

Solitary pinnal fibrosarcoma in a mixed-breed goat: morphological and histopathological observations



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SUMMARY

This case report describes the diagnosis and surgical correction of a solitary pinnal fibrosarcoma in a four-year-old goat. The goat was presented with a progressively growing mass on the pinna, initially suspected to be a benign tumour. Physical examination revealed a firm, ovoid mass measuring approximately 5 cm in diameter on the dorsal aspect of the right pinna. However, histopathological examination confirmed the mass as fibrosarcoma. Surgical excision was done to remove the tumour, and the goat showed satisfactory postoperative recovery without any recurrence. The H&E stained sections showed high cellularity, infiltrative growth, and spindle-shaped cell arrangement with a herringbone pattern. The tumour cells display elongated nuclei, scant cytoplasm, and a high mitotic rate. There was extensive collagen fibre production, with varying degrees of cytological atypia. Masson's trichrome staining highlighted dense bundles of collagen fibers in deep blue colour, whose nuclei showed shades of purple, with mitotic figures indicating active cell division. This case emphasises the importance of thorough diagnostic evaluation and timely surgical intervention to manage cutaneous neoplasms in goats. Due to limited reports and potentially devastating consequences, it is crucial to document and analyse cases of pinnal fibrosarcoma in goats to enhance our understanding of this disease and explore effective treatment strategies.

KEY WORDS

Fibrosarcoma, Ear pinna, Malignant tumour, Surgical management, Caprine, Histopathology, Fibroblast.

INTRODUCTION

Fibrosarcoma is a malignant mesenchymal tumour originating from fibroblasts and is commonly observed in various species, including humans and animals [1]. Dermal fibrosarcomas are primarily located beneath or within the skin and exhibit diverse presentations influenced by factors like their origin, species, and age of the affected animal. While these tumours can manifest in any species, they are notably more prevalent in elderly dogs and cats, with fibrosarcoma being the most common tumour in cats [2,3]. Unlike companion animals, information about tumours in farm animals is comparatively scarce. In cattle, fibrosarcomas have been observed in various locations, including the mammary gland, testicles, intestines, retroperitoneal tissue, reticulum, and neck [4,5,6,7,8]. While only a limited number of fibrosarcoma are reported in goats, indicating the importance of this case report [9]. Considering

this, the paper intends to give detailed morphological and histopathological observations in goats with fibrosarcoma. The present study reports a case of solitary pinnal fibrosarcoma in a four-year-old mixed-breed goat and discusses its diagnosis and surgical correction.

CASE PRESENTATION

A four-year-old female mixed-breed goat was presented to the Referral Veterinary Polyclinic and Teaching Veterinary Clinical Complex, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, with a progressively enlarging mass on the right pinna (Fig. 1). The owner first noticed the mass as a small nodule approximately three months ago that progressed in size over a month. Parotid lymph nodes were found to be normal on palpation. The conjunctival and vulval mucosal membranes were pink and appeared to be healthy. The goat had a rectal temperature of 39.1°C, a pulse rate of 76 beats per minute, a respiratory rate of 19 breaths per minute and a rumen motility of two contractions per minute.

Morphologically, the mass measures approximately 5 centimetres in diameter. It appeared as a well-defined, rounded mass on the concave surface of the left pinna. The surface colour of

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Figure 1 - The animal presented with a well-defined, rounded mass on the concave surface of the right pinna.

the mass was pale to pinkish with a firm or rubbery consistency (Fig. 2A). The mass had distinct borders that separated it from the surrounding tissues without any infiltrating adjacent structures. It was firmly attached to the inner surface of the pinna and had a smooth surface. The adjacent tissues did not show any signs of compression or ulceration. The mass had only very few hairs compared to the adjacent skin.

Fine-needle aspiration cytology (FNAC) was performed to determine the nature of the mass. The cytology sample revealed a high cellularity comprising spindle-shaped cells with pleomorphic nuclei and increased mitotic activity, suggesting a sarcomatous lesion [9]. The case was suspected for solitary pinna fibrosarcoma and the primary treatment approach involved surgical excision.

SURGICAL TREATMENT

The goat was placed under sedation using midazolam at a dosage of 0.25 mg/kg body weight. The area surrounding the tumour was prepared in an aseptic manner and infiltrated with

2% lignocaine. A wide excision of the tumour was conducted, ensuring clear margins while striving to preserve as much healthy tissue as possible. Hemostasis was achieved through the ligation of any bleeding vessels using polyglactin-910 (2-0), and the wound was apposed using polyamide (1-0) sutures in an interrupted pattern. In the postoperative period, the goat was monitored for any signs of pain, infection, or wound dehiscence. To promote healing and prevent complications, a therapeutic regimen of analgesics, antibiotics, and wound care was administered for five days postoperatively. Enrofloxacin at the rate of 2.5 mg/kg body weight for five days and meloxicam at the rate of 0.5 mg/kg body weight was given for three consecutive days, both administered intramuscularly. Daily wound dressing was done using povidone iodine until complete wound healing. The goat exhibited an uneventful recovery without any recurrence for one one-year observation period.

HISTOPATHOLOGY

The cut surface of the tumour mass revealed whitish and glistening fibrous tissue (Fig. 2B). Microscopically, it exhibited a high cellularity with an infiltrative growth pattern. The tissue section was composed predominantly of spindle-shaped cells arranged in interlacing fascicles or a herringbone pattern, imparting a distinctive appearance (Fig. 3A). The neoplastic cells exhibited elongated nuclei and scant cytoplasm with numerous mitotic figures indicative of rapid cell division. Cytological atypia, marked by pleomorphism, hyperchromasia, and irregular nuclear contours, could also be identified in varying degrees (Fig. 3C).

In Masson's trichrome staining, distinct histopathological features were observed. The collagen fibres, a prominent characteristic of this tumour, displayed a deep blue hue, forming dense bundles that underscored its fibroblastic nature. Interspersed within this collagen matrix were elongated spindle-shaped cells, which exhibited a lighter blue stain, creating a noticeable contrast against the darker collagen background. The nuclei of these cells often appeared elongated and were stained in shades of purple. Additionally, mitotic figures were observed as darkly stained spots (Fig. 3B and 3D). The results

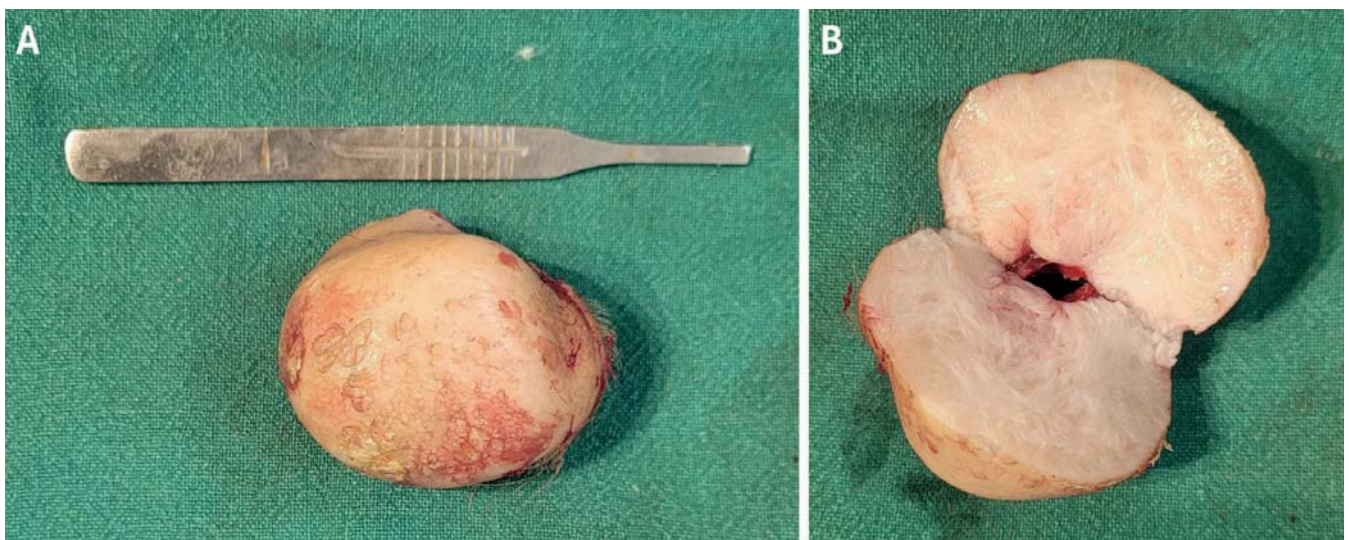


Figure 2 - (A) The mass measured approximately 5 centimetres in diameter with a pale to pinkish colour with a firm or rubbery consistency (B) The cross-section of the mass revealed whitish and glistening fibrous tissue.

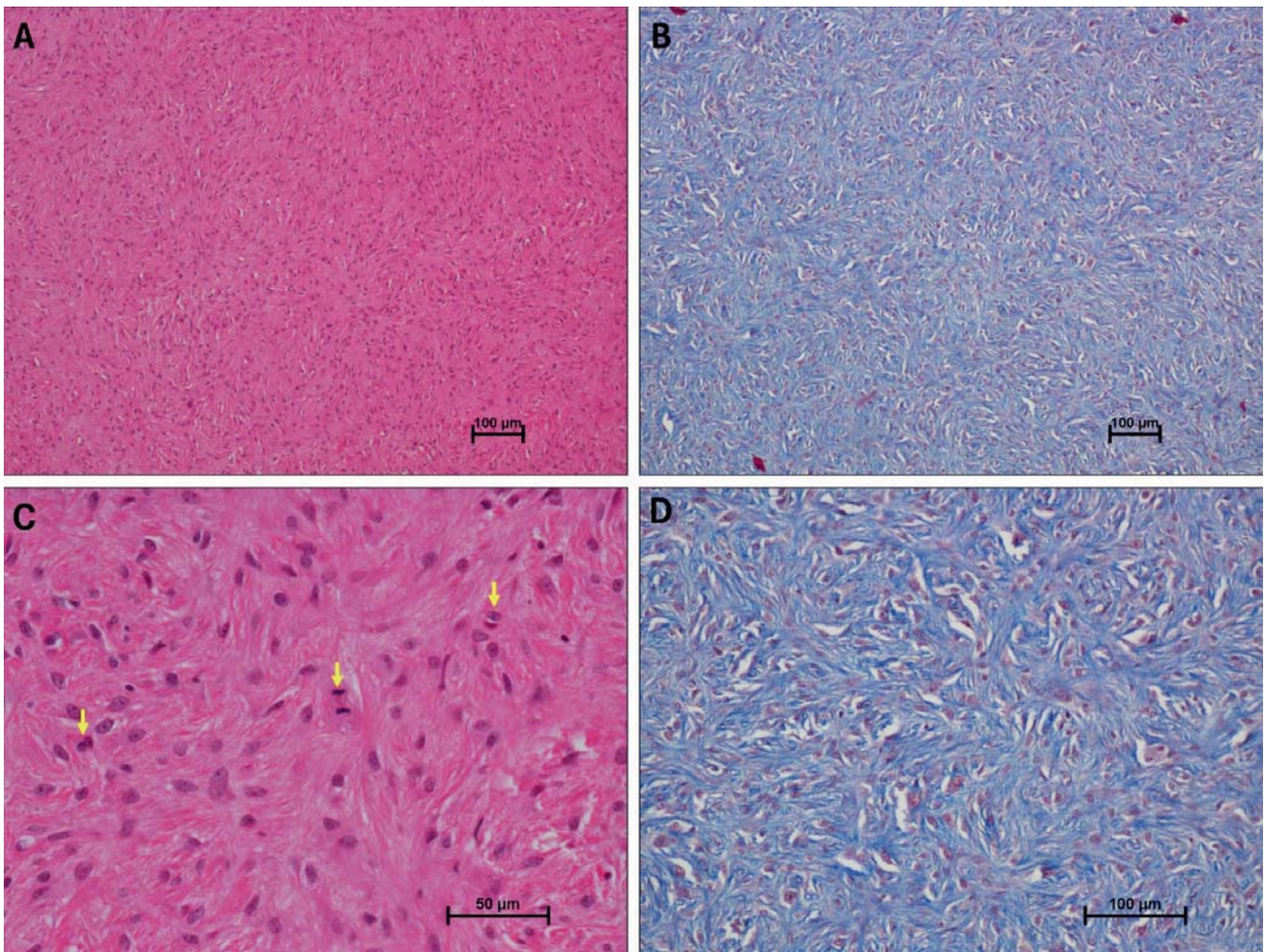


Figure 3 - (A) The stained tissue section was composed predominantly of spindle-shaped cells arranged in interlacing fascicles or a herringbone pattern, imparting a distinctive appearance. There was the extensive production of collagen fibers by the tumour cells, underscoring its connective tissue origin. (B) The collagen fibres displayed a deep blue hue, forming dense bundles that underscored its fibroblastic nature. Interspersed within this collagen matrix were elongated spindle-shaped cells, which exhibited a lighter blue stain. (C) The cells possessed elongated nuclei and scant cytoplasm and displayed a high mitotic rate (arrows), indicative of rapid cell division. (D) The nuclei of these cells appeared elongated and stained in shades of purple. The signs of active cell division, represented by mitotic figures, were observed as darkly stained spots.

of the microscopic exam indicate the presence of lesion referable to a fibrosarcoma.

DISCUSSION

This case highlights the importance of considering malignancy, even in cutaneous masses that initially appear benign. Pinnal fibrosarcoma is often characterised by the presence of a firm nodular mass on the ear, which can cause pain, discomfort, as well as cosmetic deformity in the affected goats [10]. Goats are susceptible to certain types of skin cancer, particularly in areas with less hair coverage and increased sun exposure, such as the nose, eyelids, udder, under the tail, and ears [11]. The pinna is prone to the development of various tumours due to its exposure to environmental factors and the presence of specialised structures.

Factors like aflatoxin exposure, produced by the fungus *Aspergillus parviticus*, pose a significant risk, especially in tropical regions with suboptimal food storage conditions [12]. Additionally, viral infections, including a type-D retrovirus,

have been linked to tumour development [13]. Ultraviolet (UV) radiation, now classified as a complete carcinogen, is detrimental to both humans and ruminants, acting as a tumour initiator and promoter. In small domestic animals, UV-induced tumours tend to occur in areas directly exposed to the sun, like the eyes, nose, and tail [11]. Solitary pinnal fibrosarcoma in goats is relatively uncommon. In cats, an association has been noted between fibrosarcomas and vaccination, particularly against Feline leukaemia virus (FeLV) or rabies virus, with prevalence ranging from 1:1000 to 1:10000 for vaccinated cats. While adjuvants in vaccines may contribute to inflammation and cell division in fibroblasts, leading to DNA damage, the underlying cause of spontaneously occurring fibrosarcomas remains unknown [12]. No such reports are yet documented in farm animals, especially in goats.

Metastasis rates (spread to other parts of the body) in ruminants with fibrosarcomas remain largely unquantified, but documented cases suggest its potential occurrence [9]. In dogs, oral fibrosarcomas exhibit a higher likelihood of metastasis compared to those in other locations, with over a third of the cases already showing evidence of metastasis at the time of diag-

nosis. Additionally, fibrosarcomas often recur at a relatively high rate [9,10]. The peak age of tumour incidence varies by species. It is currently unknown in goats, possibly since many ruminants are slaughtered for meat production at a relatively young age, making it difficult to establish the likelihood of tumour occurrence [10].

The location of cutaneous fibrosarcoma can vary both between different species and within the same species. Notably, few cases of cutaneous pinnal fibrosarcoma have been reported in some breeds of goats [10,13,14]. For instance, in a case study conducted by Schoiswohl et al. in 2019, fibrosarcoma was found on the outer convex surface of a Cashmere goat's pinna [10]. The occurrence of auricular fibrosarcoma at the base of the right ear in a Holstein cow was documented by Shokrpoo and coauthors [15]. Similarly, Arulmozhi and colleagues, in 2019, reported a case where fibrosarcoma in goat exhibited progressive growth at the base of the pinna [14]. Additionally, another documented case of cutaneous fibrosarcoma involved a mass located at the base of a horn, as reported by Kavin et al. in 2022. In the present case, the mass was located at the inner concave surface of the right pinna [16].

The diagnosis of fibrosarcoma typically involves a combination of medical history evaluation, physical examination, imaging tests, and biopsy [17]. A physical examination involves assessing the size and characteristics of the mass and evaluating the range of motion and functionality of nearby structures [18]. Imaging tests such as X-rays, CT scans, MRI scans, or PET scans may be performed to visualise the tumour and determine its size, location, and potential spread to nearby tissues or organs [17,18]. However, such advanced techniques are only necessary for tumours within the body surface. These imaging techniques help in planning the biopsy procedure and staging the cancer [21]. A biopsy is the definitive diagnostic procedure for fibrosarcoma [20]. The biopsy can be performed using a needle (Fine needle biopsy) or by surgically removing a portion or the entire tumour (incisional or excisional biopsy). The biopsy confirms the diagnosis of fibrosarcoma and determines its grade, which helps in predicting the tumour's aggressiveness [21].

Histopathologically, fibrosarcomas are characterised by spindle-shaped cells with oval nuclei, tapering ends, and unipolar or bipolar cytoplasm. They often form a distinctive «herringbone» pattern in long fascicles, showing mild to moderate pleomorphism in adults. Mitotic activity varies, and nuclei are darkly stained with prominent nucleoli and minimal cytoplasm. One of the hallmark features was the extensive production of collagen fibers by the tumour cells, underscoring its connective tissue origin [22]. Specific immunohistochemical markers, like Vimentin, can provide additional findings and help to identify effective treatment. Additional markers like alpha-smooth muscle actin, muscle-specific actin, and desmin may also indicate myogenic differentiation in some cases [21]. In our case, the dermal origin of fibrosarcoma was confirmed in histopathology. Employing immunohistochemistry could have provided a clearer understanding of the nature of fibrosarcoma [21]. However, the case was managed in field conditions, and the potential for further investigations was limited.

Surgical excision with wide margins remains the mainstay of treatment for localised fibrosarcoma [14]. In this case, complete excision of the tumour was achieved with good preservation of healthy tissue. The postoperative recovery was satisfactory, and the goat showed no signs of recurrence during

the follow-up period (one year). Long-term follow-up will be necessary to monitor for potential local recurrence or metastasis. In the present case, the animal does not exhibit any signs of metastasis or recurrence even after one year of surgery.

CONCLUSION

Solitary pinnal fibrosarcoma should be considered a differential diagnosis in goats presenting with progressive masses on the pinna. Prompt histopathological evaluation and timely surgical intervention are essential for optimal treatment outcomes. Further studies are warranted to gain a better understanding of the epidemiology, behaviour, and long-term prognosis of pinnal fibrosarcoma in goats.

Acknowledgements

The authors are thankful to the Director, ICAR-Indian Veterinary Research Institute, Izatnagar (UP) and Head, Division of Surgery, ICAR-Indian Veterinary Research Institute, Izatnagar (UP) for the facilities provided.

Funding

No substantial funding is to be stated.

Disclosure statement

All authors declare that there exist no commercial or financial relationships that could, in any way, lead to a potential conflict of interest.

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