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Popular Article

Bovine Actinomycosis disease in crossbred cattle

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Bovine Actinomycosis or lumpy jaw disease in cattle has been reported from many states of India. The incidence of Actinomycosis in cattle is higher where cattle are fed with straw, coarse feeds, sticks, thorns etc. These sharp and coarse feeds injure the oral mucosa and predisposing the cow to actinomycosis infection. Its successful treatment in cattle can be done by oral administration of Potassium Iodide along with parenteral administration of Penicillin or in combination with Streptomycin. Daily dressing of localized wound with Povidone Iodine or any iodine solution gives better prognosis.

Bovine Actinomycosis in cattle is an infectious, chronic disease. Its etiology is *Actinomyces bovis.* This disease is also known as "lumpy jaw" due to characteristic granulomatous swelling in jaw of affected cow. It is a gram-positive, branching, filamentous, anaerobic bacteria. It primarily affects the mandible, maxilla and other bony tissues in the head, leading to localized, progressive abscesses and osteomyelitis. Usually, its pathogens reside in oral and nasopharyngeal membranes.

Fig. 1 and 2, Actinomycosis disease affected Holstein Friesian cow

Bovine Actinomycosis is localized, progressive, granulomatous abscess and osteomyelitis. Most frequently it involves the mandible and other bony tissues in the head. Diagnosis is mostly based on clinical signs and symptoms. The diagnosis can be confirmed by culture of the organism or staining. Treatment is being given to kill the bacteria, reduce the inflammation and to stop the spread. Changes in mandible bones are often reversible.

Exotic cattle like Holstein Friesian and Jersey, and their crossbreds are more susceptible to actinomycosis infection than indigenous cattle.

Actinomyces produces pyogranulomatous abscess and osteomyelitis syndrome. *This* organism is part of the normal oral microbiota of ruminants. Disease occurs when *A. bovis* is introduced to underlying soft tissue through penetrating wounds of the oral mucosa from coarse or thick feeds, sticks, thorns or wire etc. It has also been isolated from nodular abscesses in the lungs of cattle.

Clinical signs of Bovine Actinomycosis

Common clinical symptoms involved in Actinomycosis in cows are:

- Swelling of the jaw or around the mandibular region.
- Lumpy and suppurating tumors with draining sinuses.
- Facial distortion and loose teeth.
- Potential for dyspnea due to swelling in the nasal cavity.
- Sulfur granules (small, yellow-white particles) may be present in the pus or drainage.
- When *Actinomyces* spp are inoculated into tissue, pyogranulomatous or suppurative disease develops. Lumpy jaw, caused by ***Actinomyces bovis*** is a localized, chronic, progressive, granulomatous abscess in ruminants that most frequently involves the mandible, the maxillae, or other bony tissues in the head. Any bony location can be affected; however, the mandible and alveoli around the roots of the cheek teeth are most frequently involved (Fig: 1 and 2), primary lesion appears as a slow-growing, firm mass that is attached to, or is part of, the mandible. In some cases, ulceration with or without fistulous tracts forms, and drainage of purulent exudate can occur. Yellow flakes called "sulfur granules" which is actually clusters of immune cells and bacterial components, may be scattered throughout the pus.
- Involvement of adjacent bones frequently results in facial distortion, loose or maloccluded teeth (making chewing difficult), and, less frequently, dyspnea from swelling into the nasal cavity.
- ***A. denticolens*** has been reported to cause mandibular lymphadenopathy in horses with fever, nasal discharge, and malaise.

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- *A. denticolens* also causes pyogranulomatous porcine mastitis, characterized by small abscesses containing thick yellow pus surrounded by a wide zone of dense connective tissue. "Sulfur granules" may be scattered throughout the pus, as in *A. bovis* in cattle. Chronic, deep-seated abscesses may fistulate. Sows may also develop ventral subcutaneous granulomatous lesions, and occasional pyogranulomatous infections develop in lungs, spleen, kidneys, and other organs.

Diagnosis:

In field condition, diagnosis of bovine Actinomycosis in cow usually done on the basis of clinical symptoms and history of the affected animals. However, for confirmation process of evaluating cattle and other animals for Actinomycosis can be done in following steps:

- Clinical examination for the presence of a hard immovable mass of or on the mandible or other bony structure.
- Radiography to demonstrate osteomyelitis, tooth involvement, or pathological fracture.
- Anaerobic culture of aspirates; however, negative results of culture do not rule out actinomycete involvement.
- Biopsy of the lesion
- Gram stain of aspirated material; *Actinomyces* are gram-positive, branching, filamentous bacteria.
- Cytological evaluation is useful because a Gram stain of purulent material will reveal gram-positive, club-shaped rods and filaments.
- Radiographic examination of the head is also useful; the primary radiographic lesion consists of multiple central radiolucent areas of osteomyelitis surrounded by periosteal new bone and fibrous tissue.
- A biopsy sample can be taken with a trephine and submitted for histological examination.

Treatment:

- Actinomycesbovis found sensitive to Penicillin, Streptomycin, Tetracycline, Bacitracin,Cloxacin and Co-trimoxazole. Dicrystin- DS has also recorded sensitive (Gopal Krishna Murthy and Dorairajan, 2008). Sodium iodide, intravenously, is also used to treat the infection. Potassium Iodide 10 gram orally daily for 7 to 10 days. Local dressing with Povidone Iodine of the wounds in the mandible region for local healing of wounds.
- Surgical debridement of the lesion may be necessary.
- The goal of treatment for actinomycosis is to kill the bacteria and stop the spread of the lesion. Bony deformations, however, will not regress much.

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- The treatment of many actinomycete infections involves surgical debridement in addition to antimicrobials because granulomatous inflammation protects the bacteria from antimicrobial exposure in many cases.
- For treatment of Actinomycosis in cattle the drug of choice is sodium iodide (70 mg/kg of a 10%–20% solution, intravenously, repeated several times at 7 to 10 day intervals). If clinical signs of iodine toxicity develop like dandruff, diarrhoea, anorexia, coughing, and excessive lacrimation, administration should be discontinued or treatment intervals should be increased.
- Sodium iodide does not have direct antimicrobial activity but may promote cellular oxidative pathways that can inhibit certain bacteria. In the US, the product label for sodium iodide states that it should not be used in pregnant cattle. However, studies have not been able to document negative impacts to pregnancy. Concurrent administration of antimicrobials (eg, penicillin, florfenicol, or oxytetracycline) is recommended to enhance inhibition and killing of the pathogen.
- Surgical intervention may help to restore normal shape of mandible up to some extent.

Prevention:

Good oral hygiene and proper management of feeding practices can help to reduce the risk of infection. As this bacterium is part of the normal oral microbiota in ruminants, control focuses on avoidance of course, stemmy feeds that might damage the mucosal epithelium. Infections are most prevalent in cattle in winter or drought months where high-quality feedstuffs run short, leaving low-quality, stemmy feedstuffs as the only available feeds.

When multiple cases occur in a herd, it is not by a contagious mechanism but rather from the widespread herd exposure to a risk factor, i.e. coarse feed.

Conclusion

Bovine Actinomycosis or lumpy jaw causes significant economic losses in dairy animals. It leads to decrease in the productive life span of the dairy animal and poor response to the daily clinical treatment as a result of late recovery by the animal. Abrasions or wounds in the oral cavity, caused by dry and coarse feeds fed to the animal are believed to be the primary cause of entry of organism in to the animal. To prevent the occurrence of this disease, animals should be fed with smooth and water-soaked straws to avoid damage to the buccal mucosa. Affected animals should be isolated in the initial stage of the disease and should not be allowed to graze in pastures along with healthy cattle to prevent the contamination of grass, water, bedding and utensils by the animals. In conclusion removal of pus from the affected area along with washing with normal saline solution followed by flushing with iodine solution and parenteral administration of broad-spectrum antibiotic (Penicillin and Streptomycin) and

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non-steroidal anti-inflammatory intramuscularly with oral administration of Potassium Iodide is an effective method for its treatment.

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