ENTEROCOCCUS FAECALIS INFECTION AFTER ORTHOPEDIC SURGERY IN A DOG

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ABSTRACT

An *Enterococcus faecalis* infection is reported in a dog following a badly executed orthopedic surgery. *E. faecalis* is a notorious pathogen in human medicine but is rarely reported in animals.

SAMENVATTING

Een hond waarbij een osteosynthese op onjuiste wijze werd uitgevoerd, raakte ter hoogte van de weke delen rondom de fractuur geïnfecteerd met *Enterococcus faecalis*. Deze kiem is een bekende nosocomiale pathogeen in de humane geneeskunde.

Keywords: *enterococcus faecalis* – dog – orthopedic surgery

INTRODUCTION

Enterococci are well known pathogens in human medicine. Infections caused by these bacteria are mostly nosocomial, and the species most frequently involved is *E. faecalis* (Murray, 1990). During the last decade much attention has been paid to infections caused by these bacteria because of the occurrence of multiple resistance against almost every useful antibiotic (Herman and Gerding, 1991).

Enterococci are found in the intestines of nearly all animal species investigated, including humans. The species differ from animal host to animal host and in accordance with the age of the animals (Devriese *et al.*, 1987; Devriese *et al.*, 1991). They have been isolated from a hepatic abscess in a dog (Farrar *et al.*, 1996) and from a case of discospondylitis in a dog after lumbosacral epidural analgesia (Remedios *et al.*, 1996), but infections with these bacteria following surgery have not been described in veterinary medicine. The lack of intensive care units and the less frequently performed invasive surgical techniques are most probably the reason why these bacteria are not a problem in veterinary medicine.

On the other hand, enterococci are known to play a role in infections in poultry, canaries and psittaciformes (Devriese *et al.*, 1994). These are probably only secondary infections and triggered by underlying infections with viruses or bacteria. In this report we describe a case of *E. faecalis* infection after poorly executed orthopedic surgery in a dog.

CASE DESCRIPTION

A six-month-old male Dobermann was presented at our clinic because of postoperative complications following osteosynthesis of a femur fracture. The dog had incurred a mid-diafysial oblique femur fracture due to a car accident. Osteosynthesis was performed by the referring veterinarian within a few hours after the accident using an intramedullary Steinmann pin and cerclage wire. After one week the pin had loosened and protruded through the skin. This complication was treated using an Ehmer sling without reposition.

Since the condition of the dog did not improve, the dog was presented at our clinic three weeks after the accident had occurred. Radiography showed that the pin had moved through the insertion site. The bone fragments had been displaced and fibrous tissue had formed. Swelling of the soft tissues was noted and an active infection was assumed. The pin was removed and the wound cleaned and sutured. A swab sample was taken from the pin and the surrounding muscle tissue for bacteriological examination. The pin was bacteriologically negative, but *E. faecalis* was isolated from the surrounding muscle tissue in a pure culture and identified by API Strep20 (bioMérieux, La Balme-les Grottes, France). An antibiogram based on the disk susceptibility test was performed. The strain had acquired resistance to macrolides, and was intermediately susceptible to tetracyclines. The infection was treated empirically with amoxycillin and clavulanic acid.

DISCUSSION

In this case the primary problem was the orthopedic material used. The pin and cerclages were too thin and the cerclages were badly placed. This method did not provide sufficient stability for the fracture. Subsequently, the fragments started to move and the pin was displaced. When more appropriate material is chosen, this can be an acceptable technique for the treatment of some femur fractures, though other techniques can also be utilized. The strongest fixation is effected by a plate, sometimes accompanied with cerclage wire. An interlocking nail, either with or without cerclage, is another good technique. A Künscher nail plus cerclage is also acceptable. The use of intramedullar Steinmann pins must be accompanied either with cerclage or with cerclage and a half Kirschner splint. Another possibility is to use a lag screw with cerclage plus a unilateral type 1A external fixation (Brinker et al., 1997).

The use of materials that provide insufficient stability can have serious consequences, as is shown in this case report. This dog was further treated with another technique that made its condition even worse, with subsequent muscle tissue contraction becoming evident. This made it very difficult to even attempt repositioning the fragments when the dog was presented for further treatment at our clinic. Muscle tissue infection with E. faecalis was a contraindication for remodeling using bone implants. The most appropriate strategy would have been first to get the infection under control and then to carry out corrective osteotomy. In this procedure, a spongiosa autogreffe from the humerus would have been implanted after repositioning of the fragments. Fixation of the fragments with plates would also have been necessary. Because of the muscle contraction in this case, however, the prognosis was bad. The owners did not allow the corrective osteotomy to be performed because of the costs of the surgery. Therefore, it was decided to limit therapy to removal of the pin and to treating the dog against the E. faecalis infection. The dog recovered well from the infection. The injured leg ended up shorter, however, though the dog did not show much discomfort.

Most probably this infection occurred after the pin had penetrated the skin, and it was through this wound that the muscle tissue got infected. Infections are relatively frequent after orthopedic surgery involving implants. The bacteria are localized within a biofilm that covers the implant, and this biofilm protects them from the body's normal immune reactions (Smith et al., 1989). In the present case E. faecalis was isolated not from the pin itself but rather from the surrounding muscle tissue, thus indicating that the infection had not been caused by the orthopedic surgical intervention. Swabs taken from open tracts are notoriously unreliable for providing accurate information regarding bacteriology. However, in this case a pure culture was obtained from the swab indicating this was the cause of infection.

The treatment of enterococcal infections is difficult due to the intrinsic insensitivity of enterococci to several therapeutically used antibiotics and the frequent occurrence of acquired resistance to other antibiotics. Standard therapies in human medicine are ampicillin or amoxycillin, which often need to be used in combination with gentamicin or streptomycin. Another possibility is to use vancomycin or teicoplanin, administered intravenously (Nicoletti and Stefani, 1995). The glycopeptide antibiotics vancomycin and teicoplanin are not registered for animal use. The combination of ampicillin or amoxycillin with gentamicin or streptomycin would not have been practical in this case since aminoglycosides are only available in parental preparations, and for practical reasons the dog could not be treated properly with this antibiotic combination.

E. faecalis is an important nosocomial pathogen in humans, but veterinary reports are virtually non-existent. This case report presenting the first description of an E. faecalis infection in a dog after surgery illustrates the importance of the application of appropriate materials for osteosynthesis.

REFERENCES

Devriese, L.A., Van De Kerckhove, A., Kilpper-Bälz, R., Schleifer, K.H. (1987). Characterization and identification of enterococcal species isolated from the intestines of animals. International Journal of Systematic Bacteriology 37, 257-259.

Devriese, L.A., Hommez, J., Wijfels, R., Haesebrouck, F. (1991). Composition of the enterococcal and streptococcal intestinal flora of poultry. Journal of Applied Bacteriology 71, 46-50.

Devriese, L.A., Deherdt, P., Uyttebroek, E., Lepoudre, C., Ducatelle, R., Dom, P., Haesebrouck, F. (1994). Streptococcen- en enterococcen-infecties bij vogels. Vlaams Diergeneeskundig Tijdschrift 63, 109-111.

Farrar, E.T., Washabau, R.J., Saunders, H. (1996). Hepatic abscesses in dogs: 14 cases (1982-1994). Journal of the American Veterinary Medical Association 208, 243-247.

Herman, D.J., Gerding, D.N. (1991). Antimicrobial resistance among enterococci. Antimicrobial Agents Chemotherapy 35, 1-4.

Murray, B.E. (1990). The life and times of the Enterococcus. Clinical Microbiological Reviews 3, 46-65.

Nicoletti, G., Stefani, S. (1995). Enterococci: susceptibility patterns and therapeutic options. European Journal of Clinical Microbiology and Infectious Diseases 14, 33-37.

Remedios, A.M., Wagner, R., Caulkett, N.A., Duke, T. (1996). Epidural abscess and discospondylitis in a dog after administration of a lumbosacral epidural analgesic. Canadian Veterinary Journal 37, 106-107.

Smith, M.M., Vasseur P.B., Saunders H.M. (1989). Bacterial growth associated with metallic implants in dogs. Journal of the American Veterinary Medical Association 195, 765-767.