Peritoneal epithelioid mesothelioma in German shepherd dog - A case report

Department of Veterinary Pathology, College of Veterinary Science and Animal Husbandry, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat, India

Address for Correspondence:
Dr R.S. Parmar, Assistant Professor, Department of Veterinary Pathology, College of Veterinary Science and Animal Husbandry, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat, India; E-mail: drrohit.vet23@gmail.com

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ABSTRACT
A seven-year-old intact German shepherd male dog was brought to Animal Disease Investigation Office, Bhuj, Government of Gujarat with complaint of testicular enlargement. On clinical examination bilateral enlargement of testes without accumulation of any transudate/exudate in scrotum was noticed, hence bilateral orchietomy was performed. At the time of surgery, multifocal to coalescing, raised, soft to firm, off-white, 0.1 to 1 cm diameter nodules, randomly scattered over the tunica vaginalis of testes were noted. After two days of surgery, dog showed blood tinged vomitus and lethargy. Although, dog was treated symptomatically, animal was died on the next day. On post mortem examination, the serosal surfaces of the abdominal viscera, internal abdominal wall and diaphragm were studded with multifocal to coalescing, raised, soft to firm, off-white, 0.1 to 2 cm diameter nodules. Mild ascites was noted. Appropriate samples were collected in 10% neutral buffered formalin and submitted for histopathology. Microscopic examination revealed, neoplastic cells expanding and elevating the serosal surface of most visceral organs, testes and wall of abdomen. The neoplastic mesothelial cells showed resemblance with epithelial cells and exhibited various cytoplasmic and nuclear features of malignancy such as moderate to abundant quantity of eosinophilic cytoplasm, variably distinct cell border, round to oval large vesicular nuclei with centrally placed prominent nucleoli, occasional mild anisokaryosis, karyomegaly and mitotic figures less than one per high power field. On immunohistochemical examination, neoplastic cells showed strong cytoplasmic immunoreactivity with cytokeratin and vimentin and negative for smooth muscle actin and S-100. On the basis of gross, microscopic and immunohistochemical examination, the growth was diagnosed as peritoneal malignant epithelioid mesothelioma.

Keywords: Dog, epithelioidmesothelioma, histopathology, immunohistochemistry

Mesothelial cells are specialised squamous like flattened epithelial cells having centrally placed round to oval nucleus. Primarily mesothelium lines the various serous cavities of the body like pleural, pericardial and peritoneal cavities and the organs contained within these cavities. It serves as a protective barrier in terms of providing slippery non adhesive surface for underlying structures. The mesothelial lining also serves other useful functions including transport across the serosal surface, immunity through significant contribution in antigen presentation, inflammation and tissue repair and coagulation. Mesothelial cells are considered as slowly regenerating cells but with appropriate stimulus such as soluble inflammatory mediators and stimulus from dying or injured cells, its proliferation can be greatly enhanced. Towards the lumen of the cavity lined by mesothelial cells, the mesothelial cells have well developed microvilli. Though mesodermal in origin mesothelial cells express both mesenchymal and epithelial intermediate filaments.

Malignant mesothelioma is a rare tumor of animals arising from serosal lining of various body cavities. It is reported sporadically in calves where it can be congenital and spontaneous among dogs but reported more commonly in human population where a strong association has been suggested between inhalation of asbestos and occurrence of mesothelioma. The incidence of metastasis to distant organs is rare but spread via implantation is common. In dogs, tunica vaginalis of scrotum is one of the common locations for origin of mesothelioma. Histologically three predominant patterns of mesothelioma have been recognised including epitheloid, sarcomatous and biphasicas seen in human.

In the present investigation a seven-year-old intact German Shepherd male dog was brought to Animal Disease Investigation Office, Bhuj, Government of Gujarat with complaint of testicular enlargement. On clinical examination ascites was noted along with bilateral enlargement of testes without accumulation of any transudate/exudate in scrotum, hence
bilateral orchiectomy was performed. Clinical pathology revealed moderate normocytic hypochromic anemia and azotemia (increased urea nitrogen and creatinine). At the time of surgery, multifocal to coalescing, raised, soft to firm, off-white, 0.1 to 1 cm diameter nodules, randomly scattered over tunica vaginalis of testes were noted (Fig.1). After two days of surgery, dog showed blood tinged vomitus and lethargy. Although, dog was treated symptomatically; animal was died on next day.

On post mortem examination, the serosal surfaces of the abdominal viscera, internal abdominal wall and diaphragm were studded with multifocal to coalescing, raised, soft to firm, off-white, 0.1 to 2 cm diameter nodules. Mild ascites was noted. Appropriate Mesothelioma is locally aggressive neoplasm originates from serous lining of body cavities that can readily spread by means of implantation rather than through metastasis. In animals it has been reported in dog and cattle. The tunica vaginalis covers the testes, which is merely an extension of peritoneal mesothelial lining. In male dog, often tunica vaginalis is an important site for mesothelioma. In the present case, neoplastic growth was noticed on the different visceral organs like kidneys, spleen, testicular surface, diaphragm, and abdominal wall in form of multifocal to coalescing, raised, soft to firm, off-white nodules of variable diameter.
Clinically as well as morphologically mesothelioma in dog is much similar to that of human mesothelioma with rapid progression leading to grave prognosis. The exact pathogenesis of mesothelioma in animals is yet to establish but in humans, inhalation of asbestos is strongly associated with malignant mesothelioma with presence of typical ferruginous bodies in lungs. However reports on experimental induction of mesothelioma with asbestos, glass fibers, aluminium oxide, and Simian virus 40 in rats were available. Clinically affected animals showed almost similar signs as that of humans including respiratory distress due to pleural effusion, weight loss, coughing, and vomiting.

There are many other conditions including neoplastic as well as non-neoplastic which must be differentiated from malignant mesothelioma. Non neoplastic conditions include reactive or hyperplastic mesothelium while neoplastic conditions include adenocarcinoma, histiocytic sarcoma etc. Careful examination and various diagnostic aids are needed for this differentiation. Ultrastructural examination of mesothelial cells reveals well developed surface microvilli which may not be a feature of adenocarcinoma. Besides, the immunohistochemical investigation showed that neoplastic cells in mesothelioma exhibit immuno-reactivity to both, cytokeratin and vimentin. Although this is not a reliable differentiating feature because other neoplasms may also show positive reactivity for both of these markers. CD18 is one of the important immunohistochemical marker that distinguishes histiocytic sarcoma from mesothelioma.

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