Original

Antimicrobial Drug Susceptibility of *Staphylococcus* Clinical Isolates from Canine Pyoderma and External Otitis

犬の膿皮症と外耳道炎から分離したブドウ球菌の薬剤感受性

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Abstract: Thirty-five *Staphylococcus* isolates from dogs infected with pyoderma or otitis externa were evaluated to establish their sensitivity against 33 antibiotics, based on the sensitivity of cephalexin. Cephalexin susceptible isolates were found in 26 isolates (74%) of the 35. Nine resistant isolates were considered to be multiple drug resistant *Staphylococcus* as these isolates were only susceptible to imipenem, fosfomycin, doxycycline, minocycline, amikacin and vancomycin.

Key words: antibiotic susceptibility, dog, external otitis, pyoderma, *Staphylococcus*

要 約: 膿皮症と外耳道炎の犬から分離したブドウ球菌35株の33種類の抗菌剤に対する感受性を、セファレキシンを基準に検討した。その結果、セファレキシニンに感受性を示したブドウ球菌は26株と74%を占めたが、耐性を示した9株はイミペネム、フォスホマイシン、ドキシサイクリン、ミノマイシン、アミカシン、バンコマイシンなど一部の抗菌剤にしか感受性を示さない多剤耐性株であった。

キーワード: 薬剤感受性, イヌ, 外耳道炎, 膿皮症, ブドウ球菌

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Introduction

In small animal medicine, canine bacteriological pyoderma and external otitis are common diseases

encountered in dogs⁴⁾. Major pathogens for these diseases include *Staphylococcus*, *Proteus* sp., *Pseudomonas* sp. amongst others. Of these, *Staphylococcus* is recognized as the primary pathogen³⁾. Amoxycillin, erythromycin,

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lincomycin and cephalexin (CEX) have been used to treat these diseases, with CEX usually selected as the first choice antibacterial in such cases^{1,2,5}. However, when a patient is presented that has received prior treatment in a different hospital or in recrudescence cases, it is possible that confusion may arise as to the correct choice of antibiotic for continued treatment. This study was designed to evaluate the most effective way to select an antibiotic drug for canine incurable pyoderma and otitis externa using a test based on the sensitivity of CEX.

Materials and Methods

From August 2007 to October 2007, a survey was made on the sensitivity of *Staphylococcus* species on the skin and otitis. After informed consent, a sample from each of thirty-five dogs that had been admitted to the Yu Animal Hospital (Kashiwa, Chiba) and Ichikawa Animal Hospital (Matsudo, Chiba) with pyoderma and otitis externa were taken. Twenty-two samples were taken from lesions of seborrheic dermatitis, superficial pyoderma and deep pyoderma of the cervicale region and the inguinal region, eleven samples were taken from otitis externa and two samples were taken from the region of moist interdigit dermatitis. Of the 35 cases, eight dogs were mixed breed, seven dogs were Shih Tzu, Golden Retriever and Miniature Dachshund were three dogs respectively, Shiba Inu, Labrador Retriever and Yorkshire Terrier were two dogs respectively, and Chihuahua, Maltese, King Charles Spaniel, American Cocker Spaniel, Beagle, Toy Poodle, Shepherd and Miniature Schnauzer were one dog respectively. Four dogs were under 2 years, thirteen dogs were 2 to 7 years and eighteen dogs were over 7 years; twenty-two dogs were male and thirteen dogs were female. The samples were taken by swabbing from skin, interdigit sites and auris externa with a sterile cotton swab, and then examined using Gram stain to confirm whether any complication with other pathogens had occurred or not, and were directly inoculated into heart infusion (HI) agar and mannitol salt agar. After incubation at 38°C for 18 hours, *Staphylococcus* from colonies was stained by gram stain and examined for major pathogens. If over two different colonies were found, then these isolates were reincubated for two days using HI agar to confirm as just *Staphylococcus*. Isolates incubated were identified as *Staphylococcus* using Gram stain, oxidase reaction and catalase reaction. Susceptibility of isolates identified as *Staphylococcus* was determined according to the National

Committee for Clinical Laboratory Standards (NCCLS) disk diffusion test. The contents of the 33 disks used were new quinolones (ofloxacin; OFLX, levofloxacin; LVFX), penicillins (oxacillin; MIPIC, ampicillin; ABPC, amoxicillin; AMPC, amoxycillin/clavulanic acid; CVA-AMPC, piperacillin; PIPC), first generation cephalosporins (cephalexin; CEX, cefazolin; CEZ), second generation cephalosporins (cefmetazole; CMZ, cefotiam; CTM), third generation cephalosporin (cefotaxime; CTX, cefpodoxime; CPDX, cefteteram; CFTM, ceftriaxone; CTRX, cefixime; CFIX, flomoxef; FMOX), aminoglycosides (amikacin; AMK, gentamicin; GM, kanamycin; KM, tobramycin; TOB, fradiomycin; FRM), macrolides (erythromycin; EM, clarithromycin; CAM, rokitamycin; RKM, roxithromycin; RXM), tetracyclines (minocycline; MINO, doxycycline; DOXY), lincomycin; LCM, chloramphenicol; CP, fosfomycin; FOM, imipenem; IPM, vancomycin; VCM. The sensitivities of isolates were classified by susceptibility or resistance to CEX. Then sensitivity tests were performed for the 33 disks for CEX susceptible and resistant drugs.

Result

In 35 isolates, twenty-six isolates (74%) were susceptible and nine isolates (26%) were resistant against CEX (Table 1). All of the nine isolates resistant to CEX were found to be resistant against two new quinolones (OFLX, LVFX), penicillins (MIPIC, ABPC, AMPC, CVA-AMPC, PIPC), aminoglycosides except AMK (GM, KM, TOB, FRM), macrolides (EM, CAM, RKM, RXM), LCM, CEZ and over 6 drugs of 8 drugs of second and third generations cephalosporins (CMZ, CTM, CTX, CPDX, CFTM, CTRX, CFIX, FMOX). On the other hand, of 9 CEX resistant isolates, 8 isolates were susceptible to MINO (1 isolate was intermediate), 7 isolates were susceptible to DOXY (2 isolates were intermediate), 8 isolates were susceptible to AMK and all of the 9 isolates were susceptible to VCM.

Discussion

CEX is the most common antibiotic for canine pyoderma and external otitis infected with *Staphylococcus* because of its usefulness and efficacy. In this study, we evaluated its sensitivity against *Staphylococcus* and we confirmed that CEX was the drug of first choice for canine

Table 1. Antimicrobial susceptibility percentage of cephalexin susceptible isolates and resistant isolates for *Staphylococcus* spp. isolated from 35 dogs with pyoderma and otitis externa

Antimicrobial	Percentage of susceptibility in 26 cephalexin susceptible isolates	Percentage of susceptibility in 9 cephalexin resistant isolates
Lincomycin	15	0
Ampicillin	27	0
Macrolides (4 drugs)	60	0
Aminoglycosides (4 drugs)	70	0
Quinolones (2 drugs)	75	0
Amoxicillin	77	0
Oxacillin	88	0
Piperacillin	88	0
Amoxicillin/Clavulanic acid	100	0
1st Generation Cephalosporins (Cefazolin)	100	0
Chloramphenicol	54	11
3rd Generation Cephalosporins (6 drugs)	93	11
2nd Generation Cephalosporins (2 drugs)	100	33
Imipenem	100	67
Fosfomycin	100	67
Doxycycline	100	78
Minocycline	81	89
Amikacin	100	89
Vancomycin	100	100

pyoderma and external otitis because CEX was effective for 26 isolates of 35 isolates (74%). However, although CEX was ineffective for the remaining 26% isolates, these isolates were also completely resistant to penicillins, first generation cephalosporins, new quinolones, macrolides, aminoglycosides and lincomycin. Furthermore, almost all of the second and third generation cephalosporins and also CP were ineffective against CEX resistant isolates, which were found to comprise a notably high proportion (26%) of all isolates. These were thus shown to be multi-resistant *Staphylococcus*, with the potential to contaminate and disseminate throughout the environment. These results indicate the importance of including antibiotics sensitivity tests against DOXY and MINO when sensitivity tests are performed.

References

- 1) Frank, L.A. and Kunkle, G.A. 1993. Comparison of the efficacy of cefadroxil and generic and proprietary cephalexin in the treatment of pyoderma in dogs. *J. Am. Vet. Med. Assoc.* 203: 530–533.
- 2) Ganiere, J.P., Medaille, C. and Mangion, C. 2005. Antimicrobial drug susceptibility of *Staphylococcus intermedius* clinical isolates from canine pyoderma. *J. Vet. Med. B Infect. Dis. Vet. Public Health.* 52: 25–31.
- 3) Nagase, N., Sasaki, A., Yamashita, K., Shimizu, A., Wakita, Y., Kita, S. and Kawano, J. 2002. Isolation and species distribution of *Staphylococci* from animal and human skin. *J. Vet. Med. Sci.* 64: 245–250.
- 4) Nagata, M., Murayama, N. and Shibata, K. 2006. Efficacy of Nolvasan surgical scrub containing 2% chlorhexidine acetate in topical management of canine superficial pyoderma: a randomized, double-blind, controlled study. *Jpn. J. Vet. Dermatol.* 12: 1–6.
- 5) Pellerin, J.L., Bourdeau, P., Sebbag, H. and Person, J.M. 1998. Epidemiological surveillance of antimicrobial compound resistance of *Staphylococcus intermedius* clinical isolates from canine pyodermas. *Comp. Immunol. Microbiol. Infect. Dis.* 21: 115–133.