Malignant Mesothelioma and Mesothelial Hyperplasia of the Tunica Vaginalis Testis of a Dog - Case Report

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KEY WORDS
Mesothelioma - testicular neoplasms - immunohistochemistry - dogs.

SUMMARY
A 5-year-old male boxer dog was presented with a history of recent left scrotal enlargement and thickening of the tunica vaginalis. The dog was castrated and the left testicle submitted for diagnostic examination. Projecting from the serosal surface of the testicle were numerous, white, firm, nodular masses, which measured up to 1 cm in diameter. Histologically, lesions of mesothelial hyperplasia and malignant mesothelioma of the tunica vaginalis were observed. Most tumour cells were vimentin-positive, with the exception of some cells in superficial regions which stained positively for cytokeratin. Small numbers of the vimentin-positive tumour cells also stained positively for desmin or smooth muscle actin. This is the second report of malignant mesothelioma of the tunica vaginalis testis in a dog, and the first to be immunohistochemically examined for intermediate filament expression.

INTRODUCTION
Primary malignant mesothelioma of the tunica vaginalis testis is an extremely rare tumour in humans and domestic species. In humans, there is an association between mesotheliomas in this site and asbestos exposure (MIRABELLA, 1991). Mesotheliomas of the tunica vaginalis have been reported to occur spontaneously in Fischer rats in which they are a well recognised entity (GOULD, 1977, MITSUMORI and ELWELL, 1988), and rarely in bulls (LADDS and CRANE, 1976, SUTTON, 1988); there is one previous report in a dog (CIHAK et al., 1986).

Case report
A 5-year-old, male boxer dog was presented to the Department of Small Animal Medicine and Surgery, The Royal Veterinary College, University of London, with a history of recent left scrotal enlargement and thickening of the tunica vaginalis. Because neoplasia was suspected, the dog was castrated. The left testis was fixed in 10% neutral buffered formalin, and submitted to the Department of Pathology and Infectious Diseases for diagnostic investigation.

On gross examination of the testis, numerous white, firm, nodular, sessile masses with irregular surfaces and measuring up to 1 cm in diameter, were projecting from serosal surfaces of the testis, epididymis, and spermatic cord (Fig. 1). Samples were routinely processed, and embedded in paraffin wax. Sections (5 \textmu m) were mounted on glass slides and stained with haematoxylin and eosin (HE). Some sections of the testis were immunohistochemically stained for vimentin, cytokeratin, desmin, or smooth muscle actin by the avidin-biotin complex method (ABC Vectastain Elite).

Histopathology
Serosal surfaces of the testis, epididymis, and spermatic cord were markedly expanded by multiple, densely cellular, infiltrative, neoplastic masses. Tumour cells in superficial regions were forming nodular papillary projections (Fig. 2), within which they were arranged in small sheets, supported by a fine fibrovascular stroma (Fig. 3). The tumour cells were


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polygonal, with a moderate amount of finely granular, brightly eosinophilic cytoplasm which had well-defined margins. In some fields, there were up to 4 overlying stratified layers of polygonal cells with small amounts of pale-staining, eosinophilic cytoplasm. Nuclei were oval or sometimes irregularly shaped, with finely stippled chromatin and 1-2 large, central, deeply eosinophilic nucleoli. There was moderate anisokaryosis, with small numbers of multinucleate tumour cells. Small numbers of scattered mitotic figures were observed, some of which had a bizarre appearance. Tumour cells were extensively infiltrating stromal tissue of the adjacent epididymis. All other surfaces were covered by 2-5 layers of hyperplastic mesothelial cells. The hyperplastic cells were forming small numbers of micropapillary or papillary projections from the serosal surfaces.

Immunohistochemically, tumour cells showed diffuse, positive, granular, cytoplasmic staining for vimentin, with the exception of superficial, stratified cells, the cytoplasm of which stained positively for cytokeratin. Rare scattered vimentin positive tumour cells also showed positive granular cytoplasmic staining for desmin and smooth muscle actin. The cytoplasm of hyperplastic mesothelial cells was also cytokeratin-positive.

DISCUSSION

Mesotheliomas are benign, or, more usually, malignant tumours derived from mesothelial cells which line the peritoneal, pleural, or pericardial cavities. Mesotheliomas arising in the tunica vaginalis, an extension of the peritoneal cavity, have the same histological features as those which arise in other sites. Mesothelial cells have the potential to develop as either epithelial or mesenchymal cells. Mesotheliomas therefore usually contain epithelioid and mesenchymal components in varying proportions, as indicated by positive immunohistochemical staining for the intermediate filaments cytokeratin and vimentin. Those with approximately equal proportions of the two cell types are termed biphasic (HEAD, 1990). Tumours which are primarily epithelioid or primarily fibrous, can resemble adenocarcinomas or fibrosarcomas respectively (HEAD, 1990). In addition to cytokeratin and vimentin, tumour cells can express desmin, smooth muscle actin, or neural markers, indicating divergent differentiation (MAYALL, 1992, HURLIMANN, 1994). Based on immunohistochemical staining for intermediate filaments, the tumour masses in this case were composed primarily of mesenchymal type cells with multifocal myoid differentiation. The one previously reported case of mesothelioma involving the tunica vaginalis of a dog was not characterised immunohistochemically (CIHAK et al., 1986).

The tumour in this case was considered to be malignant on the basis of invasion of the epididymal stroma. Cytological atypia is not considered to be useful in separating benign from malignant mesotheliomas, as benign processes commonly show cyto-
logical atypia (CHURG et al., 2000). In general, mesothelioma in humans is associated with extensive local invasion and widespread metastasis. If there is early identification of these tumours however, treatment can be successful. To date this dog is well, no other serosal surfaces are affected and there is no clinical evidence of recurrence or metastasis.

In addition to the tumour tissue, mesothelial hyperplasia of the tunica vaginalis serosa was noted in some histological fields in this case, as in some human patients (EIMOTO and INOUE, 1977). Mesothelial hyperplasia in this region can be a reaction to various irritative stimuli, as in the pleural, pericardial, or peritoneal cavities. Mechanical irritation may have been caused in this case by the tumour masses. It has also been suggested, based on studies of induced mesotheliomas in rats, that mesothelial hyperplasia can progress to dysplasia and neoplastic change (FRAIRE et al., 1994); it is possible that such progression occurred in this dog. The association between mesotheliomas and exposure to asbestos fibres in humans is well-known, but has not been confirmed in animals. This association has been suspected in dogs, however there is no history of it in this case (GLICKMAN et al., 1983).

Tumour masses in the tunica vaginalis testis of this dog were diagnosed as malignant mesothelioma of predominantly mesenchymal differentiation, on the basis of gross, histological, and immunohistochemical findings. This is the second report of mesothelioma in this site in a dog, and the first to be confirmed immunohistochemically.

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REFERENCES


