Short Communications

Meticillin-resistant *Staphylococcus aureus* in a harbour seal (*Phoca vitulina*)

V. Fravel, W. Van Bonn, C. Rios, F. Gulland

METICILLIN-resistant *Staphylococcus aureus* (MRSA) is an important zoonosis that has increased in prevalence over the past decade, with up to 2 per cent of human beings acting as carriers, posing a risk to in-contact animals (Tattevin and others 2009, Loeffler and Lloyd 2010, Couto and others 2011). Pulsed-field gel electrophoresis has been used to separate MRSA strains into community-associated strains, which are sensitive to many non-β-lactam antibiotics, and hospital-associated strains, which are usually multidrug-resistant (Johnson and others 2007, Tattevin and others 2009). The two major strains of community-associated MRSA in the USA are USA300 and USA400 (Bootsma and others 2010).

MRSA has been isolated from most domestic animal species. Strains isolated from dogs and cats are usually human-associated strains (Loeffler and Lloyd 2010), whereas MRSA isolates from horses vary genetically from common human isolates. Food animals are often infected with a unique MRSA lineage that has evolved independently from common human *S aureus* clones (Loeffler and Lloyd 2010). Strains have also been isolated from wild and captive marine mammals (Faires and others 2009, Schaefer and others 2009). Following the isolation of MRSA from the blowhole of a bottlenose dolphin (*Tursiops truncatus*) that was suspected to have died of pneumonia, surveillance of other marine mammals in the facility revealed MRSA in nasal secretions from several bottlenose dolphins and walruses (*Odobenus rosmarus*). No efforts were made to actively decolonise these animals. Eight months later, repeated cultures from previously MRSA-colonised animals were negative. The death of a harbour seal (*Phoca vitulina*) associated with MRSA occurred at a seal sanctuary in Ireland, and MRSA was cultured from the animal's spleen and a lymph node (O'Mahony and others 2005).

This short communication documents the isolation of MRSA from a non-healing wound in a weanling 20.5 kg female harbour seal that stranded in California, USA, and was brought to The Marine Mammal Center (TMMC), Sausalito, for treatment.

On admission, the seal was lethargic, in poor body condition and had a large open wound, typical of a shark bite, across the hip area. Radiographs revealed no evidence of bone involvement. Initial treatment consisted of amoxicillin (Aurobindo Pharma) at a dose of 22 mg/kg orally twice daily, enrofloxacin (Baytril; Bayer) at 5 mg/kg orally once daily and carprofen (Rimadyl; Pfizer) at 4 mg/kg orally once daily. The wound was debrided and flushed with dilute povidone-iodine solution every other day. Initially, the seal ate well and the wound appeared to be healing. Two weeks into treatment, the seal showed a decreased appetite and increased lethargy, and the wound developed a purulent exudate. The exudate was cultured on sheep blood agar and incubated at 37°C in air with 5 per cent carbon dioxide for five days at the University of California at Davis Veterinary Medical Teaching Hospital. The culture yielded an isolate that was identified as MRSA. Pulsed-field gel electrophoresis was performed by the Centers for Disease Control and Prevention (CDC), and the strain was identified as USA300, a typical community-associated MRSA in the USA (Johnson and others 2007). Antibiotic sensitivity testing of the isolate was determined using the broth microdilution method, and antimicrobial susceptibility was read as minimal inhibitory concentrations. This method revealed sensitivities to doxycycline, amikacin, chloramphenicol and gentamicin. Treatment was changed to doxycycline (Vibramycin; West-Ward Pharmaceuticals) at 10 mg/kg orally twice daily. The animal improved within three days and the doxycycline was discontinued after 18 days. One week following the cessation of antibiotic treatment, the seal's body condition had improved and the wound had almost completely healed; therefore, the seal was released.

Upon receipt of the wound culture results, the seal's nares, the nares of a seal sharing the pen, the pool walls and water in the pool, and the floor of the enclosure the animals were housed in were swabbed, transported on Amies media and cultured within 48 hours as described above. MRSA was isolated from all the swabs of the enclosure and the wounded seal's nares, but not from the pool water or from the in-contact seal's nares. The seals were moved to a separate pool, and the original pool was drained and cleaned with dilute sodium hypochlorite solution; no MRSA was isolated from follow-up swabs of the pen and pool walls one week later. Subsequent cultures of randomly chosen pools and pens throughout the facility was performed as well and revealed no isolation of MRSA.

The source of the MRSA isolate in this case could not be determined, as the wound was not cultured until after the lack of response to initial treatment. The seal was potentially exposed to over 100 human caregivers over the course of its rehabilitation, and had a period of improvement before declining; therefore, it is possible that the infection was acquired at TMMC. It is also possible that the animal was colonised with MRSA at initial presentation to TMMC.

In conclusion, this report describes not only the potential for marine mammals in coastal waters to acquire a typically human-associated bacterial infection, but also the potential for human caregivers to transmit disease to the animals in their care. MRSA infections in marine mammals can be controlled with easily accessible antibiotics and can be eradicated from their environment with simple hygiene measures, as has been highlighted in this case. This report also demonstrates the need for further research into sources of antibiotic-resistant bacteria in marine mammals that share coastal waters with human beings.

Acknowledgements

The authors thank Robyn A. Stoddard, Brandi Limbago and Gregory E. Fosheim at CDC for facilitating and performing the pulsed-field gel electrophoresis. In addition, they thank Spencer Jang and all the staff at the University of California at Davis Microbiology Laboratory for isolating the MRSA and facilitating the transfer of the isolate to CDC. Finally, the authors thank all the staff, volunteers and veterinary externs who participated in the treatment and care of the affected seal.

References

BOOTSMA, M. C. J., WASSENBERG, M. W. M., TRAPMAN, P. & BONTEN, M. J. M. (2010) The nosocomial transmission rate of animal-associated ST398 methicillin-resistant *Staphylococcus aureus*. *Journal of the Royal Society Interface* **10,** 1-7

COUTO, N., POMBA, C., MOODLEY, A & GUARDABASSI, L. (2011) Prevalence of meticillin-resistant staphylococci among dogs and cats at a veterinary teaching hospital in Portugal. *Veterinary Record* **168,** doi:10.1136/vr.c6948

Veterinary Record doi: 10.1136/vr.d4199

V. Fravel, DVM,
W. Van Bonn, DVM,
C. Rios, MLS(ASCP),
F. Gulland, VetMB, PhD,
Veterinary Science, The Marine Mammal Center, 2000 Bunker Road, Sausalito, CA 94965, USA

E-mail for correspondence: fravelv@tmmc.org

Provenance: not commissioned; externally peer reviewed

FAIRES, M. C., GEHRING, E., MERGL, J. & WEESE, J. S. (2009) Methicillin-resistant *Staphylococcus aureus* in marine mammals. *Emerging Infectious Diseases* **15,** 2071-2072

JOHNSON, J. K., KHOIE, T., SHURLAND, S., KREISEL, K., STINE, O. C. & ROGHMANN, M. C. (2007) Skin and soft tissue infections caused by methicillin-resistant *Staphylococcus aureus* USA300 clone. *Emerging Infectious Diseases* **13,** 1195-1200

LOEFFLER, A. & LLOYD, D. H. (2010) Companion animals: a reservoir for methicillin-resistant *Staphylococcus aureus* in the community? *Epidemiology and Infection* **138,** 595-605

O'MAHONY, R., ABBOTT, Y., LEONARD, F. C., MARKEY, B. K., QUINN, P. J., POLLOCK, P. J., FANNING, S. & ROSSNEY, A. S. (2005) Methicillin-resistant *Staphylococcus aureus* (MRSA) isolated from animals and veterinary personnel in Ireland. *Veterinary Microbiology* **109,** 285-296

SCHAEFER, A. M., GOLDSTEIN, J. D., REIF, J. S., FAIR, P. A. & BOSSART, G. D. (2009) Antibiotic-resistant organisms cultured from Atlantic bottlenose dolphins (*Tursiops truncatus*) inhabiting estuarine waters of Charleston, SC and Indian River Lagoon, FL. *Ecohealth* **6,** 33-41

TATTEVIN, P., DIEP, B. A., JULA, M. & PERDREAU-REMINGTON, F. (2009) Methicillin-resistant *Staphylococcus aureus* USA300 clone in long-term care facility. *Emerging Infectious Diseases* **15,** 953-955

Meticillin-resistant *Staphylococcus aureus* in a harbour seal (*Phoca vitulina*)

V. Fravel, W. Van Bonn, C. Rios, et al.

Veterinary Record published online July 8, 2011
doi: 10.1136/vr.d4199