Leading Article

Endovascular infections

E.G.J. Olsen

National Heart and Chest Hospital, Westmoreland Street, London W1M 8BA, UK.

Viral, rickettsial, bacterial, fungal, metazoal and protozoal infections can affect the cardiovascular system.¹ Attention is usually paid to resulting endocarditis, myocarditis or pericarditis. Vessels belonging to the systemic, pulmonary or venous system are by no means immune from infection, but vascular infections have not received the same prominence in the literature.

Some infective agents are more frequent than others and in the context of endovascular infections (assuming the heart to be an endovascular structure), *Streptococcus viridans* and *Staphylococcus aureus* spring readily to mind.

One of the rarer infective agents of endovascular infection is *Salmonella*.² Not surprisingly, gastro-intestinal signs and symptoms dominate the clinical picture and five forms are recognized, including gastroenteritis, enteric fever, bacteraemia, a chronic carrier state and a focal nidus anywhere in the body frequently following bacteraemia, but also consequent upon enteric fever and gastroenteritis.² Localized infections can occur in the cardiovascular system.

In this issue, a case of a 55 year old man is reported,³ who, during an episode of blood culture proven *Salmonella virchow* bacteraemia, developed a false aneurysm of the left ventricle in a pre-existing true aneurysm following myocardial infarction. Non-specific clinical manifestations including fever, chest pain, dry cough and generalized malaise, as well as gastro-intestinal symptoms, were observed. This case report illustrates that early recognition of the false aneurysm due to infection is essential, and that successful treatment (in this case by aneurysmectomy) results in a cure of a condition usually carrying an extremely poor prognosis. Early recognition is possible by two-dimensional echocardiography and gallium citrate-67 scanning.

The interpretation of primary infection when the organism can be identified usually poses no difficulty. Secondary infections in previously damaged tissue may make interpretation difficult with regard to ascribing accurately the end-stage of the disease

processes.

Distinction between true and false aneurysms can also be difficult even at morphological level. A true aneurysm can be mistakenly interpreted as a false aneurysm, if, as in cases of ventricular aneurysm, no myocardial tissue is identifiable in the thinnest part of the wall, which may consist of fibrous tissue only. Histological examination will, however, often show endocardium and pericardium. In cases of aortic aneurysms, the media may also completely disappear. As described in this case report, false aneurysms of the ventricle lack the constituents of the wall, but blood is contained by pericardial adhesions which may result in a large fibrous sac communicating with a ventricular cavity through a small aperture.⁴ Commonly, false aneurysms result from rupture of the ventricle or the affected vessel.

In endovascular *Salmonella* infection resulting in true (or false) aneurysms, involvement such as the thoracic⁵ and abdominal aorta,⁶ coronary arteries^{7,8} and peripheral arteries⁹ have all been documented. Arteriovenous fistulae^{10,11} can also result.

In this issue, a case report of a 16 year old girl is also described. She developed an aortobronchial fistula presenting clinically with haemoptysis following an aortic patch graft for coarctation of the aorta ascribed to an infective process most likely consequent upon recent preceding dental infection.¹² Aneurysms following patch graft aortoplasty for coarctation have more recently been reviewed.¹³ To achieve a correct diagnosis, recovery and identification of the organism is essential. In aortic aneurysms, for example, the so-called inflammatory atherosclerotic aneurysm¹⁴ may mimic infection, in view of the chronic inflammatory cell infiltrate, which can be striking.

These two case reports illustrate the potential hazards of infection, particularly in patients with previous pathology in the cardiovascular system, and most timely intervention can result in a cure. They, furthermore, illustrate that the entire endovascular system is at risk and that these patients may present with unusual clinical symptoms.

Correspondence: E.G.J. Olsen, M.D., F.R.C.Path., F.A.C.C., F.E.S.C.

Received: 31 October 1988

References

1. Olsen, E.G.J. *The Pathology of the Heart*, 2nd edition. The Macmillan Press, London and Basingstoke, 1980, pp. 155–177 & 178–199.
2. Cohen, J.I., Barlett, J.A. & Corey, G.R. Extra-intestinal manifestations of *Salmonella* infections. *Medicine* 1987, **66**: 349–388.
3. Echevarria, S., Arjona, R., Alonso, J., Riancho, J.A., Revuelta, J.M. & Gonzalez Marcias, J. False aneurysm formation after *Salmonella virchow* infection of a pre-existent ventricular aneurysm – survival after surgical resection. *Postgrad Med J* 1989, **65**: 168–170.
4. Olsen, E.G.J. True and false aneurysms. In: Silver, M.D. (ed.) *Cardiovascular Pathology*, vol. 1. Churchill Livingstone, Edinburgh, London, 1983, p. 272.
5. Yanoff, M., Frank, J. & Frost, J. Primary mycotic thoracic aortic aneurysm caused by *Salmonella choleraesuis*. *Am J Med* 1965, **38**: 145–150.
6. Parsons, R., Gregory, J. & Palmer, D. *Salmonella* infections of the abdominal aorta. *Rev Infect Dis* 1983, **5**: 227–231.
7. Barnett, R.N. & Zimmerman, S.L. Coronary arteritis with fatal thrombosis due to *Salmonella choleraesuis* variety kunzendorf. *Am Heart J* 1947, **34**: 441–446.
8. McGee, M.B. & Khan, M.Y. Ruptured mycotic aneurysm of a coronary artery: A fatal complication of *salmonella* infection. *Arch Intern Med* 1980, **140**: 1097–1098.
9. Rubin, R.H. & Weinstein, L. *Salmonella Microbiology, Pathologic and Clinical Features*. Stratton Intercontinental Medical Book Corp, New York, 1977.
10. Lockyer, W., Feinfeld, D., Cherubin, C., Carvounis, G., Iancu, M. & Avram, M. An outbreak of *Salmonella* enteritis and septicemia in a population of uremic patients. *Arch Intern Med* 1980, **140**: 943–945.
11. Samra, Y., Shaked, Y. & Maier, M. Nontyphoid salmonellosis in renal transplant recipients. *Rev Infect Dis* 1986, **8**: 431–440.
12. Riancho, J.A., Gutierrez, J.A., Echevarria, S., Daroca, R. & Macias, J.G. Aortobronchial fistula: An uncommon cause of haemoptysis. *Postgrad Med J* 1989, **65**: 171–173.
13. Hehrlein, F.W., Mulch, J., Rautenburg, H.W., Schlepfer, M. & Scheld, H.H. Incidence and pathogenesis of late aneurysms after patch graft aortoplasty for coarctation. *J Thorac Cardiovasc Surg* 1986, **92**: 226–230.
14. Rose, A.G. & Dent, D.M. Inflammatory variant of abdominal atherosclerotic aneurysm. *Arch Pathol Lab Med* 1981, **105**: 409–413.