

Scarlet fever can mimic toxic shock syndrome

M.G. Brook and B.A. Bannister

Royal Free Hospital Department of Infectious Diseases, Coppetts Wood Hospital, Coppetts Road, London N10 1JN, UK.

Summary: We describe a patient who presented with a widespread erythematous rash, diarrhoea, confusion, pre-renal uraemia and hyponatraemia. The diagnosis of staphylococcal toxic shock syndrome seemed likely as she was menstruating and there was no evidence of pharyngitis. A rising ASO titre confirmed a streptococcal aetiology and thus 'toxic' scarlet fever. Toxic shock syndrome and toxic scarlet fever are compared.

Introduction

Scarlet fever was a major cause of morbidity and mortality in the pre-antibiotic era. Although the term toxic shock syndrome has become synonymous with a staphylococcal related illness of rash and hypotension, such features would far more likely have had a streptococcal aetiology in the earlier part of this century.¹⁻³ Scarlet fever still occurs, but the disease seen nowadays is usually no more severe than an uncomplicated streptococcal sore throat with the addition of a rash.⁴ It is unclear why the severe toxic form of the disease has become uncommon, but its incidence fell simultaneously with that of the other streptococcal complications: rheumatic fever and glomerulonephritis.¹ Patients, particularly adult females, presenting with a severe illness associated with an erythematous rash would nowadays be most likely diagnosed as toxic shock syndrome (TSS).⁵⁻¹⁰ We present such a case which highlights the diagnostic pitfalls and shows that 'toxic' scarlet fever (TSF) has not completely disappeared. The clinical similarities between TSS and TSF are also reviewed and features of differentiation are stressed.

Case report

Seven days prior to admission a 40 year old married school teacher suddenly became ill with abdominal pain and diarrhoea. On the third day of illness a widespread erythematous rash, a temperature of 41°C and myalgia developed. Penicillin was commenced but changed to erythromycin one day

later because of tongue swelling. Two days before admission she became confused, anuric, had hicoughs and abdominal distension. Tampons had been used from 3 days prior to the onset of the illness until admission.

On examination she was afebrile, confused, disorientated and incoherent. There was a diffuse erythematous rash affecting the whole of the body, with peeling on the face, and petechiae and ecchymoses over the anterior lower limbs. There was neck stiffness but neurological examination was otherwise normal. There were no obvious sites of skin infection. The oropharynx was diffusely inflamed but the tonsils were not swollen and there was no exudate. There was minimal uterine bleeding, a mildly inflamed cervix and a small amount of malodorous discharge. There was no pelvic tenderness or induration. The blood pressure was 115/75 mm Hg with a pulse of 100 beats/min.

Initial investigations revealed uraemia (urea 23.8 mmol/l, creatinine 436 µmol/l, potassium 4.6 mmol/l and urinary sodium 5 mmol/l), hyponatraemia (113 mmol/l), hypocalcaemia (1.92 mmol/l) and hypoalbuminaemia (26 g/l) and biochemical evidence of myositis. The electrocardiogram was normal. There was mild anaemia (10.7 g/l) with a leucocytosis (neutrophils $27 \times 10^9/l$) and thrombocytopenia ($90 \times 10^9/l$), but disseminated intravascular coagulation was excluded by normal clotting studies and absent fibrin degradation products. Liver function tests, cerebrospinal fluid, urine microscopy and urinalysis were normal.

Initial antibiotic treatment was with vancomycin and cefotaxime, and her initial recovery was rapid but later complicated by a gastrointestinal haemorrhage, fluid retention related to hypoalbuminaemia

Correspondence: M.G. Brook, B.Sc., M.R.C.P., D.R.C.O.G., D.T.M.&H., D.C.H.
Accepted: 5 July 1988

and ileus. She was discharged fit and well 4 weeks after admission, with all laboratory tests normal.

Pathogenic organisms were not cultured from multiple swabs, presumably due to prior antibiotic treatment, and no site of infection was found, but a rising ASO titre from 200–400 IU/ml on admission to 3200 IU/ml at 4 weeks confirmed the diagnosis of toxic scarlet fever. The anti-staphylococcal antibodies, anti-staphylolysin and anti-nuclease, remained stable in low titres.

Discussion

Before the ASOT titre rise, the aetiological diagnosis was unclear. This emphasizes the considerable overlap between TSS and TSF. There were several features not typical of scarlet fever, including a lack of evidence of focal streptococcal infection in spite of attempts to isolate *Streptococcus pyogenes* from throat, vagina and ascites. Similarly, the uraemia, hyponatraemia and diarrhoea seen in this patient have been rarely reported in TSF¹¹ although glomerulonephritis is a recognized late complication.⁵ It is possible that a low grade septicaemia had occurred in this patient and had responded to the antibiotics given at home. This might then explain the diarrhoea and pre-renal uraemia.^{12–14}

The reported clinical features common to TSS and TSF include a widespread erythematous rash which later peels, headache, malaise, mucosal inflammation, confusion and myalgia.^{1–10} This is perhaps not surprising as the pyogenic toxin type A produced by scarlet fever-related strains of streptococci, and toxic shock syndrome toxin type I (TSST-1) produced by staphylococci isolated in cases of TSS have a similar structure.^{11,15,16} The mortality of TSF is unknown but is likely to be similar to the presently reported 5% for TSS.⁵

Both diseases can occur following skin infections^{1–4,17} although TSF most commonly occurs as a complication of pharyngitis/tonsillitis^{1–4} and TSS in association with vaginitis during menstruation following tampon use.^{5–10} The other clinical features that would suggest TSF in cases of uncertainty include puncta and skin crease accentuation of the erythema (Pastia's sign). Illness in a male would also suggest TSF in a disease that has an equal sex incidence, whereas TSS has a 9:1 female

predominance. The incidence of hypotension, renal failure and hepatic dysfunction in TSF is unclear as there are few descriptions in recent literature¹¹ and accounts from earlier in the century use non-specific terms such as 'toxaemia' and 'collapse'. These complications are common in TSS^{5–10} and their presence would also suggest the latter diagnosis.

Laboratory data on TSF are sparse as most published accounts were written from the pre-antibiotic era.^{1–3} A recent report of two cases of atypical TSF suggests that hepatic and renal dysfunction does occur¹¹ whereas these complications are well recognized in TSS.^{5–10} Although altered muscle enzymes have not previously been reported in TSF, the frequent description of clinical myositis suggests that this test would be abnormal with similar frequency in both conditions. Myocarditis is seen in up to 20% of cases of scarlet fever and would also cause increased muscle enzymes.⁵ Disseminated intravascular coagulation has also been reported in both TSS and TSF.^{5,7,11} Features that would suggest TSS and not TSF include hypotension and diarrhoea.^{5–10} Diarrhoea has only been described as a rare pre-terminal complication of TSF¹ but has also been reported in severe streptococcal infections including septicaemia.^{12–14} Tampon use and vagino-cervicitis are features of over 90% of cases of TSS,^{5–10} although menstruation may be a non-causal coincidental association of TSF, as seen in the patient described.

In cases of infection originating outside the throat and vagina the initial diagnosis can be difficult, particularly in the common situation where the pre-admission use of antibiotics has prevented the early identification of organisms. The implication of this overlap is that anti-staphylococcal antibiotics such as flucloxacillin or fusidic acid may be used after an incorrect diagnosis of TSS, and would provide suboptimal cover against streptococci. Benzylpenicillin is the drug of choice for streptococcal infection, and therefore TSF, but may be ineffective for up to 80% of staphylococcal isolates.¹⁸ At a time when TSS is in the forefront of medical literature⁸ and TSF thought to have virtually disappeared,⁵ TSF should be remembered in cases of 'atypical' TSS and antibiotic prescribing should be accordingly adapted.

References

1. Dick, G.F. & Dick, G.H. Symptoms. In: *Scarlet Fever*. The Year Book Publishers, Chicago, 1938, pp 35–52.
2. Musser, J.H. Scarlet fever. In: Pullen, R.L. (ed) *Communicable Diseases*. Henry Kimpton, London, 1950, pp 69–79.
3. Dowling, H.F. Streptococci infections. In: *The Acute Bacterial Diseases*. W.B. Saunders, London, 1948, pp 34–172.
4. Breese, B.B. Streptococcal pharyngitis and scarlet fever. *Am J Dis Child* 1978, **132**: 612–616.

5. Christie, A.B. Toxic shock syndromes. In: *Infectious Diseases*. Churchill Livingstone, London, 1987, pp. 12–16.
6. Todd, J., Fishaut, M., Kapral, F. & Welch, T. Toxic-shock syndrome associated with phage-group-1 Staphylococci. *Lancet* 1978, **ii**: 1116–1118.
7. Shandos, K., Schmid, G.B., Bruce, D.B. *et al.* Toxic shock syndrome in menstruating women. *N Engl J Med* 1980, **303**: 1436–1442.
8. Eykyn, S.J. Toxic shock syndrome. Some answers but questions remain. *Br Med J* 1982, **284**: 1585–1586.
9. Neild, G. & Cameron, J.S. Tampon shock. *Lancet* 1980, **ii**: 1196.
10. Anon. Toxic shock and tampons. *Br Med J* 1980, **281**: 1426.
11. Cone, L.A., Woodare, D.R., Schlievert, P.M. & Timory, G.S. Clinical and bacteriologic observations of a toxic shock-like syndrome due to *Streptococcus pyogenes*. *N Engl J Med* 1987, **317**: 146–149.
12. Teall, A., Visuvanathan, S., Payne, A. & Silverstone, A. Unsuspected streptococcal infection presenting with diarrhoea in late pregnancy. *J Infection* 1987, **14**: 185–186.
13. Thomas, P.S., Wilkins, E. & Hickey, M. Streptococcus pyogenes and dysentery. *J Infection* 1988, **16**: 200–201.
14. Ispahani, P., Donald, F.E. & Avelio, A.J.D. Streptococcus pyogenes bacteraemia: an old enemy subdued but not defeated. *J Infection* 1988, **16**: 37–46.
15. Willoughby, R. & Greenberg, R.N. The toxic shock syndrome and streptococcal pyrogenic exotoxins. *Ann Intern Med* 1983; **98**: 559.
16. Johnson, L.P., L'Italien, J.J. & Schlievert, P.M. Streptococcal pyrogenic exotoxin type A (Scarlet fever toxin) is related to *Staphylococcus aureus* enterotoxin B. *MGG* 1986, **203**: 354–356.
17. Rengold, A.L., Dan, B.B., Shandds, K.K.N. & Broome, C.V. Toxic shock syndrome not associated with menstruation. *Lancet* 1982, **i**: 1–4.
18. Phillips, I. & Eykyn, S.J. Staphylococci. In: Weatherall, D.J., Ledingham, J.G.G. & Warrell, D.A. (eds) *The Oxford Textbook of Medicine*, vol. 2. Oxford Medical Publications, Oxford, 1987, **5**: 191–198.