# Splenic Hamartoblastoma in a Sow

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ABSTRACT. Multiple lesions of splenic hamartoblastoma were found incidentally in a 2- to 3-year-old crossbred sow. The predominant cells, characterized by extreme nuclear irregularity and hemidesmosome-like structures, were considered to be derived from reticular cells of the spleen, and demonstrated infiltrative growth. Their cytological atypism and growth pattern suggest that the present lesions are true neoplasms.—KEY WORDS: reticular cell, sow, splenic hamartoblastoma.

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Hamartoma of the spleen is a benign tumour-like growth composed of an abnormal mixture of normal components of spleen. Several theories of its pathogenesis have been proposed and hamartomatous lesions have been diagnosed as neoplasms such as splenomas, lymphangiomas or haemangiomas, congenital anomalies, and post-traumatic scars [12]. A human hamartoma, which was composed of reticulum cells proliferating like true neoplastic cells, was finally diagnosed as hamartoblastoma [4]. Splenic hamartoma is also designated nodular hyperplasia of the spleen and have been seen in dogs, sheep, and cattle [5, 6, 8]. We describe here a swine splenic hamartoblastoma characterized by the growth of reticular cells showing irregular nuclear contours.

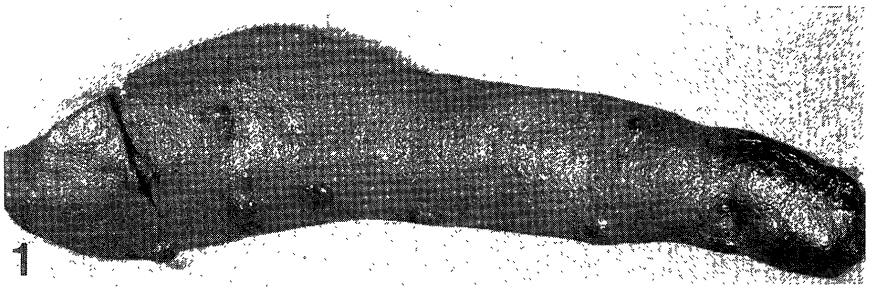
A 2- to 3-year-old crossbred sow was brought to an abattoir in good condition. The spleen measured 45 × 11 × 4 cm and several nodules, 1.0 to 0.5 cm in diameter, were incidentally found throughout the surface (Fig. 1). They protruded above the capsular surface. On sectioning, the nodular tissues appeared dark red and bulged from the cut surface (Fig. 2). They were clearly circumscribed from the surrounding splenic parenchyma but not encapsulated. Samples from the spleen were fixed in 10% neutral buffered formalin, routinely processed, cut at 4 μm and stained with haematoxylin and eosin (HE), Giemsa, and silver impregnation. The immunoperoxidase method was applied to paraffin wax sections using mouse monoclonal antibody to vimentin (Dako Corporation, Carpinteria, CA, U.S.A.), rabbit polyclonal antibody to S100 protein (Nichirei Corporation, Tokyo, Japan), and StrAviGen biotin-streptavidin universal kits (BioGenex Laboratories, Dublin, CA, U.S.A.) as the detection system. For electron microscopy, small pieces from formalin-fixed lesions and surrounding normal-appearing tissues were post-fixed in 1% buffered osmium tetroxide and treated routinely.

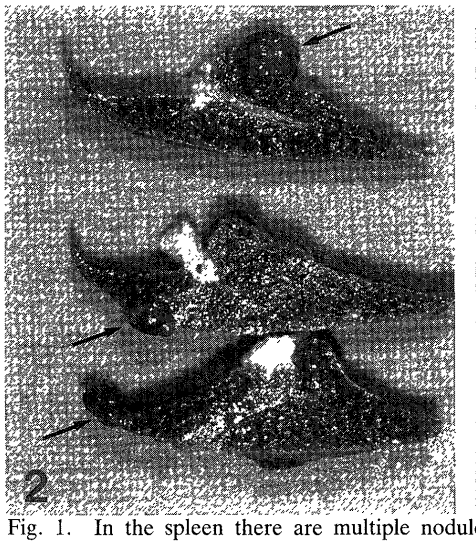
Histologically, the nodules were composed of reticular tissues resembling splenic cords or ellipsoids (Fig. 3). In the abnormal tissues, cells with highly irregular nuclei predominated and cells with oval nuclei were admixed with them. These cells had inconspicuous nucleoli and indistinct cell borders, and a few mitotic figures existed. Delicate reticular fibres formed a meshwork between them. These reticular cells showed an infiltrative growth pattern without compression of the surrounding splenic tissues, and the boundaries between the lesions and the normal tissues were ill-defined. Several splenic trabeculae, some of which were degenerative, and splenic follicles were present in the reticular tissues. Smooth muscle cells, endothelial cells, and blood vessels were sparsely distributed throughout the lesions. Numerous erythrocytes and scattered neutrophils, eosinophils, lymphocytes, plasma cells, and macrophages were also present. Positive immunostaining for S100 protein was found in dendritic reticular cells, but not in abnormal and normal reticular cells. Some abnormal reticular cells stained weakly for vimentin, while normal reticular cells were negative.

Ultrastructurally, the abnormal reticular cells usually showed extreme nuclear irregularity with moderate amounts of heterochromatin and rarely with nuclear pockets and intranuclear fibrillary inclusions (Fig. 4). There were poorly to slightly developed organelles and moderate amounts of cytofilaments in the cytoplasm. Occasional hemidesmosome-like structures, some of which were long, and rare desmosome-like structures were seen on the inner face of the cell membrane (Fig. 5). Reticular microfibrils were present in the extracellular space close to the cell surface. In some parts, abnormal reticular cells were located immediately beneath endothelial cells lining splenic sinuses. In contrast, normal reticular cells contained oval nuclei with less condensed chromatin, and there were sparsely distributed organelles and few cytofilaments in the cytoplasm. Junctions were rarely found. Although readily distinguishable from normal reticular cells, the abnormal cells were considered to be derived from either cordal reticular cells or reticular cells of ellipsoids according to their location and morphology.

Hamartomatous lesions are very common in dogs and are called nodular hyperplasia of the spleen [8]. These lesions contained elements that resembled both white and red pulp and are considered to belong to hyperplastic processes [5], or intermediate between hyperplasia and benign neoplasia [8]. Such disorders, which comprized two or more kinds of normal-appearing cells and are microscopically well-demarcated from the surrounding splenic pulp, are apparently different from our case.

In man, splenic hamartomas may be divided into three types: red pulp (pulposal), white pulp (lymphoid or follicular), and mixed [1, 7]. In the first type, tissues





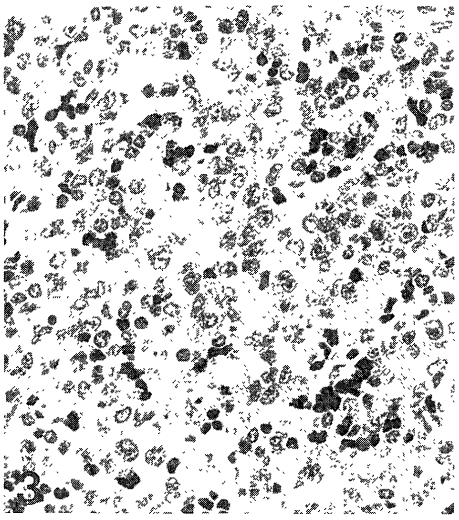
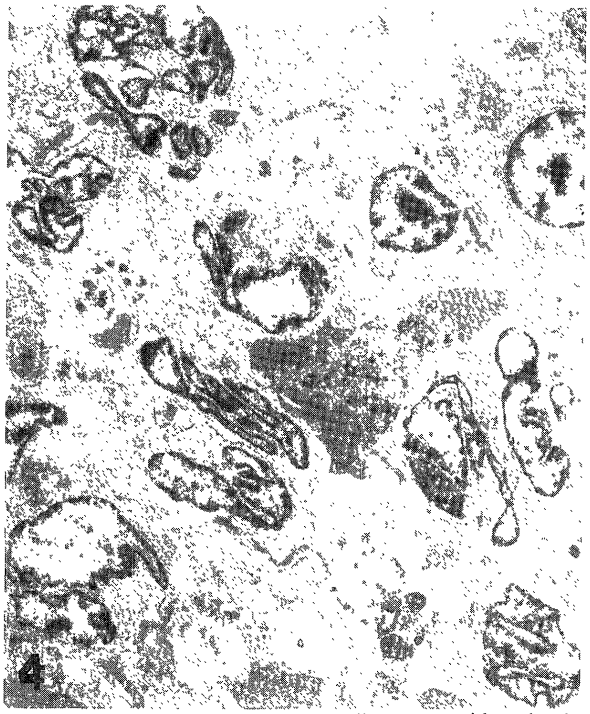


Fig. 1. In the spleen there are multiple nodules that are raised above the capsular surface.
Fig. 2. Well-demarcated, spherical lesions protruding above the capsular and cut surfaces (arrows).
Fig. 3. This abnormal tissue is composed of many reticular cells and erythrocytes. HE-stain, × 400.



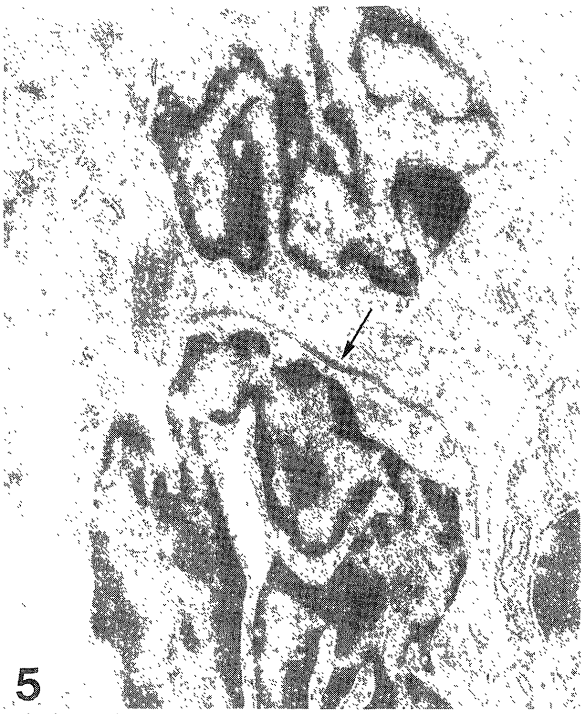


Fig. 4. Highly irregular nuclear outlines are evident in the reticular cells. Uranyl acetate and lead citrate, × 2,700.
Fig. 5. A long hemidesmosome-like structure on the inner face of the cell membrane (arrow). Uranyl acetate and lead citrate, × 10,100.

consist of cells similar to the cells lining the normal splenic sinuses and/or supporting stromal cells [2]. Although the normal sinus cell type predominated in most human cases [10–12], Hisano *et al.* [4] found a tumour mainly composed of neoplastic reticulum cells in an 18-year-old Japanese woman, and these cells grew with destruction and replacement of the surrounding splenic tissue and were considered to be neoplastic. This tumour was termed hamartoblastoma or so-called "reticulum cell tumour". Whereas component cells in most reported hamartomas and the hamartoblastoma do not show atypia, atypical reticular cells in our case showed an infiltrative growth pattern and were characterized by ultrastructural aberrations from their normal counterparts in nuclear profiles, chromatin pattern, organelles, cytofilaments and junctions. The increased number of cytofilaments was detectable also in immunohistochemistry for vimentin. These morphological changes suggest that the present case has a more definite neoplastic nature than the reported human hamartoblastoma.

Fibroblastic reticular cells are closely associated with reticular fibres, exhibit a close hemidesmosome-like junction to the accompanying fibres [9], and are different from S100-positive dendritic reticular cells in germinal centres. In man, tumours of fibroblastic reticular cell origin are extremely rare [3, 13]. Our case may be useful in understanding tumours of reticular cell origin.

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