Efficacy of staphylococcal bacterin for treatment of canine recurrent pyoderma: an open clinical trial

M.K. BORKU1, Y. OZKANLAR2*, B. HANEDAN1 and S.Y. DURU3

1 Department of Internal Medicine, Faculty of Veterinary Medicine, Ankara University, Ankara-TURKEY.
2 Department of Internal Medicine, Faculty of Veterinary Medicine, Ataturk University, Erzurum-TURKEY.
3 Department of Internal Medicine, Faculty of Veterinary Medicine, Kirikkale University, Kirikkale-TURKEY.

*Corresponding author: Dr. Yunusemre. OZKANLAR, Department of Internal Medicine, Faculty of Veterinary Medicine, Ataturk University, 25700, Erzurum-TURKEY.
E-mail: ozkanlary@yahoo.com

SUMMARY

This study was performed to investigate the efficacy of a staphylococcal bacterin used in cows for curative and preventive purposes against staphylococcal mastitis, as a primary treatment to idiopathic pyoderma caused by staphylococci in dogs. Twenty-one dogs with a history of recurrent pyoderma were used in the study. Alopecic, erythematous, pruritic, crusting, malodorous and exudative skin lesions were monitored in the dogs and the lesions were either local or generalized. The lesions were classified as superficial and deep based on the findings of clinical appearance. Staphylococcus intermedius was isolated and identified from each of the dogs’ lesions. The staphylococcal bacterin, conventionally used against mastitis in cows, was administered eleven times during a four month period. The response was classified as excellent, good or poor, based on clinical findings. There was a follow-up period of 12 months. Excellent and good responses were classified as successful result. The success rates in superficial and deep pyoderma were 100 % and 81.82 %, respectively. The overall success rate was 90.48 %. In conclusion, administration of the staphylococcal bacterin alone was effective and safe to treat dogs with recurrent staphylococcal pyoderma induced by Staphylococcus intermedius.

Keywords: Staphylococcus, pyoderma, bacterin, dog

RÉSUMÉ

Efficacité de la Bactérine staphylococcique dans le traitement des pyodermites récurrentes canines: un essai clinique.

Cette étude a pour objectif d’évaluer l’efficacité d’une bactérine staphylococcique utilisée classiquement pour le traitement et la prévention des mammites staphylococciques chez les vaches, dans le traitement en première intention de pyodermites dues aux staphylocoques chez les chiens. Vingt et un chiens, avec un historique de pyodermite récurrente ont été utilisés pour cette étude. L’évolution de lésions alopeciques, érythémateuses, prurigineuses, malodorantes et exsudatives localisées ou généralisées ont été suivies chez les animaux. Ces lésions ont été classées en lésions superficielles et profondes en fonction de leur aspect macroscopique. Staphylococcus intermedius a été isolé et identifié de la totalité des lésions étudiées. La bactérine staphylococcique a été administrée onze fois en une période d’un mois. La réponse a été considérée comme excellente, bonne ou mauvaise en fonction de l’évolution clinique des lésions. Les animaux ont ensuite été suivis pendant une période d’un an. Le taux de réussite du traitement pour les pyodermites superficielles et profondes a été, respectivement, de 100 % et 82 %. En conclusion, l’administration de bactérine staphylococcique seule s’est révélée efficace et sans danger dans le traitement de chiens présentant des pyodermites récurrentes dues à Staphylococcus intermedius.

Mots clés: Staphylococcus, pyodermite, bactérie, chien

Introduction

Recurrent staphylococcal pyoderma is a common clinical skin problem in dogs and frequently occurs as a result of an underlying cause. Dogs with pyoderma usually tend to respond to appropriate antibiotics. However, most of them may recur within a few weeks after cessation of antibiotic treatment if the underlying problems are not controlled [17]. Staphylococcal bacterin preparations e.g. lysigin (Boehringer Ingelheim Vetmedica Inc., St. Joseph, MO 64506 USA) are very effective for the treatment and prevention of mastitis caused by staphylococcus spp. in cows [3,19]. Lysigin is a lysed culture of highly antigenic polyvalent somatic antigen containing phage types I, II, III, IV and miscellaneous groups of staphylococcus aureus.

A number of investigations have been performed to understand the mechanism of immunological abnormality in dogs with recurrent pyoderma [4,6,10,20,23].

Most of the investigators reported that recurrent pyoderma was associated with immunological dysfunction [4,10,11]. However, some researchers refuse this [13,22]. Staphylococcal bacterin preparations are proposed as an adjunct to antibiotic treatment in the management of canine recurrent staphylococcal pyoderma [9,16]. Antibiotic administrations alone have broadly been investigated [14,18]. To our knowledge, the efficacy of bacterin alone on treatment of pyoderma has not yet been evaluated. Therefore, it is not clear if the main success is due to bacterin or antibiotic in the previous studies. The purpose of this study was to investigate the efficacy of staphylococcal bacterin as a sole primary treatment and the interval of administrations in dogs with recurrent staphylococcal pyoderma.

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Materials and methods

ANIMALS

Twelve male and nine female dogs with recurrent pyoderma were used in this study. There were three Scottish Terriers, two West Highland White Terriers, one Kerry Blue Terrier, one Yorkshire Terrier, three Doberman Pinschers, two Boxers, two Great Danes, three American cockers, two Chinese Sharpeis, and two German shepherd dogs (Table II). Prior to referral to the authors’ clinic, all dogs had a history of two recurrences of skin lesions, at least, following the administration of long-term antibiotic treatment. The relapses were reported within 2 to 4 weeks of the cessation of antibiotics.

SAMPLE CULTURING AND LESION DIFFERENTIATION

Swab samples of the lesions were obtained from all dogs and routine bacteriological cultures were performed [12]. The isolates were identified using the Api STAPH identification system (Analytab Products Inc., Plainview, N.Y.) [2]. Routine mycological tests were undertaken to presence of fungal organisms. Multiple superficial and deep skin scrapings for microscopic examination were performed to rule out the presence of any ectoparasites. Potential recruits were subjected to a two weeks of dietary trial which eventually had no effect on their skin problems. None of the dogs showed the diagnostic criteria for canine atopic dermatitis [15,21]. The lesions were differentiated as superficial or deep based on the findings of clinical appearance. In the deep pyoderma, exudates in deep of dermis were determined under the skin and lesions were 0.5-8 cm in size. In the superficial pyoderma, exudates were determined at the surface of skin and lesions were 0.5-2 cm in size. The occurrence of pruritis was variable in the dogs with superficial or deep pyoderma.

Alopecic, erythematous, pruritic, crusting, malodorous, exudative skin lesions of 0.5-8 cm diameter were observed (Fig. 1A) on the dorsum, abdomen, face and limbs for deep pyoderma. Alopecic, erythematous and slightly exudative lesions were detected (Fig. 2A) on the dorsum, abdomen and face on the surface of the skin for superficial pyoderma. In the dogs with deep pyoderma, pruritic exudates were observed in the deep of dermis, originating from the subcutaneous layers of the skin, when they were squeezed. *Staphylococcus intermedius* were isolated from the lesions of all dogs.

Results of this study clearly indicate that the bacterin, staphylococcal antigen product, is beneficial as primary treatment to control canine recurrent staphylococcal pyoderma with specific series of injections (Table I). Reduced clinical signs and lack of recurrence of pyoderma suggested beneficial effect of the bacterin which was continued for a year period of follow-up.

TREATMENT PROCEDURE

After identifying the bacteria from lesions, bacterin treatment was administered to 21 dogs. Lysigin, produced for the treatment of mastitis induced by *Staphylococcus aureus* in cows, was administered as shown in Table I.

Results

The responses were evaluated as excellent, good or poor. Excellent was defined as the new hairs becoming visible on the third day. Good as hair growth by day 12 and poor when no response was observed within a month.

Eleven out of twenty-one dogs (52.38 %) had deep pyoderma and ten of them (47.62 %) had superficial ones. Fifteen of all the affected dogs (71.43 %) had an excellent response, four of them (19.05 %) good, and two of them (9.52 %) poor. One hundred per cent of superficial and 81.82 % of deep pyoderma cases were rated as successful result. Thus, the entire success rate was 90.48 % (19 dogs). The details of the data were reviewed in Table II.

Case 2 was evaluated as a poor response. The lesions improved initially, but they recurred after two months of bacterin treatment, and the dog died unexpectedly. At necropsy, it was diagnosed that the dog had a splenic tumor and follicular dendritic cell sarcoma. Case 13 initially improved, but the lesions recurred after five weeks and the authors had been forced to use antibiotic. The case was classified as a poor response (Table II).

Discussion

Results of this study clearly indicate that the bacterin, staphylococcal antigen product, is beneficial as primary treatment to control canine recurrent staphylococcal pyoderma with specific series of injections (Table I). Reduced clinical signs and lack of recurrence of pyoderma suggested beneficial effect of the bacterin which was continued for a year period of follow-up.

Antibiotics have been used as a first choice for treatment of pyoderma and the investigators have explored the most effective one. However, no antibiotic can permanently solve the disease in idiopathic recurrent pyoderma [17]. Thus, the literature and overall observations suggest that bacterin may be applied as a choice of primary treatment in idiopathic pyoderma to solve the possible underlying disorder by restoring or activating the immune system [7,8]. Without bacterin, recurrent staphylococcal pyoderma recurs following antibacterial management and needs to be treated each time. Previous studies on the use of bacterin preparations for unmanageable canine recurrent staphylococcal pyoderma include
the use of autogenous bacterin [5,7], antigen toxoid [16], staphylococcus phage lysate (SPL, Delmont Laboratories, USA) [ 8 ], and Propioni bacterium acnes bacterin (Immuno-regulin, ImmunoVet Incorporated, USA) [1]. One of the effective preparations was SPL, prepared by lysis of Staphylococcus aureus bacteria and used as an adjunct to sodium oxacillin (as antibiotic) and benzoyl peroxide (as antibacterial shampoo). The success rate of 77 % in the SPL group may be related to use of antibacterial agents because the placebo treated group had a 63 % success rate. Furthermore, the antibiotic treatment used in that study made it impossible to determine how much of the beneficial

Figure 1 A, B, C. Deep pyoderma in case 1
A: Clinical appearance of the lesions on the day presentation,
B: Clinical appearance of the lesions area on the fifth day,
C: Clinical appearance of the skin on the third week.

Figure 2 A, B, C. Superficial pyoderma in case 11.
A: Clinical appearance of the lesions on the day presentation,
B: Clinical appearance of the lesions area on the fifth day,
C: Clinical appearance of the skin on the third week.
response and how much was attributable to the SPL. CURTIS et al. [7] recently conducted a study using autogenous bacterin plus antibiotic to treat idiopathic pyoderma and they found that the bacterin plus antibiotic was more effective than antibiotic alone to treat superficial pyoderma. Autogenous bacterin is one of the effective bacterin preparations in the literature although it is difficult to prepare the bacterin for each of individual dogs with pyoderma [9]. Lysigin was used in this study as a primary, sole treatment and the success rate was 90.48 %. Using bacterin without any adjunct preparations could be the accomplishment of this clinical trial, but to explain the mode of action, further studies must be performed.

PUKAY [16] administered bacterin daily during 5 days and continued weekly during 3 weeks but it was suggested that the duration of administration should be extended. In Pukay’s report, 56.25 % of the cases relapsed and required additional injection. It is necessary to decide how many booster injections are required in such preparations. The present study suggests that daily injections for five days, weekly injections for three weeks and monthly injections for three months were found to be satisfactory in controlling canine recurrent pyoderma.

Deep pyoderma was not often cured simply and needed other adjunct treatments [17]. In the present study, 4 months of bacterin administration with a pre-determined schedule was used to solve the problem of pyoderma in both deep and superficial types to determine the efficacy of bacterin without any concomitant antibiotic administration.

Tumors associated with pyoderma in case 2 resulted in poor response. Hypothetically, a tumor might lead to immunologic healing discomfort because liver and spleen are known to be connected with cellular defense mechanism. The case 13 initially improved but the lesions recurred and the authors had been forced to use antibiotic. Since the adjunct treatment contributed to response, the case was not evaluated in successful response groups. In case 20, German shepherd dog was evaluated as good because the lesions nearly cured, but several small lesions tended to recur. In previous reports,
some German shepherd dogs affected with pyoderma could not be permanently resolved [16]. It is commonly believed that German shepherd dogs are predisposed to bacterial skin disorders and the condition was named as German shepherd dog pyoderma [8]. This study also suggests that using a bacterin may be an alternative treatment to solve German shepherd dog pyoderma, but several controlled studies needed to be performed to clarify the certain cure of the disease in these dogs.

A number of investigations have been performed concerning the canine recurrent pyoderma associated with immunological dysfunction [4,6,10,20,23]. CHABANNE et al. [4] reported immunological imbalance in German shepherd dog pyoderma and proposed the condition is associated with defective helper cells. In the present study, secondary pyoderma is identified in the dogs with findings of recurrence after responding well to antibiotics. This may be related to possible immunologic abnormality in some dogs because of response to the bacterin affecting the immune system with no recurrence. Another reasonable explanation of the response in some dogs with possible normal immune system may be related to the activation of immune system against staphylococcal spp.

In conclusion, the results of this study indicate that the administration of a staphylococcal bacterin at regular intervals by the i.m. route might be effective as a sole therapy in the majority of dogs with recurrent pyoderma.

References