Managing toxic shock syndrome

TOXIC shock syndrome is a rare and potentially fatal condition which may develop in individuals of all ages. Although comparatively rare, A&E nurses will probably be the first to meet a patient with this condition. Some knowledge of TSS is important as early diagnosis and treatment may be life-saving.

TSS can only be diagnosed clinically because there is no specific blood test for it. James Todd first described TSS in 1978 (Box 1). The measurement of blood pressure in patients who have fever and a rash is particularly important in diagnosis.

TSS develops following exposure to bacterial toxins, known as superantigens, usually produced by *Staphylococcus aureus* or streptococcal bacteria. The bacteria are commonly found on healthy skin and mucosal surfaces, but it is not known why most of these organisms never produce enough toxin to cause illness (Mellish, 1992; Chesney, 1989).

Who is likely to develop TSS?

It is rare in children under six and is less common in Afro-Caribbean races. Higher rates of TSS in the USA, during the 1980s, were associated with a specific type of vaginal tampon or certain surgical packs following nasal surgery (Parsonnet, 1996). This pattern was not seen in the UK: the Public Health Laboratories Services recorded up to 15 cases a year, with the greatest number in 1990.

Although it is an unusual condition, TSS is diagnosed mainly in A&E. It causes between two and five deaths annually in the UK. Most UK cases follow burns or trauma in children. Menstrually related cases have fallen in the last decade (Arbuthnott and Furman, 1998).

Many early exposures to staphylococcal toxins probably recover without diagnosis or treatment and it is likely that exposure to toxins without developing clinical symptoms is common (Michie, 1998).

The typical case

A child with a burn or scald involving less than five per cent of body surface area usually recovers without incident. One in a 1000 of such cases will develop fever and malaise two to three days later. This may progress to a rash, conjunctival infection and diarrhoea within 24 hours. On examination the child will have tachycardia and hypotension. The hypotension is progressive and often unresponsive to intravenous resuscitation. The first problems nursing staff or parents might notice are fever and drowsiness, perhaps a rash, and diarrhoea. The toxins stimulate immune cells leading to the release of cytokines, which cause fever and tissue damage.

Most patients will recover without the need for intensive care or ventilation and should demonstrate no long-term sequelae following the early use of standard supportive treatments. These are:

- Rapid recognition, diagnosis and hospitalisation;
- Investigation, including blood tests, swabs, radiograph and echocardiograph;
- Supportive therapy and monitoring, for example oxygen and intravenous fluids to maintain blood pressure, routines to support major organ systems;
- Antimicrobials (remove the bacteria making the toxin), treat with clindamycin or flucloxacillin, treat the nasal carriage with rifampicin or mupirocin;
- Antitoxin therapy, use intravenous immunoglobulin if the diagnosis is made early;
- Ensure follow-up, consider psychological support, check an echocardiograph.

There is a two to five per cent risk of recurrence, and the elimination of nasal carriage staphylococci is a sensible precaution.

The importance of nurses in diagnosis

A series of 68 TSS cases in the UK, compiled by the authors between 1990 and 2000, sheds some light on who diagnoses TSS. Of this group, 43 cases were born or
trauma-related. The median period of fever before diagnosis was four days (range two to 12 days). Twenty cases were diagnosed by primary carers before referral and 11 were diagnosed in A&E. Burns-related cases were missed at initial presentation more often than menstrually related cases. Nursing staff first made six of the diagnoses in A&E and made additional diagnoses on the wards.

TSS was, therefore, not an easy diagnosis to make. If analysed using standard risk analysis (Bordage, 1999), two problems are evident. First, only 23 of the 68 patients had a blood pressure reading checked on initial presentation. Importantly, 17 of these were recorded by nurses. Some cases had delayed diagnosis because a blood pressure measurement was not documented.

Second, there was a difficulty in data integration, in that the reported findings in 18 cases were not gathered into an appropriate diagnosis or differential diagnosis. In most cases an initial diagnosis was recorded but was not subsequently reconsidered with updated observations or results. In some of the menstrually related cases the diagnosis of TSS was suggested by nursing staff.

Several other conditions may resemble TSS—a differential diagnosis includes the disorders outlined in Box 2. In some situations it may be difficult to distinguish among these; a common confusion is with septic shock, as the conditions may appear similar in their early stages. However, septic shock is caused by multiplying bacteria, and not mainly by bacterial superantigen toxins. Challenges arise when using syndrome definitions such as those in Box 1, together with a differential diagnosis as in Box 2.

Some patients may not quite fulfil all the criteria, or treatment may arrest the development of the disorder. In these situations a diagnosis of TSS cannot be applied. A proportion of cases is diagnosed once they develop skin desquamation, which is usually a late sign. Patients differ in the sequence and speed with which they show clinical signs. Children tend to present initially with drowsiness or irritability and fever, while adults often describe a ‘flu-like illness’ accompanied by a rash.

In order to remedy these two major correctable difficulties in recognising TSS, it is important to educate all health care staff and the public. The fact that relatively small burns or collections of pus following trauma may result in serious illness needs to be remembered. Practical clinical points to help develop better practice are outlined in Box 3. The value of nurses in making a diagnosis of TSS and particularly in measuring blood pressure accurately cannot be underestimated.

**Principles and recommendations**

The principles of treatment are to block the effects of the toxin and remove bacteria that make more toxin, while supporting the patient (Dinges, 2000; Mellish, 1992). This will involve support for the cardiovascular, renal and respiratory systems as with any other patient with shock.

In practice providing mask oxygen, intravenous resuscitation, intravenous immunoglobulin and clindamycin will be sufficient. Clindamycin is the preferred antibiotic because it blocks further toxin production by bacteria. Intravenous immunoglobulin neutralises toxins and their effects and can result in the patient’s rapid improvement. It is difficult to explain why one person develops TSS while others do not (Lindberg, 2000; Chesney, 1989). The prediction of long-term complications remains impossible with the limited patient data available. Collection of case data in both active and passive surveillance is important, and is an aim of the Public Health Laboratory Service. The value of such collections has been proven in other areas such as in vaccination and drug reactions. We need to ensure accurate documentation; the survey described earlier demonstrated that nursing notes were often more detailed and valuable than other clinical records.

TSS may be difficult to diagnose but a better awareness of this condition and skill in measuring blood pressure in sick patients will save lives and reduce morbidity. TSS may be rare, but nurses have an important role in its diagnosis and management.

**Box 2. Conditions to consider**

**Conditions to consider in a differential diagnosis of staphylococcal toxic shock syndrome (TSS), with the most common disorders first:**

- Gastroenteritis;
- Septicaemia (for example pneumococcus, meningococcus and haemophilus);
- Scarlet fever (and staphylococcal scarlet fever);
- Viral encephalopathy;
- Urinary tract infection;
- Septic abortion;
- Haemorrhagic shock syndrome;
- Streptococcal TSS;
- Measles;
- Leptospirosis;
- Drug reactions, acute systemic lupus erythematosus;
- Rheumatoid arthritis;
- Tick-borne disorders including typhus and Rocky Mountain spotted fever (rare);
- Arcanobacterium haemolyticum-induced pharyngitis (rare).

**Box 3. How to improve clinical practice**

- Always check the blood pressure of a patient with diarrhoea, vomiting or drowsiness
- Remember that toxic shock syndrome may present at any age and in either sex
- If diagnosis is difficult, stand back and consider a wide differential diagnosis
- Discuss all patients who have problematic symptoms with colleagues

**REFERENCES**


**FURTHER INFORMATION**

The Toxic Shock Syndrome Information Service (TSSiS) – 01483 418561 www.tssis.com

For related articles on this subject and links to relevant websites see www.nursingtimes.net