CASE REPORT

Cytopathology of a Rare Case of Osteosarcoma in a Murrah Buffalo (*Bubalus Bubalis*)

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Osteosarcomas are the malignant tumors of bones that may arise directly from bone or metastasis from other organs. There is involvement of various cells like osteoblast, chondroblast, fibroblast, etc. Osteosarcomas are commonly reported in dogs and cats but rarely in large animals. Benign tumors are much more common in large animals than sarcomas (Thompson and Pool, 2002). There are very few reports on osteosarcoma in cattle (Naghshineh *et al.,* 1991; Plumlee *et al.,* 1993; Prins *et al.,* 2012; Micheloud *et al.,* 2015; Santos *et al.,* 2016). However, rarely observed in buffaloes (Silveira *et al.,* 2010). The present communication reports a rare case of metastatic osteoblastic osteosarcoma involving the trachea of a Murrah buffalo through a cytological approach using Fine Needle Aspirates (FNA).

History and Clinical Observations

A 4 years old she-buffalo of Murrah breed was presented to the Teaching Veterinary Clinics of the Guru Angad Dev Veterinary and Animal Sciences University with a history of bilateral submandibular swelling for one and half months and difficulty in breathing. A thorough clinical examination was performed by assessing the general body condition, body temperature, heart rate, and ruminal motility. Physical examination revealed bilateral sub-mandibular hard swelling on both sides of the trachea (Fig. 1) with enlarged adjoining mandibular and pre-scapular lymph nodes (Fig. 2). Mid cervical and thoracic region radiography revealed soft tissue swelling ventrally at C6 level while mild to the moderate miliary interstitial pattern was observed in lungs, which may indicate metastasis of the primary tumor to the lungs. Blood samples for complete blood count and Fine Needle Aspirates (FNA) from the bilateral mass around the trachea and the lymph node were collected using a 20 gauge needle attached to a 10 mL syringe, and the smear was made for cytological studies. The slides were stained with Leishman's stain and viewed under a microscope (Olympus Bx51 microscope).

Result and Discussion

The animal was alert with a body temperature of 100.8°F, heart rate of 62 beats/minutes, and ruminal motility of 3/3 minutes. The leucocytes count was within the normal

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Fig. 1: A buffalo showing swelling in the sub-mandibular area (black arrow) and adjoining lymph node enlargement (blue arrow)

Fig. 2: A buffalo showing pre-scapular lymph node enlargement.

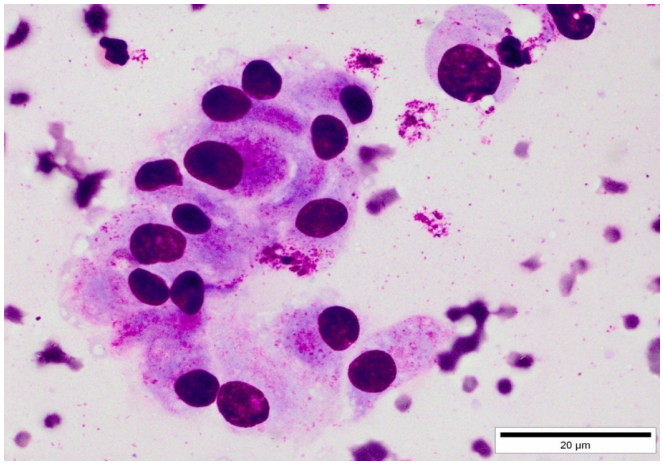

Fig. 3: Cytology of the FNA of the tumour from the tracheal area showed the features of various pleomorphic round to elongated cells with coarse chromatin and prominent nucleoli in the nucleus and fine granular eosinophilic osteiod matrix within the cytoplasm of the cells. (Leishman's stain, 100X)

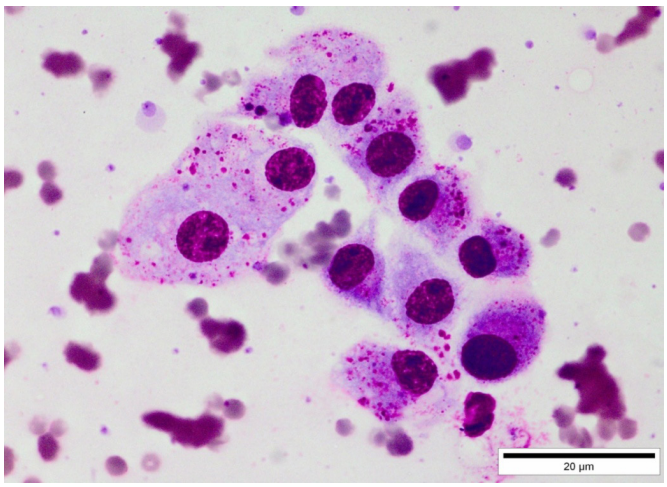

Fig. 4: Cytology of the FNA of the tumour from the tracheal area depicting the features of various pleomorphic round to elongated cells with coarse chromatin and prominent nucleoli in the nucleus and fine granular eosinophilic osteiod matrix within the cytoplasm of the cells. (Leishman's stain, 100X)

range. Cytological examination of the FNA from the mass around the trachea in the brisket area revealed numerous pleomorphic small to large, round or elongated cells with increased nuclear and cytoplasmic ratio. These cells were characterized by an eccentrically placed nucleus with coarsely granular chromatin and prominent nucleoli. The cytoplasm contained numerous eosinophilic granulated materials suggestive of osteoid matrix substance (Figs. 3 & 4), indicating osteoblastic cells of the tumor. There was also the presence of few multinucleated osteoclastic giant cells (Fig. 5).

Similarly, in lymph node aspirates cytology, features of osteoblastic cells were observed (Fig. 6), indicating metastasis of the primary tumor. Based on these findings, a diagnosis of osteosarcoma was made. The prognosis was grave in the present case, and no treatment like surgery, chemotherapy, or radiotherapy was possible.

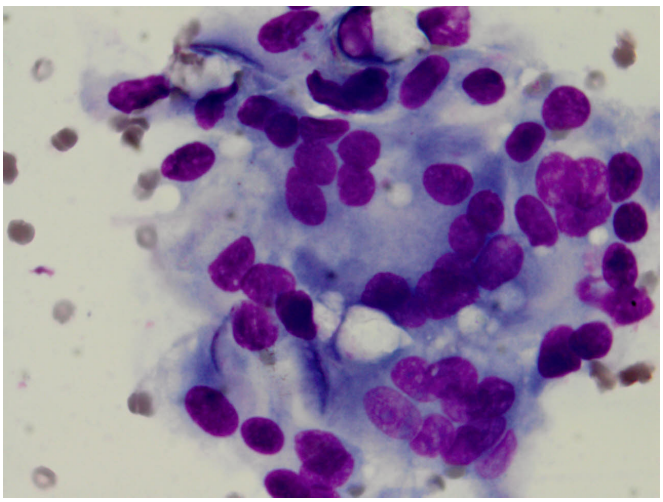

Fig. 5: Cytology of the FNA of the tumour from the tracheal area showed the features of multinucleated osteoclastic giant cells. (Leishman's stain, 100X)

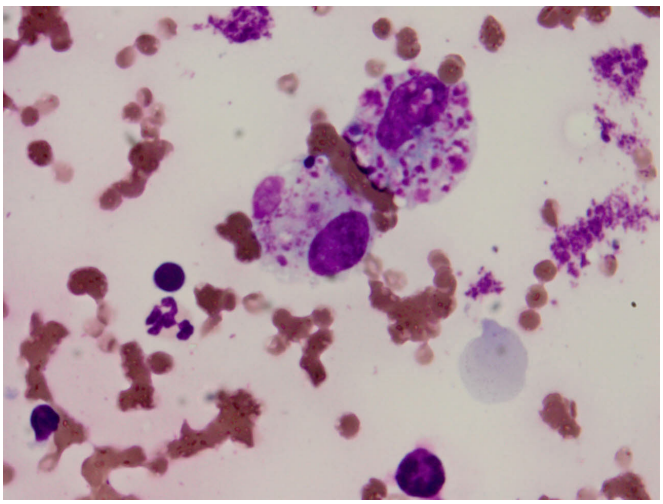

Fig. 6: Cytology of the FNA of the lymph node showing the features of a large round to oval shaped cells with fine granular eosinophilic osteiod matrix within the cytoplasm of the cells. There were also presence of normal lymphocytes and few neutrophils. (Leishman's stain, 100X)

Various conditions are associated with swelling of the submandibular area and enlargement of the lymph nodes such as actinobacillosis, theleriosis, abscess, inflammation, or tumor in bovine. Thus, proper history and routine clinical examination of the animal and fine needle aspirates cytology of the swollen tissues are required for an early diagnosis of the conditions. The diagnosis of osteosarcoma primarily depends on the presence of pleomorphic malignant cells with osteoid matrix production.

Osteosarcoma is the primary malignant tumor of the bone and is presented in three major subtypes based on cellular characteristics (osteoblastic, chondroblastic, and fibroblastic), out of which osteoblastic osteosarcoma is the most common one (Gorlick, 2009). In buffaloes, it is a rare tumor. In bovine, osteosarcomas are frequently observed in and around the head region (Thompson, 2007). Only a few cases of osteosarcoma have been reported and mainly in the cattle involving the maxillary region in a cow (Prins *et al.,* 2012), nasal in a Brazilian cow (Lucena *et al.,* 2011), and in Wagyu bovine (Santos *et al.,* 2016), skull in Holstein heifer (Micheloud *et al.,* 2015). Naghshineh *et al*. (1991) observed single osteosarcoma among 1,980 bovine tumors recorded in Iran. A rare case of sinus chondro osteocarcoma in a young buffalo was reported by Silveira *et al*. (2010) and mandibular osteosarcoma by Abouelnasr *et al*. (2016).

Osteosarcoma is a tumor of bone that is composed of osteoblasts, and this tumor has metastatic potential. In this case, the tumor was aggressive, and it metastasized to the adjacent lymph nodes.

Similarly, Santos *et al*. (2016) also reported tumor metastasis in the lungs and lymph nodes in Wagyu bovine. Conversely, many previous reports suggest invasion of osteosarcoma in cows to adjoining tissues without metastasis (Plumlee *et al.,* 1993; Prins *et al.,* 2012; Micheloud *et al.,* 2015). The most common site for the osteosarcoma to metastasize is the lungs. It has been reported that metastatic osteosarcoma is challenging to control, and thus the prognosis is grave.

Here, clinically, the animal showed signs of difficulty in breathing, which may be due to trachea compression near the submandibular area by the tumor and metastasis of the tumor in the lungs. The swollen lymph nodes may be due to metastasis of the tumor to the lymph node.

In conclusion, the cytology of the FNA served as a rapid and reliable aid in the early diagnosis of osteosarcoma.

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