Pasteurella septica infection in respiratory disease

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Bacteria of the genus *Pasteurella* are well recognized in the veterinary world as the cause of various diseases of domestic, farm, and wild animals, such as fowl cholera and epidemic haemorrhagic septicaemia of swine and cattle. Since the earliest reports of human infection from Europe, Schipper (1947) collected 21 cases recorded between 1919 and 1946: eight of these had infected bites, and seven had pulmonary infection. Of the 37 cases reviewed by Olsen and Needham (1952) and seen at the Mayo Clinic, 35 had disease of the upper and lower respiratory tract, and bronchiectasis was confirmed by bronchography in 30. *Pasteurella septica* was recovered from bronchial aspirates but rarely from sputum, and it was considered that the organism was a secondary invader in pre-established bronchiectasis. In the United Kingdom, Cawson and Talbot (1955) reported two cases of bronchiectasis in farmers secondarily infected with *P. septica* and suggested cats and dogs as the commonest source—an observation supported by Smith (1955), who isolated it from tonsillar swabs in 54% of 111 London dogs. Further case reports by Bartley (1960), DeBoer and Dumler (1963), Freigang and Elliott (1963), Brodie and Henderson (1963), and Maneche and Toll (1964) confirm that *P. septica* may appear in the sputum cultures of patients with chronic infection of the respiratory tract following animal contact.

Because it is an unusual finding, and in view of the recent interest shown in zoonoses generally, eight cases encountered in Gloucestershire during a four-year period are reported; in some of them the infection may have played an important part in the current acute respiratory illness.

ILLUSTRATIVE CASE HISTORIES

CASE 7 A housewife, aged 50, who had suffered from periodic bronchitis for five years, was admitted to hospital with widespread bronchopneumonia in 1965, and *P. septica* was the sole organism in the sputum culture. It was resistant to sulphonamide, penicillin, tetracycline, and erythromycin, but clinically and radiologically she responded to ampicillin,

and *P. septica* disappeared from the sputum. Subsequent bronchography revealed generalized bronchial diverticulosis. During further chest infections six, eight, and nine months later, *P. septica* reappeared in the sputum cultures, and her serum agglutinated a viable suspension of her sputum organisms, on each occasion at a maximum titre of 1/80. She had a cat.

CASE 8 A housewife of 75 was admitted to hospital with bilateral lower lobe pneumonia, and both *Staphylococcus aureus* and *P. septica* were cultured from the sputum in equal proportions. She improved generally and radiologically after treatment with novobiocin, and *Staph. aureus* disappeared from the sputum, but *P. septica* persisted in two further cultures during the following three weeks, when she relapsed with pneumonia, developed right-sided empyema, and died. Necropsy showed extensive bronchopneumonia, lower lobe bronchiectasis, and a right-sided empyema. In addition, there was cirrhosis of the liver, and microscopical examination revealed small abscesses in which were clumps of small Gram-negative cocco-bacilli with bipolar staining, indistinguishable from *P. septica*. She had been in contact with a cat.

DISCUSSION AND CONCLUSIONS

All eight patients suffered from chronic disease of the upper or lower respiratory tract, and all gave histories of close contact with dogs, cats, cattle, or sheep.

During acute episodes of infection, *P. septica* was isolated on more than one occasion from the sputum of all cases except case 1, and it was notably resistant to erythromycin in five of the eight cases. In all instances except the first isolation in case 8, the second in case 4, and the fourth in case 6, it was the predominant organism, and although it occasionally persisted after antibiotic therapy without harmful effect, as in case 3, its removal from the sputum was always associated with clinical improvement.

Although sputum culture in patients with chronic pulmonary disease is often thought to be unhelpful, this series suggests the opposite. In two patients who died from pneumonia while still

TABLE
FEATURES IN 8 CASES

Case	Age	Sex	Animal Contact	Respiratory Disease	Pasteurella Isolations	Antibiotic Resistance	Other Features
1	51	F	Dog	Post-tuberculous bronchiectasis; recurrent bronchitis	1	Sulphonamide	No further isolations after severing animal contact
2	56	M	Dog	Emphysema; broncho-pneumonia	2	Erythromycin, novobiocin	Death due to pneumonia
3	56	M	Cattle, sheep, dog, cat	Bronchiectasis; recurrent bronchitis	7	None	Serum agglutinins absent
4	73	M	Cattle, pigs, dog	Chronic sinusitis; recurrent bronchitis	3	Erythromycin	—
5	56	M	Cat	Emphysema; bronchial diverticulosis; recurrent bronchitis	2	Sulphonamide, erythromycin	Death due to cor pulmonale
6	72	M	Dog, cat	Bullous emphysema; recurrent bronchitis	4	Erythromycin	Death due to respiratory failure
7	50	F	Cat	Chronic bronchitis; bronchial diverticulosis; broncho-pneumonia	7	Sulphonamide, penicillin, tetracycline, erythromycin	Serum agglutinins present (titre 1/80) during three infections
8	75	F	Cat	Bronchiectasis; bronchopneumonia; empyema	3	None	Death due to pneumonia and empyema; <i>P. septica</i> present in cirrhotic liver abscesses at necropsy

excreting *P. septica* in large quantities, and in two others with advanced emphysema who died within a year of the last isolation of the organism, I think that it contributed to the fatal outcome. The general improvement after appropriate chemotherapy and the disappearance of the organism suggest that these chance super-infections were having a deleterious effect.

The demonstration of a significant antibody titre would confirm host reaction, but although this has been reported in non-respiratory infections, such as puerperal septicaemia by Brugnattelli (1913) and peritonitis by Ludlam (1944) and Coghlan (1958), none has been reported in respiratory disease apart from the cases of empyema and pneumonia described by Ortscheit (1921) and Foerster (1938) respectively. The difficulty in demonstrating serum agglutinins has been emphasized more recently by Brodie and Henderson (1963). In case 7 of this series, serum agglutinins were found to a maximum titre of 1 in 80 during the last three exacerbations of bronchitis during which *P. septica* was grown alone from the sputum. Although such findings in only one patient are not conclusive of general pathogenicity, they suggest that *P. septica* as an opportunist invader may play an important role in some chest infections following animal contacts in people with already damaged lungs. Presumably bacteria which would normally be thrown to the side by a healthy person can assume greater importance where there is a pre-existing breakdown in the resistance of normal skin or mucosa.

In case 8 the presence of clumps of *P. septica*-like organisms in the cirrhotic liver abscesses at a time when this organism was being excreted in the sputum suggests that metastatic lesions may have been produced by a wider extension of the organism following further breakdown in host resistance. Searches for similar groups of bacteria in the lung sections have proved negative.

Frequency of bronchiectasis as a background to *P. septica* infection is confirmed, and this series further demonstrates that other permanent structural abnormalities of the respiratory tract may underlie it, such as bronchial diverticulosis, bullous emphysema, and abnormalities of the nasal sinuses. These findings emphasize the facility with which damaged tissue may be contaminated, and justify combined bacteriological and serological investigations for *P. septica* in new exacerbations of infection in chronic chest disease, where there has been close contact with domestic or farm animals.

SUMMARY

P. septica was the predominant organism in the sputum of eight cases of chronic respiratory disease with acute exacerbations, four of whom subsequently died. All had a history of recent animal contacts.

The findings of serum agglutinins at a titre of 1 in 80 in one case, and clumps of organisms in abscesses in the liver of another, support the impression that *P. septica* may occasionally play

a more important pathogenic role than has hitherto been suspected.

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