

Scientific Report

Penile fibrosarcoma tumor in a bull

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Summary

This is a report of a penile fibrosarcoma in a two-year-old crossbred Holstein bull. The ulcerated tumor mass with dimensions of $7 \times 9 \times 6.5$ cm, was enveloped the glans and body of the penis. It had a white-gray color at cross section appearance. There was no metastatic evidence of regional lymph node enlargement. Histopathologically, elongated spindle-shaped cells arranged densely in the interwoven pattern had a low rate of mitosis with oddly-shaped nuclei and pleomorphism. Immunohistochemically, the neoplastic cells were positive for vimentin and S100, but negative for α -smooth muscle actin, desmin, C-KIT and GFAP.

Key words: Bull, Fibrosarcoma, Penis, Immunohistochemistry

Introduction

Fibrosarcoma is a malignant tumor derived from fibrous connective tissue and characterized by immature proliferating fibroblasts or undifferentiated anaplastic spindle cells. Fibrosarcomas are unusual mesenchymal tumors in cattle. The tumor may appear with varying degrees of differentiation including low grade (differentiated), intermediate malignancy and high malignancy (anaplastic). Depending on this differentiation, tumor cells may resemble mature fibroblasts (spindle-shaped), secreting collagen, with rare mitoses. These cells are arranged in short fascicles giving the appearance of a herring bone pattern. Poorly differentiated tumors consist of more atypical cells, pleomorphic, multinucleated giant cells, numerous atypical mitoses and reduced collagen production (Smirnov, 1988; Fletcher *et al.*, 2002; Pandit *et al.*, 2004; Van den Top *et al.*, 2008). Fibrosarcoma occurs most frequently in the mouth, is locally invasive, and recurs often following surgery in dogs (Vascellari *et al.*, 2006).

Two 12- and 18-month-old bulls were reported with multinodular proliferations of varied sizes, mainly between 0.5 and 5 cm in diameter, well circumscribed, and nonpigmented and were attached to the glans by a relatively broad pedicle. They consisted of densely packed irregular collagenous connective tissue with many fibroblasts. In the epidermis, orthokeratotic hyperkeratosis, many koilocytes were present. The morphologic patterns were typical of fibropapillomas of papillomavirus etiology (Tafti and Kargar, 2009). There have been some vaginal fibrosarcoma in cow (Scott, 1988; Aydogan *et al.*, 2007), and also there is a case of post injection Sarcoma in a dog similar to post vaccination sarcomas in cats (Vascellari *et al.*, 2006). Immunofluorescent examination of extracellular matrix of 5 fibrosarcomas showed the matrix to contain fibronectin and collagen type I, III and V (Smirnov, 1988). Some tumors such as hemangiopericytoma, leiomyosarcoma, schwannoma and other mesenchymal tumors can have regions that are consistent with fibrosarcoma, but careful examination with immunohistochemistry

can identify these other tumors. Fibrosarcomas are the most common tumor of adult and aged cats and dogs. No breed and sex predisposition has been reported in animals (Goldschmidt and Hendrich, 2002). Fibrosarcoma masses were situated at the distal portion of the thoracic esophagus of one dog and in the site of junction of the esophagus and stomach, which was metastasized in the lung and mediastinal lymph nodes in Iran (Oryan *et al.*, 2008).

Case presentation

A two-year-old crossbred Holstein bull was referred to the clinic of the Faculty of Veterinary Medicine, Islamic Azad University of Tehran, Iran with a two-month history of dysuria and weight loss. There was a large ulcerated soft tissue mass enveloping the glans and body of the penis and had invaded into the urethral canal (Fig. 1). The tumor mass was pulling out the penis from the sight horizontal to the trunk. In the cross section, it had a white-gray color. Appetite was normal and the general physical examination revealed dysuria and to some extent hematuria with no other abnormalities. Hematological examination prior to surgery revealed a leukocytosis. The total WBC count was elevated to 19.6×10^3 cells/ μL compared by reference range $4\text{-}12 \times 10^3$ cells/ μL (Wood and Quiroz Rocha Gerardo, 2010). Other parameters, such as RBC, hemoglobin and hematocrit were slightly under normal reference range, which may be an indicator of mild anemia due to the continuous hemorrhagic discharge from the mass. Serum biochemistry showed minor increases in ALT and creatinine, but AST and total protein were within the normal range. Following local epidural anesthesia, the penis was removed from its base with the whole of the tumoral mass. The ulcerative tumor mass, $7 \times 9 \times 6.5$ cm samples, were fixed in formalin and embedded in paraffin. Histologic sections ($5 \mu\text{m}$) were stained with hematoxylin and eosin (H&E), and also masson's trichrome. The sections were also evaluated immunohistochemically for the expression of vimentin (V9, mouse monoclonal, dilution: 1/50, Dako, Denmark), smooth

muscle actin (1A4, mouse monoclonal, dilution: 1/50, Dako, Denmark), desmin (D33, mouse monoclonal, dilution: 1/50, Dako, Denmark), S-100 protein (rabbit polyclonal, dilution: 1/50, Dako, Denmark), GFAP (GF5, mouse monoclonal, dilution: 1/100, Dako, Denmark), and C-KIT (CD117) (polyclonal rabbit, dilution: 1/50, Dako, Denmark). CD117 is the receptor for the cytokine stem cell factor (SCF), also known as c-kit ligand.

Microscopically, the appearance of the tumor cells showed mesenchymal origin characterized by spindle cells in nodular whorls or streams and bundles, high nuclear to cytoplasm ratio, oddly-shaped large nuclei (Fig. 2), without inflammatory component and necrosis. The tumor cells were invaded to adjacent connective and arrectal tissues and occluded the urethral lumen. Mitotic index was 1 per high-power field (1/HP field). In masson's trichrome staining, the large bundles of collagen were blue in color between the spindle cells (Fig. 3). Each immunohistochemical section was counted for positive cells as average in 5 high power fields. The immunohistochemistry of this tumor showed diffuse vimentin (100%) (Fig. 3) and S100 (75%) expression but no desmin, SMA, C-KIT (CD117) or GFAP (Glial fibrillary acidic protein) expression. This tumor was low grade fibrosarcoma because of low mitotic index microscopically and without any metastases to regional lymph nodes in the clinical follow up to 6 months.

Discussion

Fibrosarcomas are unusual mesenchymal tumors in cows. Fibropapillomas, unlike fibrosarcomas, are the most commonly encountered type of skin and mucous membrane tumor of cows (Campo, 1997), but both occur infrequently in the penis as compared to limbs in animal and human beings (Pandit *et al.*, 2004; Van den Top *et al.*, 2008). To some extent fibrosarcomas cannot be distinguished from other mesenchymal tumors in H&E stained sections. Therefore, histochemical and immunohistochemical methods are useful for differential diagnosis. A highly



Fig. 1: Penile fibrosarcoma, bull. Ulcerative tumor mass involved glans and body of the penis

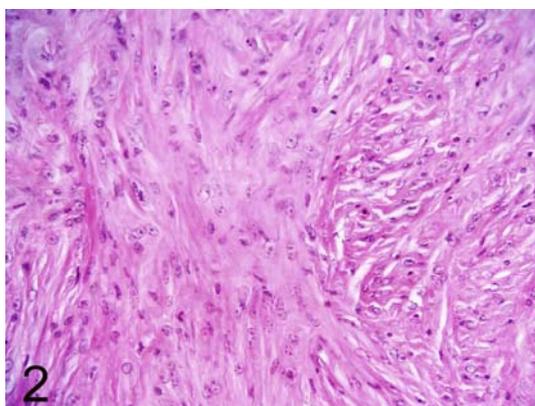


Fig. 2: Penile fibrosarcoma, bull. Spindle cells in streams and bundles with a bizarre shaped large nucleus (H&E, ×400)

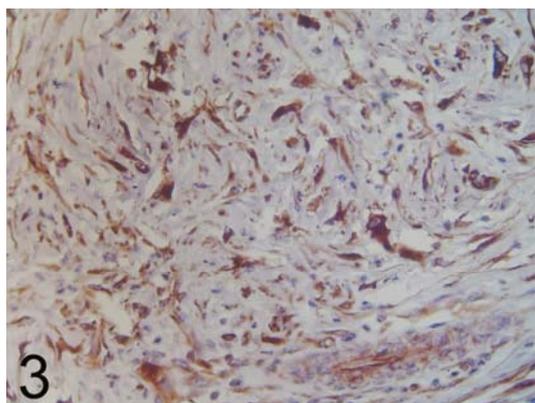


Fig. 3: Penile fibrosarcoma, bull. Spindle cells in streams and bundles. Strongly positive cytoplasmic reaction for vimentin (×400)

malignant fibrosarcoma which arose in or close to the mammary gland of a 12-year-old Ayrshire cow, with metastases in local lymph nodes, lungs, liver, kidney and adrenal glands with numerous mitoses in

microscopic feature has been described (Orr, 1984). Histologically, this reported tumor was low in mitotic index with an odd shape, large and vesicular nuclei. It was similar to other mesenchymal counterparts such as leiomyoma, leiomyosarcoma, cajal cell sarcoma and schwannoma, because of impact collagenous fibers and the cytoplasm of cells to be arranged in the interwoven to herring bone pattern. Histochemically, masson's trichrome staining revealed that this tumor could not originate from muscle cells. The reported tumor with numerous newly synthesized vessels was similar to some types of schwannomas and cajal cell sarcomas (Miettinen *et al.*, 2000; Miettinen and Lasota, 2003). Simultaneous lack of desmin and the presence of C-KIT is a sharp contrast between cajal cell sarcomas and true smooth muscle tumors (Miettinen *et al.*, 2000; Miettinen and Lasota, 2003). Schwannomas are positive for GFAP and S100 protein and always negative for C-KIT (Miettinen *et al.*, 2000; Miettinen and Lasota, 2003). It is best explained by multidirectional differentiation of these tumors and the lack of C-KIT in schwannomas seems to allow for a sharp separation of cajal cell sarcomas and schwannomas (Miettinen *et al.*, 2000; Miettinen and Lasota, 2003). This tumor was not schwannoma because of its negative reactivity to GFAP, not leiomyosarcoma because of its negative reactivity to desmin and SMA with S100 expression, and not cajal cell sarcomas because of lack expression of C-KIT. So it can be a fibrosarcoma with a reaction only to S100 and vimentin as a mesenchymal marker. A variety of tumors can occur on the prepuce and penis including papilloma, equine sarcoid, melanoma lymphoma, mast cell tumor, hemangioma and hemangiosarcoma (Maclachlan and Kennedy, 2002). The reason for dysuria may be due to obstruction of the urethra because of large tumoral ulcerative mass. We believe that evaluation of more bovine penile tumors will lead to a better understanding of their frequency, specific features, and pathogenesis of fibropapillomas or other mesenchymal tumors from fibrosarcomas and treatment of recent types of tumors.

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