

CASE STUDY INVASIVE EPITHELIAL PERITONEAL MESOTHELIOMA IN A MALE NEW ZEALAND RABBIT

BY

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ABSTRACT

This report describes the gross, microscopic, and immunohistochemical features of an invasive epithelial mesothelioma in a 5 months-old intact male New Zealand rabbit. The tumor involved peritoneum and invaded into intestinal wall. Histologically, the tumor consisted of nests of epithelioid cells with frequent mitotic figures and multinucleation that infiltrated mucosa and submucosa of intestine. Neoplastic cells strongly co-expressed vimentin and cytokeratin intermediate filaments, which assisted in the differentiation from other epithelial tumors of non-mesothelial origin.

Key words: epithelial mesothelioma, rabbit, histopathology

INTRODUCTION

Mesothelioma is a rare neoplasm arising from the lining cells of the peritoneal, pleural, and pericardial cavities or the tunica vaginalis of the testis (**Wilson and Dungworth, 2002**). Spontaneous mesothelioma has been reported in humans as well as in many species of animals, including dogs, cattle, goats, horses, rats, and hamsters (**Kannerstein and Churg, 1980**), but is most common in cattle, where it may be congenital (**Lopez, 2001**). Mesothelioma is associated with exposure to asbestos in humans (**Glickman, 1983; Hesterberg and Barrett, 1985; Lopez, 2001; Vogelzang, 2002; Wilson and Dungworth, 2002**) and potentially in dogs (**Glickman et al., 1983; Wilson and Dungworth, 2002**). This association is not restricted to pleural mesotheliomas because peritoneal mesotheliomas also occur in humans exposed to asbestos. The tumor has been experimentally induced in rats and

hamsters by inhalation or injection of asbestos, glass fibers, and aluminum oxide (**Kannerstein and Churg, 1980**). Mesothelioma has also been induced in rats by intracavitary injections of the simian virus 40 (SV40) (**Mutsaers, 2004**). There are distinct histologic patterns: epithelioid (resembling carcinoma), sarcomatoid or sclerosing (resembling fibrosarcoma), and biphasic mesothelioma (**Head et al., 2002**). In this report, we describe the macroscopic, histopathologic, and immunohistochemical findings of an invasive epithelioid mesothelioma in a male rabbit affecting peritoneum.

MATERIALS AND METHODS

White firm masses weighing 350 mg were accidentally detected in the abdominal cavity of five months old intact male New Zealand rabbit after slaughtering and evisceration of the animal reared at El-Serw Experimental Research Station belongs to Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Egypt. Formalin-fixed, paraffin-embedded sections (5 μ m) from samples of peritoneal masses and intestine were stained with hematoxylin and eosin for routine histopathology. For immunohistochemistry, deparaffinized sections were treated with hydrogen peroxide and blocked with 2% animal-free serum for 30 min at 37°C. Sections were then incubated with antibodies against pancytokeratin (1 : 100) and vimentin (1 : 200), followed by peroxidase-conjugated antibodies (EnVision Labelled Polymer, peroxidase; all from DakoCytomation) for 30 minutes. Bound antibodies were detected using 3, 3'-diaminobenzidine tetrahydrochloride. The sections were counterstained with Mayer's hematoxylin. All stained sections were visualized with a light microscopy (binocular, Olympus). Pictures were picked up using Digital camera (Canon 5 mega pixels, 3.2x optical zoom).

RESULTS AND DISCUSSION

Mesothelioma is one of the common spontaneous tumors in Fischer rats, observed mainly in male rats, although the incidence is low (**Goodman et al., 1979**; **Maekawa et al., 1983**; **Solleveld et al., 1984**). In this study, the mesothelioma was detected in a male New Zealand rabbit. **Tanigawa et al., (1987)** and others reported that all mesotheliomas were detected only in males where the incidence was 4.3%, though **Goodman et al. (1979)** and **Solleveld et al., (1984)** reported mesotheliomas in females. In the peritoneal cavity, multiple

nodules of different sizes were also scattered similarly on the surface of viscera, mesentery, diaphragm and peritoneum. Asbestos induces pleural and peritoneal mesotheliomas not only in human beings but also in rats and dogs (**Wagner, 1962; Shin and Firminger, 1973; Davis, 1974; Davis 1976; IARC 1977; Reggeti et al., 2005**). However, in this case study, there was no historical report or gross evidence of asbestos exposure. Histopathology, the tumor consisted of nests of epithelioid cells with frequent mitotic figures and multinucleation that infiltrated mucosa and submucosa of intestine and peritoneum (**Fig. 1**), which was convincing of mesothelioma, but did not rule out carcinoma of nonmesothelial origin. Normal mesothelial cells coexpress cytokeratin and vimentin, which may allow differentiation from other epithelial tumors (**Mutsaers, 2004**). In this case, tumor cells strongly coexpressed both cytokeratin and vimentin intermediate filaments, thus supporting the diagnosis of mesothelioma (**Figs. 2&3**). Cytokeratin and vimentin are also coexpressed in other tumors including some anaplastic carcinomas, amelanotic melanomas, renal carcinomas, and Sertoli cell tumors, but there was no evidence of any other potential primary masses in this animal. Histological and immunohistochemical findings were consistent with the previously described by **Reggeti et al., (2005)**. In human mesotheliomas, three histological subtypes are recognized; epithelial, sarcomatous or fibrous, and biphasic or mixed (**Suzuki, 1980; Antman, 1981**). In addition to those, some variants such as desmoplastic, tubulopapillary or myxoid have been reported (**Adams and Unni, 1984; Whitaker and Shilkin, 1984**). Histological patterns of spontaneous mesotheliomas observed in the present case resembled the epithelial type of human cases. Immunohistochemical localization of cytokeratin also suggested that this mesothelioma resembled the epithelial type of human counterpart, since the epithelial type of human mesotheliomas contains abundant keratin proteins (**Barwick and Mardi, 1982; Corson and Pinkus, 1982**). According to histopathology and immunohistochemistry, this case was diagnosed as invasive peritoneal epithelial mesothelioma in a male New Zealand rabbit.

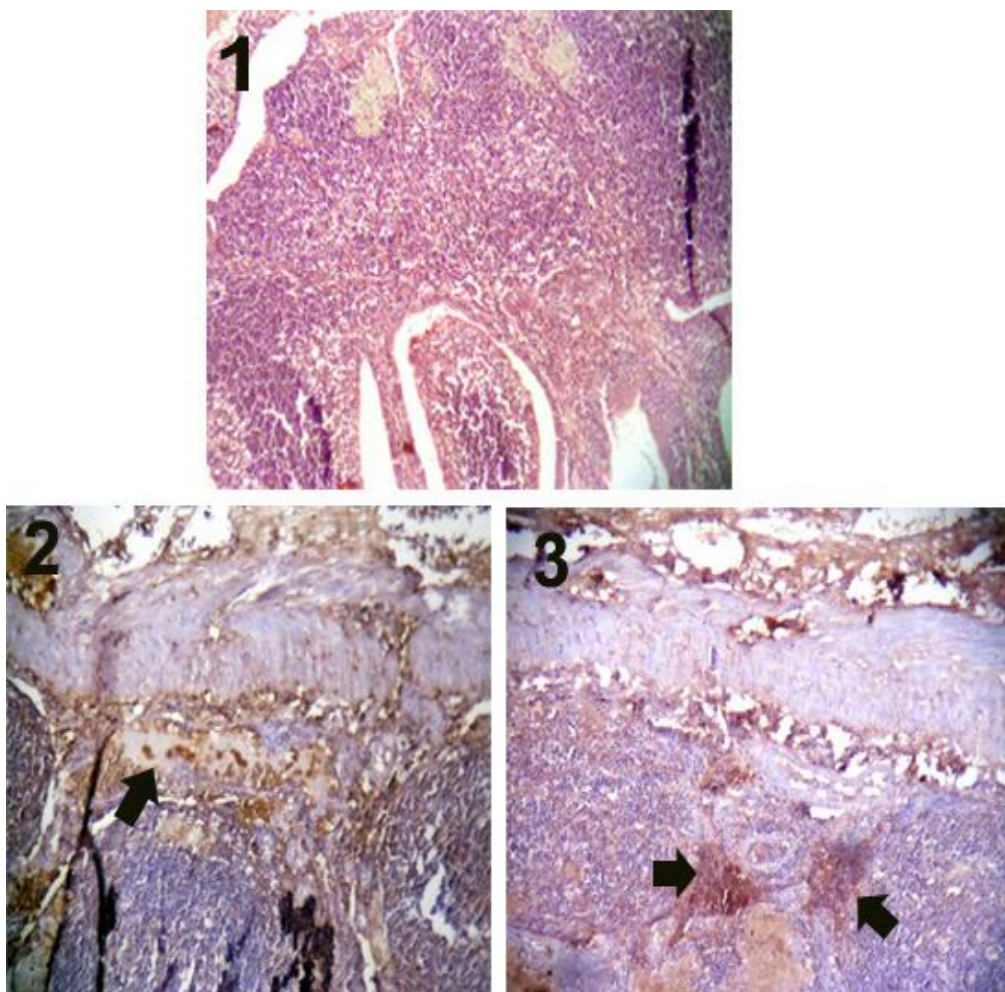


Fig. 1: Intestine reveals cords of epithelioid cells infiltrating intestinal mucosa and submucosa (H&E: x 100).

Figs. 2&3: The epithelioid cells infiltrating deep submucosa are positive for **2:** cyokeratin (arrow) and **3:** vimentin (arrows) (IHC, counterstained with Mayer's hematoxylin x100).

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المخلص العربى

تشخيص حالة ورم المتوسطة الطلائي النافذ فى ارنب نيوزيلاندى

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وصفت هذه الحالة الصفة العينية والميكروسكوبية والصبغة المناعية لورم المتوسطة الطلائي النافذ فى ارنب نيوزيلاندى سليم عمر ٥ شهور. الورم شمل الغشاء البريتونى واخرق جدار الامعاء. الفحص الهيستوباثولوجى اوضح الورم مكون من اعشاش لخلايا شبيهة بالخلايا الطلائية مع وجود انقسامات عديدة للانوية و تعدد الانوية فى الخلايا السرطانية المرتشحة لجدار الامعاء. كما اظهرت الخلايا السرطانية ايجابية لكلا من السيتوكيراتين و القيمنتين عند صبغها مناعيا مما ساعد فى تمييز السرطان عن غيره من الاورام الطلائية من الاصل غير طبقة المتوسطة.