

## Bacterial Over-Growth Syndrome (BOGS) and its Therapeutic Management in a Labrador dog – A Case Report

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### ABSTRACT

A two-year-old female Labrador was presented with a complaint of severe itching and offensive odour for the past two weeks. Clinical examination revealed significant paronychia, hyperpigmented axillae and erythema on the ventral abdomen. Skin scraping examination was performed for mite identification and microbial culture and isolation. Gram staining of the culture revealed heavy colonization of the cocci species. Therapeutic management was done with a combination of topical, systemic and supportive therapy for three weeks. The dog showed no recurrence of the condition post-treatment.

**Keywords:** Labrador dog, Bacterial overgrowth syndrome, Pyoderma

Bacterial overgrowth syndrome (BOGS) is a surface bacterial proliferation that appears without any lesions of pyoderma in dogs and is characterized by pruritus, foul-smelling skin, paronychia, erythema and hyperpigmentation. BOGS can be secondary to an underlying impairment of skin integrity and is recognized to be a complication of allergic skin disorders (Viaud *et al.*, 2012). A hyperproliferation of *Staphylococcus pseudintermedius* all over the body surface of dogs can cause a syndrome exhibiting superficial lesions and pruritus, without formation of pyoderma lesions, called as BOGS. The exact pathogenesis of the disease is unknown, but bacterial hypersensitivity is not believed to be the cause of BOGS (Pin *et al.*, 2006). Bacterial toxins may act as

superantigens, triggering non-specific inflammatory reactions (Rhodes and Werner, 2018). Quorum sensing may be a factor in this syndrome; quorum sensing occurs when a certain density level of bacteria is exceeded, causing expression of characteristics that switch bacterial metabolism from cell proliferation to toxin production (Rhodes and Werner 2018). The initial diagnosis of BOGS relies on compatible clinical signs (pruritus, greasy seborrhea, malodor, erythema, lichenification, hyperpigmentation, excoriations and secondary hair loss), along with the absence of papules, pustules or epidermal collarettes, and the demonstration of high numbers of staphylococci on the skin (Pin *et al.*, 2006). The definitive diagnosis is based on history, physical examination, cytology, bacteriology, dermatopathology, exclusion of other dermatoses and response to treatment (Viaud *et al.*, 2012).

### CASE HISTORY AND OBSERVATION

In the present study, a two-year-old female Labrador was presented to the Veterinary Clinical Complex, Veterinary College, Gadag, with a complaint of severe itching and offensive odour for the past two weeks. Deworming and vaccination were regular. Upon clinical examination, the ventral abdomen was the most affected area, followed by the axilla and footpad. Severe erythema, alopecia, hyperpigmentation near axillae and pododermatitis (Fig. 1). Physiological parameters were within the normal range with a respiratory rate of 27 beats/min, pulse rate of 92 / min and

temperature of 102°F. One of the key clinical features noticed in BOG syndrome is the lack of papules, pustules, epidermal collarettes, and crusts. This may be explained by the absence of folliculitis and the bacteria being on the skin's surface rather than in the hair follicles. Skin scrapings were taken, examined under a microscope and were negative for mite infestation. Swabs were collected aseptically, inoculated into nutrient broth, and incubated for 24-48 hours at 37°C. All the cultures from enriched inoculum growth were streaked onto primary growth medium such as nutrient agar, and it was then incubated at 37°C for 24-48 hours (Fig. 3). Skin swabs cytology revealed cocci organisms in clusters. Acetate tape imprints were taken (Fig. 2) using the standard Scotch tape method, stained using a drop of New Methylene Blue (NMB) and examined under oil immersion. Tape impressions were negative for Malassezia infection, but cocci were found adherent. The case was diagnosed as bacterial overgrowth syndrome caused by *Staphylococcus spp.*

#### TREATMENT AND DISCUSSION

Treatment was initiated with tablet cephalexin @ 15mg/kg body weight twice a day PO for two weeks, including one week after clinical recovery. Topical application of 2% chlorhexidine gluconate spray for checking bacterial growth and a shampoo containing salicylic acid, zinc gluconate and pyridoxine hydrochloride as a sebotytic agent was advised for two weeks. Supportive therapy with a syrup containing omega-3 and 6 fatty acids was also advised. According to Loeffler *et al.* (2011), 3% chlorhexidine shampoo showed marked effects on decreasing bacterial population and clinical signs. Tablet pantoprazole was advised @1mg/kg body weight PO to prevent gastritis from antibiotics. Complete recovery with no recurrence was seen two weeks post-treatment. Clinical response was monitored on the 15<sup>th</sup> and 30<sup>th</sup> day post treatment. Excellent clinical response along with quick recovery was noticed on the 15<sup>th</sup> day (Fig. 4), and complete resolution of clinical signs was observed by the

*Bacterial Over-Growth... by Swethasri et al.*

30<sup>th</sup> day.

*S. pseudintermedius* is the most common bacterium isolated from canine pyoderma and is usually limited to dogs. This organism is mainly responsible for BOGS in dogs. Cytology is an important diagnostic aid (Hnilica and Patterson, 2017). Therapy generally involves appropriate systemic antibiotic treatment for at least one month. It is accepted, as for pyoderma, that topical therapy with antiseptic lotions, shampoos or gels is beneficial in canine BOGS when used regularly (Viaud *et al.*, 2012).

#### SUMMARY

Clinical cases of BOGS in dogs can be effectively managed using mild topical antiseptics and/or antiseborrheic. First- generation cephalosporin (cefalexin) has favourable safety profiles and ensures clinical efficacy due to excellent activity against *S. intermedius* and its distribution into the skin. Antimicrobial agents are effective, and first-time infections are rarely associated with multi-resistant staphylococci; antimicrobials can be chosen empirically in such cases. A cautious follow-up is mandatory until the underlying dermatosis is controlled.

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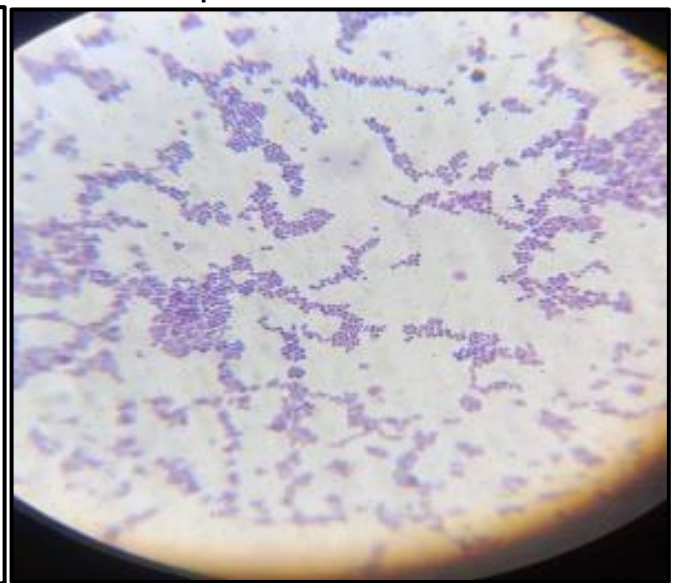
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**Fig. 1: Lesions on ventral abdomen and footpad**



**Fig. 2: Sample collection using tape impression**



**Fig. 3: Culture from nutrient agar after Gram stain showing Staphylococci organisms**



**Fig. 4: 15<sup>th</sup> day post-treatment status of the case depicting complete recovery with resolution of clinical signs.**