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## Liposarcoma of Bone Marrow Origin in a Kudu (*Tragelaphus strepsiceros*)

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**ABSTRACT:** A primary intraosseous liposarcoma in a kudu (*Tragelaphus strepsiceros*), is reported. The lesion had a multilocular radiographic appearance and caused fracture of a metacarpus of the right front leg. Microscopically the lesion consisted of a lobular proliferation of lipoblasts of varying maturity. This is the first description of an intraosseous liposarcoma in a nondomesticated animal.

**Key words:** Kudu, *Tragelaphus strepsiceros*, primary intraosseous liposarcoma, case report.

Liposarcoma is the second most common of the soft tissue sarcomata in humans, and comprises between 8 and 18% of cases in published series (Jaffe, 1972; Lichtenstein, 1972). Despite the considerable amount of fatty tissue in the marrow spaces of bone, both benign and malignant fatty tumors originating primarily in bone are very rare. An extensive review of the literature from 1930 to 1980 revealed fewer than 35 reported primary intraosseous liposarcomas in humans (Torok et al., 1983). In a survey of neoplasia in domestic animal species over a 60 yr period, eight subcutaneous liposarcomas were encountered among 3,388 neoplasms in dogs (Bastianello, 1982). To our knowledge, the only published case of an intraosseous liposarcoma occurring in an animal was reported by Brodey and Riser (1966) in a dog. All other unequivocal examples of liposarcoma in canines (Saik et al., 1987; Doster et al., 1986; Sundararaja, 1984), young cats (Stephens et al., 1983, 1984), domestic rats (Port et al., 1979) and geese (Doster et al., 1987) occurred extraskeletally. Our case represents the first description of a liposarcoma of bone marrow origin in a nondomestic animal.

During a culling program at the Pilanesberg National Park, Bophuthatswana (25°15'N, 27°5'E) an adult male kudu *Tragelaphus strepsiceros*, that was lame in the right front leg, was observed. The animal was shot and a necropsy was conducted. Apart from the lesion in the right metacarpus, no other abnormalities were seen.

Close examination of the right front leg revealed a mass approximately 17 × 15 × 15 cm in size which showed ulceration of the skin on the medial aspect. On cut surface the tumor was white-pink in color with areas of hemorrhage, had a lobular appearance and the cortical bone was expanded and thin. The mass extended into the proximal and distal marrow spaces (Fig. 1). Radiographic examination of the metacarpus showed a multilocular radiolucency with cortical bone expansion and fracture (Fig. 2).

Microscopic examination showed a lobulated proliferation of large pleomorphic lipoblasts of varying maturity (Fig. 3) with marrow infiltration and bone destruction. Frozen sections and Oil red O stains revealed intracytoplasmic lipid. A diagnosis of a well differentiated liposarcoma was made.

Like its counterpart in soft tissue, primary liposarcoma of bone marrow origin seems to have little relation to pre-existing benign lipoma (Mueller and Robbins, 1960). It is interesting to note that liposarcoma of bone in humans has sometimes been found in association with a pre-existing benign osseous lesion. Retz (1961) described this combination with a non-ossifying fibroma and Johnson et al. (1962) identified it with bone cysts. Feline leu-

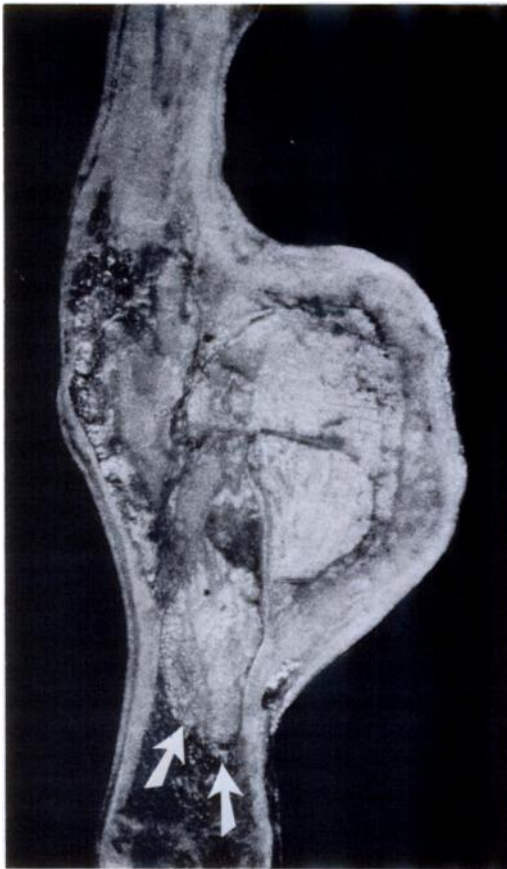


FIGURE 1. Section through the right front leg of a kudu with a liposarcoma exhibiting the expansile nature and lobulated growth pattern. Note the neoplastic growth extending into the marrow space (arrows).

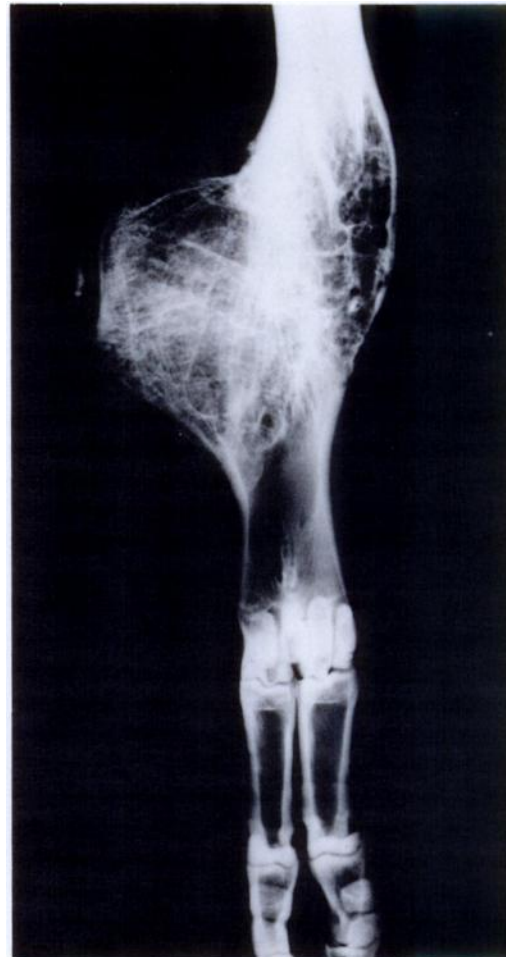


FIGURE 2. Radiograph of the right front leg of a kudu with a liposarcoma showing the thin and expanded bone cortex, pathologic fracture and multi-lobular appearance.

kaemia virus infection in kittens may be accompanied by a variety of neoplastic conditions, involving the co-occurrence of soft tissue liposarcomas and malignant lymphomas (Stephens, 1983, 1984).

Primary intrabony liposarcomas in humans occur mainly in weight-bearing long bones and most of the reported cases died within 1 to 3 yr after diagnoses as a result of pulmonary metastases. The absence of metastatic deposits and the expansile rather than infiltrative growth pattern of our case suggests a lower metastatic potential and a more indolent course. This is supported microscopically by the well differentiated nature of the lesion. Enzinger and

Winslow (1962) and Spittle et al. (1970) categorized liposarcomas microscopically into pleomorphic, round cell, myxoid and well differentiated varieties. The morphologic variation in each of the types is similar to the stages of differentiation of a fat cell and well differentiated and myxoid varieties are claimed to be associated with a longer survival. Although well differentiated liposarcomas may be confused microscopically with benign lipomas, the absence of a capsule, lobular and infiltrative growth pattern and presence of immature and pleomorphic fat cells (or li-

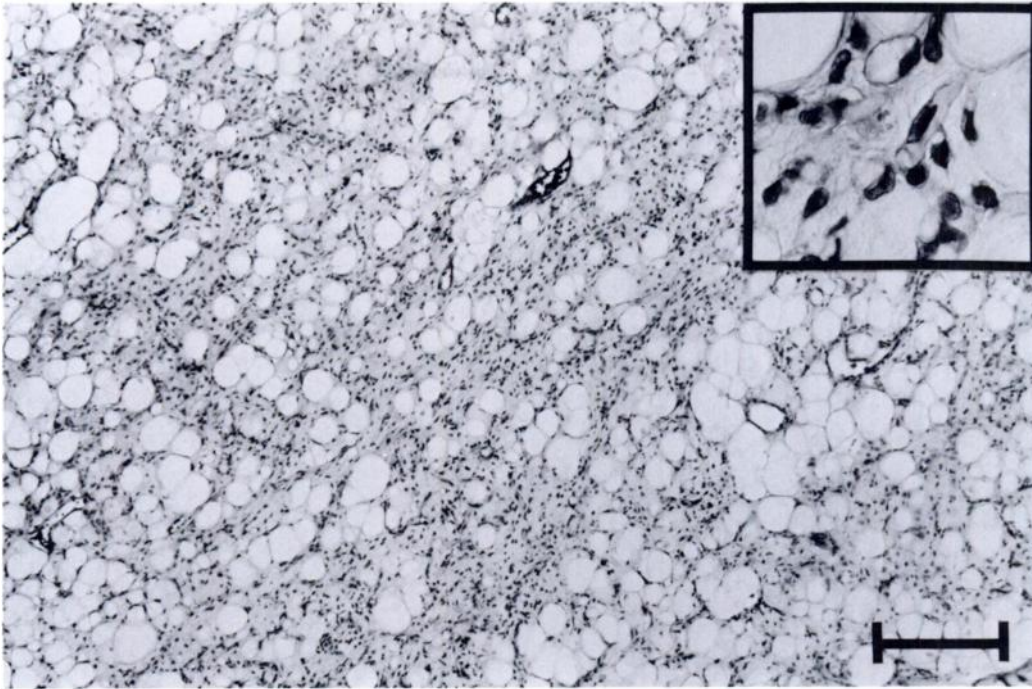


FIGURE 3. Microscopic appearance of the well differentiated liposarcoma in the leg of a kudu. The inset shows lipoblasts of varying maturity. H&E. Bar = 120  $\mu$ m.

poblasts) are important criteria in diagnosing these tumors as malignant.

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