Streptococcus suis Infection

In the summer of 2005 there was a spate of pig-borne infections and deaths in Sichuan Province. Similar infections were also reported in Hong Kong. Streptococcus suis (S. suis) is the offending pathogen.

1. What is S. suis?

S. suis is a Gram-positive coccus. Of the 35 different serotypes identified, serotype 2 causes serious infections in pigs and can be transmitted to infect humans. S. suis serotype 14 infection has also been reported recently.

2. How does S. suis infection in pigs present itself?

S. suis is one of the most important pathogens in pig farms. Occasionally it is also found in cattle, wild boars, horses, dogs, cats, and birds. One to two month-old pigs are most commonly infected, with bacteria found in the nasal cavities and tonsils. Transmission is by droplets through the respiratory route. Overcrowding and poorly ventilated pigsty are responsible for many of the outbreaks. The most common clinical presentations in pigs are septicemia and meningitis but also arthritis, endocarditis, and pneumonia. Some animals are only carriers and never develop frank infection.

3. How does S. suis infection spread from pigs to humans?

The most convincing route of transmission from pigs to humans is through broken skin when tending infected pigs or handling infected pork. Not only pig farmers are at risk but also workers in slaughter houses, butchers, chefs, housewives and maids are similarly at risk. All individuals who are immuno-incompetent, including patients who have had splenectomy, are at increased risk. There is no evidence of human to human transmission. Other routes of transmission from pigs to humans, including droplet transmission through the respiratory tract and entry through the gastrointestinal tract after ingestion of uncooked infected pork, have been suggested but not proven.

4. How does human S. suis infection present itself?

Once the bacteria gained entry through open cuts or abrasions, they spread via the blood stream to cause meningitis. The incubation period varies from a few hours to 3 days. Eighth nerve involvement is more common in S. suis meningitis than any other form of bacterial meningitis. It is usually obvious in the first 24 hours. As a consequence, irreversible high tone deafness is a sequela in over 50%, and vertigo and ataxia in up to 30%, of survivors. Other end-organ infections include septic arthritis, endocarditis, and pneumonia. Septicemia, together with development of the systemic inflammatory response syndrome (SIRS), is fatal and not uncommon.
5. What are the salient diagnostic features in human infection?

A heightened degree of suspicion is required. Patients presenting with meningitis, septicemia, septic arthritis, endocarditis, and pneumonia should be asked about exposure to pigs and handling of pork. Since the infection always involves a bacteremic phase, blood culture is indicated in suspected cases. Examination of the cerebral spinal fluid (CSF) should be performed in the presence of meningeal signs and the typical results are increased protein and decreased glucose levels in the CSF together with the appearance of white cells, predominantly neutrophils. Gram-staining and culture of CSF sediments will reveal Gram-positive cocci in pairs or short chains. Joint aspirate or sputum should be examined and cultured in case of septic arthritis or pneumonia.

6. What is the treatment for human S. suis infection?

Benzyl penicillin (12 – 24 mega units/day) is the antibiotic of choice in the treatment of human S. suis infection. Equivalent doses of ampicillin, cephalothin, clindamycin, and gentamycin are alternatives. Improvement should be obvious within 48 hours. Suspect antibiotic resistance if patient does not improve. Early treatment with antibiotic does not seem to reduce the neurological sequelae of 8th nerve involvement. There is also no proof that the concurrent administration of corticosteroids makes any difference.

Development of SIRS with multiple organ system dysfunctions can be expected in human S. suis meningitis. Every effort should be made to support dysfunctional organs until full recovery. Critically ill patients should be admitted to the Intensive Care Unit for monitoring and management.

7. What is the extent of the problem?

Porcine S. suis infection has been reported worldwide in countries where pigs are raised on a commercial scale. Human S. suis infection has been reported in Europe, the Asia-Pacific Region, New Zealand, and Argentina. Interestingly human S. suis infection is rarely reported in North America, probably due to lack of formal notification guideline.

8. Is human S. suis infection a notifiable communicable disease?

Human S. suis infection is an occupational disease and has to be reported to the Labour Department in Hong Kong. Similar notification is required in some overseas countries like the United Kingdom. As of August 2005, medical practitioners in Hong Kong are required to report suspected cases of human infection to the Centre for Health Protection of the Department of Health as well. This practice is not universal worldwide. There is currently no legal requirement to report porcine infections to authorities.
9. How can *S. suis* infection be prevented?

Primary prevention should be directed towards controlling outbreaks of *S. suis* infection in pig farms. Pigs should be raised in airy well-ventilated sties and overcrowding should be avoided to decrease the chance of droplet transmission via the respiratory route. Vaccines are available for pigs but their efficacy remains unproven.

Human *S. suis* infection can be prevented by observing basic rules of personal and environmental hygiene, which include:

- Increase awareness of *S. suis* infection among individuals who have to come into contact with pigs or to handle pork.
- Wash hands, arms, and other exposed body parts thoroughly after each contact with pigs or pork.
- Cover open wounds with water-proof dressing.
- Wear gloves where appropriate.
- Keep uncooked pork apart from other cooked food.
- Cook pork to an internal temperature of 70°C (160°F) or until the juice is clear and not pink.
- Observe meat importation rules at border crossings.
- Consult a doctor promptly in case of febrile illness after exposure to pig or pork.

There is no human vaccine against *S. suis* infection at the present time.

Further Readings


Hospital Authority (of Hong Kong) Central Committee on Infectious Diseases, Infection Control and Centre for Health Protection. Fact sheet on *Streptococcus suis* infection. July 2005.