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CLINICAL REPORT

Surgical Treatment of a Unique Dermatofibroma in a Lactating Holstein Cow: Histopathologic and Immunohistochemical Features

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ABSTRACT

A lactating 6-year-old, black-white, Holstein cow, weighing about 300 kg, presented for a mass on her carp joint (right forelimb) with severe swelling of the entire carp. The cow had untreated swelling 3 months before. This mass was small initially, but it became larger and harder over time. It was decided to take a tissue sample through fine needle aspiration but this work was not successful because the mass was too hard. Plain radiography showed just abundant soft tissue swelling with no pathology in the carpal joint. Under local anesthesia, the entire mass was removed surgically. Dermatofibroma was diagnosed by histopathologic assessment. This report aimed to describe a unique carpal dermatofibroma in a cow.

Introduction

The integumentary system reported to be a most affected organ in neoplasia in domestic animals1 Cattle are affected than goats, sheep and swine species.[1] The incidence of tumors are reported in cattle higher (78.95%) than buffaloes (21.05%). The incidence of tumors is reported almost equal in male and female animals, 50.88% vs 49.12%, respectively. Skin and soft tissues tumors are constituting more than 50% of the bovine tumors.[2] Squamous cell carcinomas is the most frequent neoplasms in ruminants.[1]

Reportedly, the incidence of tumors are most common in cattle (0.23%) and are uncommon in sheep (0.002%), goats (0.009%), and pigs (0.004%). Skin tumors are the most common neoplasms in farm animals.[3] The organ system most frequently affected by neoplastic disease was the alimentary tract. This finding was attributed to a high incidence of squamous cell carcinoma of the upper alimentary tract associated with the chronic ingestion of bracken fern.[4]

Fibroma and fibrosarcoma occur rarely in the skin and subcutis of adult cattle, sheep, goats, and pigs. Cutaneous neurofibromas are most common in adult Holstein and Hereford cattle. Fibroma, fibrosarcoma, leiomyosarcoma, and leiomyoma usually occur as single masses. Soft tissue tumors are less common in farm animals than are tumors of the skin. Included in this group of tumors are fibroma, fibrosarcoma, myxoma, myosarcoma, neurofibroma, lipoma, smooth muscle tumor, and rhabdomyosarcoma. Fibroma in cattle most often occur in the rumen near the ruminoreticula groove, causing recurrent bloat. In cattle, fibroma and fibrosarcoma of the teat occur in yearlings. Fibroma and fibrosarcoma consist of proliferating fibroblasts with admixed collagen and variable mitotic activity. Surgical excision of papilloma, fibropapilloma, and fibroma is possible and can be curative, although viral-induced lesions may recur.[3]

The weight of large animals, particularly bulls, can chronically stretch the cruciate ligament. Once this

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ligament has stretched the skin of the interdigital skin also stretches to permit a fold to form when the foot is not weight-bearing. This flap gradually turns into a fibroma. In these cases, bony filamentous growths (exostoses) are often observed in radiographs at the insertions of this ligament. There are other causes of a fibroma. The heavier the weight of a Holstein-Friesian bull, the greater the frequency of interdigital fibromas.[5]

Benign tumors include fibromas, adenomas, and lipomas.[6] Provided tuberculin testing officers are aware of the risk of fibroma and papilloma induction by transmission of papillomavirus, and they are careful to prevent equipment coming into contact with warts at time of inoculation, this source of inaccuracy may be avoided.[7] Dermatofibromas are common benign cutaneous fibrohistiocytic neoplasms, whereas melanomas are potentially aggressive malignancies. Differentiating these two entities can occasionally be difficult. Dermatofibromas create an environment that induces hyperplasia of the overlying epidermis, perhaps through increased epidermal growth factor receptor expression.[8] Fibromas are benign cutaneous dermal nodules that arise from dermal or subcutaneous fibroblasts, and are composed of spindle cells with alternating wavy collagen fibers.[9,10] They can also originate from visceral organs, including the ovary, uterus, stomach, and intestine.[11] Cutaneous fibromas are common in dogs, while they are uncommon in other animals.[12] Fibromas and fibrosarcomas occur in adult and aged cattle, with no breed or sex predilection.[11] A fibroma is an uncommon cutaneous neoplasm that usually occurs in the dermis as solitary or multiple nodules. Histologically, the fibroblasts produce mature collagen characterized by a wavy, irregular pattern of collagen.[9] The differential diagnosis of cutaneous fibroma includes melanoma and sarcoma, which also involve spindle-type cell.[8]

Cutaneous fibroma is a benign neoplasm affecting the fibroblasts and collagen matrix that develops in the dermis or subcutaneous tissue. This neoplasm is uncommon in cattle, and few reports have described the treatment and resolution of this neoplasm. Cutaneous fibromas are benign neoplasms of fibrous tissue, and they are uncommon in cattle and may be associated with bovine papillomavirus and/or trauma.[13]

Considering that there is no information about dermatofibroma in veterinary sources, it was tried to use medical sources. Dermatofibroma, also known as fibrous histiocytoma, is one of the most common cutaneous soft-tissue lesions, accounting for approximately 3% of skin lesion specimens received by dermatopathology laboratories. Dermatofibroma is one of the most common types of cutaneous soft tissue lesions.[14] It is more frequent in middle-aged adults and has a slight female predominance. The majority of lesions are located on the limbs and present as small, raised, hyperkeratotic, cutaneous nodules with a red-brown surface.[14,15]

Case Description

A 6-year-old, black-white, lactating Holstein cow, weighing about 300 kg, presented for an unusual projecting tissue mass on right carpal region (Figure 1). The cow was in her second parity with a history of once abortion in later 6 months. The mass was seen 3 months ago and has a gradual increasing in size that became larger and harder but, with no changes in size in the last month. The cow underwent a thorough physical examination. The cow was in normal body hydration and had a temperature of 38.8 °C, a respiratory rate of 30 breaths per minute, and a heart rate of 52 beats per minute.The gastrointestinal system was in normal condition. The results of hematological assay showed normal values including complete blood count (CBC). Grossly, a large mass with a diameter of 4 cm and a length of 7 cm was observed in the carpal area of the right fore limb. The carpal region was severely swelled on palpation. Routine dorsopalmar and lateromedial plain radiographs were taken that represent a soft tissue swelling on the dorsal aspect of carpus with no other bones and joints abnormalities. (Figure 2).

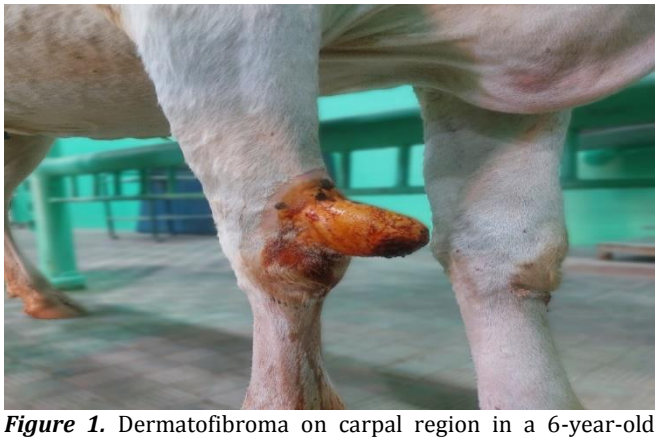

Figure 1. Dermatofibroma on carpal region in a 6-year-old Holstein cow.

Figure 2. Soft tissue swelling on carpal region.

Treatment and Outcome

Surgical Treatment

After the radiology report, mass removal surgery was started with sedation using Xylazine 2% (0.05 mg/kg) administered intramuscularly. The animal was positioned in left lateral recumbency. The carpal region was clipped and local anesthesia was applied with 2% lidocaine diluted to 1% with distilled water and administered via infiltration. Then the region was scrubbed and prepared for aseptic surgery. An elliptical incision was made on the skin of dorsal aspect of the carpus around the mass (Figure 3). The entire mass with a 1 cm safe margin was removed following sharp and blunt dissection of the subcuticular tissues and large vessels appropriate ligations. After the surgical area was flushed, and the defect was sutured in a single layer with a horizontal mattress tension suture and the use of rubber pieces (Figure 4). Penicillin + streptomycin (20,000 IU/kg, IM, q12h, for 10 days) were administered. The surgical area was subjected to pressure bandage and casting (Figure 5).

Histopathologic and Immunohistochemical Assessment

The mass was composed of interwoven eosinophilic bundles with fusiform and round cells. The thickness of bundles was different. The fusiform cells were elongate and thin (Figure 6A-C). Mitotic figures were low. There was no inflammatory reaction and the mass was well vascularized. The fascicles were stained blue in Masson's Trichrome and it means that they are collagen bundles (Figure 6D-F). According to histopathologic study, fibroma is the first candidate. For differential diagnosis from other spindle cells tumor, immunohistochemical staining for Desmin, Smooth muscle actin (SMA) and S100 were done and the immunohistochemical studies revealed no reactivity in comparison with positive control (Figure 7).

Follow-up

Complete wound healing was observed within 3 weeks following the surgery. In addition, after 6 months, no evidence of tumor recurrence was observed.

Clinical Relevance

This report describes clinical, macroscopic and histopathologic characteristics of a unique dermatofibroma in a Holstein bovine. The tumors affecting skin and soft tissues constituted more than 50% of the total bovine tumors examined.[2] Skin tumors are the most common neoplasms in farm animal's fibroma and fibrosarcoma occur rarely in the skin and subcutis of adult cattle, sheep, goats, and pigs.[3] Benign tumors include fibromas, adenomas, and lipomas.[6]

Based on the histochemical results, the nodules were a dermal fibroma resulting from an increase in collagen-producing fibrocytes in the dermis. The diagnosis was a cutaneous fibroma in Korean indigenous cattle.[16] Based on the gross warty appearance of the dermal nodules,

Figure 3. Surgical removal of the mass.

Figure 4. Horizontal mattress sutures line with tension releasing rubber pieces.

Figure 5. Pressure bandage and casting.

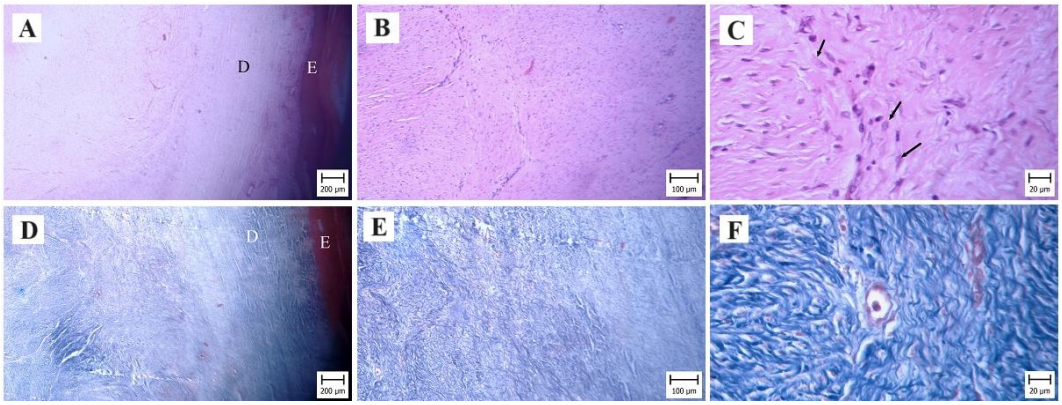

Figure 6. Micrographs of cutaneous mass of a cow. A-C: The mass was composed of eosinophilic bundles with spindle cells (Arrows) (H&E). D-F: Bundles are stained blue in Masson's trichrome which is consistent with collagen (Masson's trichrome).

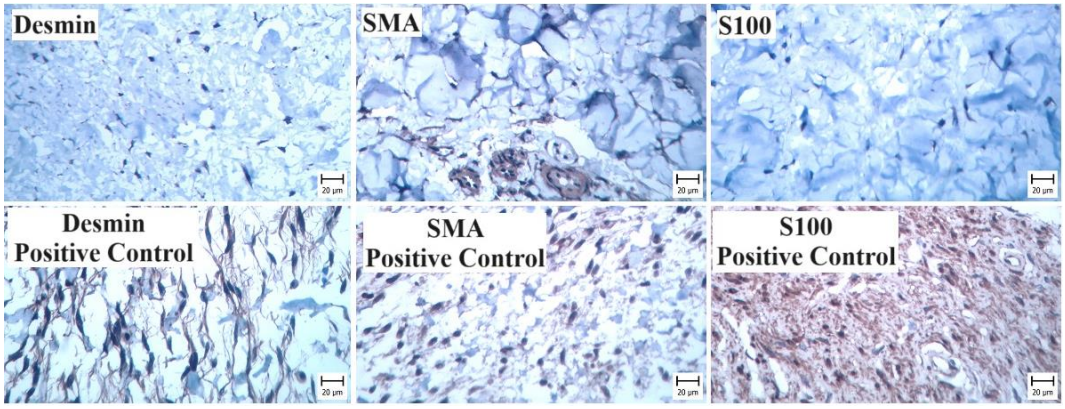

Figure 7. Micrographs of cutaneous mass of a cow (Immunohistochemical staining with Desmin, SMA and S100 antibody and counterstain with hematoxylin). Note to negative immunoreactivity to different antibody in comparison with positive control. In SMA, the tunica media of blood vessels were positive, whereas the neoplastic cells were negative.

fibropapilloma was also considered in the differential diagnosis. According to a previous report, a fibropapilloma should show features of acanthosis, hyperkeratosis, the down-growth of rete-ridges, and the dermal proliferation of plump fibroblasts microscopically. However, we could not detect any proliferation disorder of the epidermis in the dermal nodules. Papillomaviruses are associated with skin papillomas or fibropapillomas in all domestic animals, except the cat.[9]

According to the little information about dermatofibroma in cattle and also based on pathology findings, dermatofibroma can be an important clinical finding in ruminant medicine and surgery.

Conflict of Interest

None to declare.

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