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A Short Note on Multilobular Osteochondrosarcoma: Details Explanation of Detection, Treatment, Diagnosis

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Abstract

Multilobular tumour of bone (MLTB) is a rare bone neoplasm resembling benign bone tumours with no defined genetic basis. It is a slow-growing tumour that arises from the mesenchymal cells of the bone, particularly the skull and jaw bones, and can also affect the long bones in the limbs. Despite its benign histological appearance, it is locally invasive and has a potential for malignant transformation. MLTB is often difficult to manage due to the complex anatomical features involved, and the optimal treatment remains controversial.

Keywords: Multilobular tumour of bone; Prognosis; Maxilla

Introduction

The incidence of MLTB is very low, accounting for only approximately 1% of bone tumours in humans. It can occur at any age, although it is more frequently diagnosed between the ages of 10 and 30 years, with a slight female predominance. The disease is characterized by radiolucent, well-defined lobulated masses, usually associated with the surface of the bone [1]. The tumour may occur in one or more bones, but the most commonly affected sites are the skull, mandible, and maxilla. Involvement of the limb bones is seen in less than 20% of cases.

The diagnosis of MLTB is usually based on a combination of clinical, radiological, and histological findings. The clinical presentation varies depending on the site of the tumour, and patients may present with pain, swelling, or facial asymmetry. Radiographically, MLTB presents as a radiolucent, well-defined lesion with a lobulated appearance, resembling soap bubbles or honeycomb pattern. The tumour may also show calcifications, irregular bone margins, or cortical expansion [2]. Histologically, MLTB is characterized by a lobulated, trabeculated pattern of neoplastic cells separated by fibrous septae. The cells have round or oval nuclei, and the cytoplasm is clear or eosinophilic. The cells express various markers of mesenchymal origin, such as vimentin, CD99, and CD56, but are negative for epithelial and neural markers.

Results

The treatment of MLTB remains controversial, as there is no established standard of care. Surgery is the mainstay of treatment, and complete resection is the goal. However, due to the often large size and complex location of the tumour, complete resection may not be achievable without significant morbidity or mortality. In such cases, surgical debulking may be performed, followed by adjuvant radiation therapy to control residual disease. The use of chemotherapy in the treatment of MLTB is limited, and its role is unclear. However, chemotherapy may be considered in cases of recurrent or metastatic disease [3].

Prognosis in MLTB is variable, depending on the completeness of surgical resection and the histological grade of the tumour. Low-grade MLTB, which comprises the majority of cases, has an excellent long-term prognosis, with a 10-year survival rate of up to 95% [4]. High-grade MLTB, on the other hand, is associated with a higher risk of recurrence and malignant transformation, and has a worse prognosis. Therefore, close long-term follow-up is essential in all cases of MLTB. Multilobular tumour of bone is a rare bone neoplasm that presents as radiolucent, well-defined lobulated masses arising from the mesenchymal cells of the bone. Despite its benign histological appearance, MLTB is locally invasive and has a potential for malignant transformation. The optimal treatment remains controversial, and surgery is the mainstay of treatment, with adjuvant radiation therapy being considered in cases of incomplete resection. The prognosis in MLTB is variable, with a higher risk of recurrence and malignant transformation in high-grade tumours. Therefore, close long-term follow-up is essential in all cases of MLTB. Multilobular Tumour of Bone (MTB) is a rare, slow-growing, and locally invasive tumour that commonly affects the flat bones of the skull and pelvis in middle-aged to older dogs. Although the exact etiology of MTB is still unknown, several risk factors have been associated with its development. This mini-review aims to provide a comprehensive overview of the known risk factors of MTB to enhance understanding of the disease pathogenesis and improve its prevention, detection, and management [5].

Age: MTB is a relatively uncommon tumour that mostly develops in middle-aged to older dogs, with a mean age of five to seven years. Clinical studies have shown that MTB is more prevalent in dogs aged over six years, with a higher incidence in the 10-12-year age range. The exact mechanism of age-related risk factor in MTB development remains unclear [6]. However, it is speculated that MTB might arise as a result of spontaneous genetic mutations over time or long-term exposure to environmental factors that accumulate with age

Breed Predisposition: MTB is a tumour of mesenchymal origin that has been reported in several breeds of dogs. However, some breeds appear to have a higher predisposition to MTB than others. According to canine oncology literature, the Miniature Schnauzer, Rottweiler, Golden Retriever, Labrador Retriever, and Boxer breeds are overrepresented in MTB cases. The Miniature Schnauzer breed is particularly predisposed to MTB, with some studies reporting an incidence rate of up to 50% of all cases of MTB. The possible breed-

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related risk factor in MTB predisposition may be due to both genetic and environmental factors [7].

Sex: MTB incidence has not been shown to vary significantly between male and female dogs. However, some studies suggest that intact (unneutered) female dogs may be at a higher risk of developing MTB than male dogs or spayed females [8]. This finding could be related to the role of hormonal factors in the development of MTB tumour. As MTB is a tumour of mesenchymal origin that contains sex steroid receptors, it is possible that these receptors may lay a vital role in tumour growth and progression.

Environmental Factors: The role of environmental factors in the development of MTB in dogs is not entirely understood. However, some studies suggest that several environmental agents might increase the risk of developing MTB. These agents include ionizing radiation, exposure to chemicals such as carbon tetrachloride, and lead toxicity. Additionally, some reports suggest that the excessive consumption of protein from animal sources could also increase the risk of MTB development. However, the mechanisms by which these environmental factors might influence the development of MTB require further investigation [9].

Genetic Factors: MTB is considered a genetic disease that is caused by various genetic mutations. Several studies have identified specific genetic mutations that may be associated with MTB development in dogs. For example, some mutations in the PTCH1 and KIT genes have been associated with MTB tumour suppressor genes. Additionally, Loss of Heterozygosity (LOH) at loci on Chromosome18 has been observed in MTB tumours. Genetic testing of potential breeding dogs can help in the early diagnosis and prevention of the disease.

Immune System: The immune system plays a vital role in the prevention and treatment of various tumours, including MTB. A weakened immune system may render a dog more susceptible to the development of MTB, and dogs with immunodeficiency disorders are at greater risk of developing MTB. This finding suggests that maintaining good immune system function could help decrease the risk of MTB and other ailments. Several immune-boosting supplements are available that could help improve immune function in dogs, including vitamin C, E, and glycan [10].

Conclusion

MTB is a rare but potentially serious disease that commonly affects middle-aged to older dogs. Although the exact etiology of MTB remains unknown, several risk factors have been associated with its development, including age, breed, sex, environmental factors, genetic factors, and immune system. Understanding these risk factors can help promote earlier diagnosis and more effective treatment of MTB in dogs. Additionally, carefully breeding to avoid susceptable breeds or dogs that carry the specific genetic mutations might help us prevent or reduce incidence of MTB. Hence, it is essential to recognize the risk factors of MTB and take appropriate measures to minimize their impact wherever possible.

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