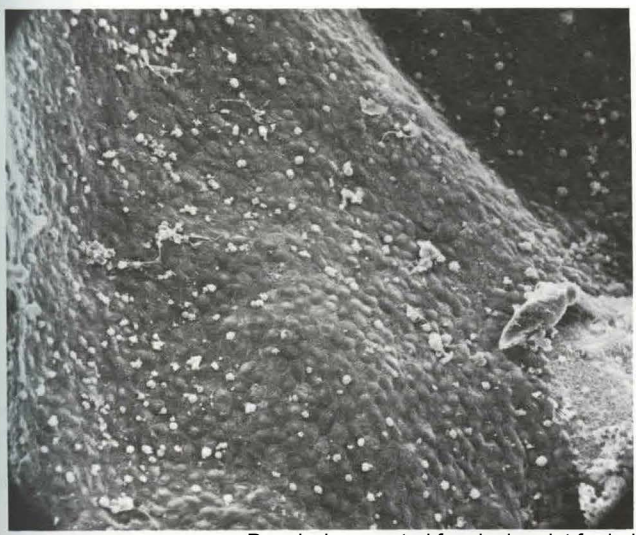

Fig. 2 SEM of splenic lymphangioma demonstrating the uniform slightly raised endothelial cells lining the vascular channels. 125x magnification

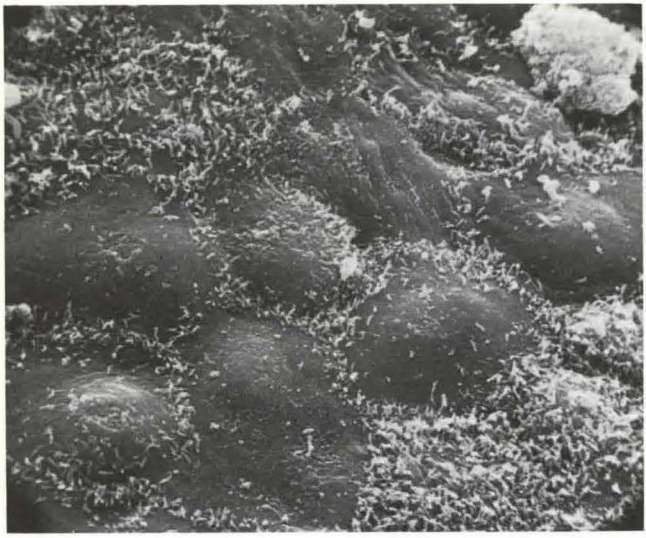

Fig. 3 SEM of splenic lymphangiom endothelial surface demonstrating th two types of surface endothelium: Smooth with rare microvilli and with numerous microvilli. 800x magnifica

Discussion

This is the first SEM study of a splenic lymphangioma. *Ohkuma* (4) presented his results on the scanning study of a lymphangioma circumscripta removed from the perianal region of a 2 year old girl. He described almost parallel slightly raised endothelial cells with occasional papillary luminal projections and fine surface wrinkling. Our results also demonstrated focally parallel raised endothelial cells. However we did not observe papillary luminal wall projections or fine surface wrinkling. *Ohkuma* described on one endothelial type. We found two types o endothelial cells; one with a smooth surface and the other with numerous microvillous projections.

SEM has only recently been used to study the surface anatomy of lymphatic vessels. None of this work has utilized human material. *Leak* (5) and *Gnepp* (3) both have demonstrated oval slightly raised lymphatic endo

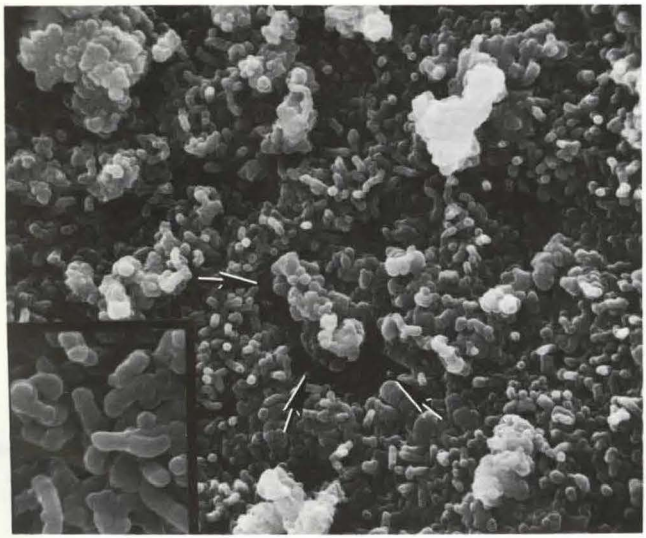

Fig. 4 SEM of lymphangioma endo thelial surface demonstrating unifo microvilli and intercellular spaces (rows). 4000x magnification. Insert Detail of microvilli demonstrating form diameter of the villous proje tions. 10000x magnification

thelial cells from the pulmonary lymphatics of rats and collecting lymphatics of dogs respectively. However, they too demonstrated only one population of endothelial cell surface. Small cytoplasmic projections or blebs have just recently been described on canine lymphatic endothelial cell surfaces (6). We have also seen these fine cytoplasmic blebs and thin microvillous-like projections on the surface of the human thoracic duct collected at the autopsy table. It would seem that cytoplasmic projections including microvilli are part of the normal microanatomy of the lymphatic system.

The two morphologic populations of observed endothelial cells could represent different surface variations of the same cell or possibly two totally different populations of endothelial cells. This will have to be clarified in the future.

Acknowledgements

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