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Toxic epidermal necrolysis (TEN): The Chelsea and Westminster Hospital wound management algorithm

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Summary Toxic epidermal necrolysis syndrome (TEN) is a potentially catastrophic exfoliative muco-cutaneous disorder first described by Lyell in 1956. It represents the most extensive form of Steven–Johnson syndrome. TEN is defined varyingly around the globe, but in the United Kingdom the consensus opinion describes the process as involving >30% of the total body surface area. It can rapidly become more extensive and threatens life. The estimated annual incidence is approximately 1–2 cases per million population. The risk of mortality increases with surface area involved and meta-analysis of the literature shows this risk to be between 16% and 55%.

Over a six month period the Chelsea and Westminster Hospital Burns Service treated five consecutive patients with more than 80% total body surface area involvement or a more than 80% mortality risk, using the severity-of-illness score for toxic epidermal necrolysis (SCORTEN). All patients were treated according to the Chelsea and Westminster Hospital wound management algorithm with excellent outcome and no mortalities.

The aim of this paper is to propose a generic TEN wound management algorithm according to the severity of skin lesions, using a simple wound grading system.

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Toxic epidermal necrolysis syndrome (TEN) is a potentially catastrophic exfoliative muco-cutaneous disorder first described by Lyell in 1956.[1] It presents when the process is involving >30% of the total body surface area (TBSA, Table 1).[2] It can rapidly become more extensive and threatens life. The estimated annual incidence is approximately 1–2 cases per million population.[3,4] The risk of mortality increases with surface area involved and meta-analysis of the literature shows this risk to be between 16% and 55%.[5]

TEN seems to be most often initiated by an adverse drug reaction, occasionally associated with concomitant viral infection. It has also been seen in graft versus host disease, malignant disorders and following vaccinations.[6] Diagnosis, differentials and management of TEN are a multidisciplinary endeavours and plastic surgeons should be familiar with this. The pathogenesis and medical management of TEN in our unit has previously been discussed by de Sica-Chapman et al., in 2010 and will not be covered further.[7]

Blister extension at the dermo-epidermal junction is demonstrated easily in this condition. The traction separation of the dermo-epidermal interface is termed a positive Nikolsky sign.[8] The weakened relationship between the layers of the skin at this specific level is characteristic of TEN.

Involvement of the palms and soles is a poor prognostic indicator and suggests extensive cutaneous involvement or a more aggressive evolution within the clinical picture. Loss of the physical barrier to colonising bacteria predisposes patients to invasive infection and septicaemia, which translates into the most common cause of mortality.[9]

Other epithelial surfaces can be involved leading to gastrointestinal, genitourinary, respiratory and conjunctival ulceration. Mucosal membranes are affected to a varying degree and commonly arise during the prodromal phase. Gross involvement of respiratory epithelium causes failure of oxygenation, whilst mucosal pathology can cause painful oral lesions and gastrointestinal/genitourinary haemorrhage.[10]

Over a six month period the Chelsea and Westminster Hospital Burns Service treated five consecutive patients with more than 80% total body surface area involvement or a more than 80% mortality risk, using the severity-of-illness score for toxic epidermal necrolysis (SCORTEN). All patient were treated according to the Chelsea and Westminster Hospital wound management algorithm with excellent outcome and no mortalities. The aim of this paper is to propose a generic TEN wound management algorithm, aided by a simple grading system for severity of TEN skin lesions.

Patients

Five consecutive patients (4× female, 1× male) with a mean age of 50 years (range = 31–61 years) with TEN involving a final mean TBSA of 75% (range = 60–95%) were treated at the Chelsea and Westminster Hospital Burns Service (Table 2). See Figure 1 for the complete management algorithm. In all patients TEN was diagnosed by skin biopsy, all medications were stopped and immunosuppression commenced – intravenous immunoglobulin (IVIG) 2 g/kg bolus over first 24 h and 1 g/kg twice a day over 48 h, with intravenous cyclosporin (IVC) at 2–5 mg/kg once daily (dependent on renal function). As previously discussed by de Sicca-Chapman and colleagues, the Chelsea and Westminster Hospital protocol is that all patients get granulocyte-cell stimulating factor (G-CSF) unless contraindicated.[7]

Four patients with significant mucosal involvement were treated with topical steroids to prevent synechiae (Table 3): All patients were regularly reviewed by gastroenterologists, gynaecologists and ophthalmologists. In significant oropharyngeal involvement nasogastric feeding was instituted throughout with glucose control on an insulin sliding scale, clinical observation of gastrointestinal absorption and review by gatroenterologists. Three out of five patient developed chest sepsis, which were treated with culture specific antibiotics.

Skin dressing management was dependent on the Stage of denudation and skin loss (Figure 2, Table 4): **Stage 0** – Normal skin was protected with emollient; **Stage 1** – Erythematous skin was then treated with topical steroids every 4–6 h from the time of admission until clinical resolution (Table 3). All areas where then covered with Mepitel™ (Molnlycke Health Care, US, LLC, Norcross, GA) and betadine soaked gauze; **Stage 2** – Blisters were aspirated to prevent extension and the overlying epidermis reapplied and dressed with Mepitel™ and betadine soaked gauze. Only the outer gauze dressings were carefully changed every day to prevent bacterial strike through, leaving the Mepitel™ layer intact and thus not striping the reapplied epidermis; **Stage 3** – Areas with denuded skin/epidermal loss were covered with Biobrane™ (Smith & Nephew Healthcare Ltd, Hull, UK), cryopreserved cadaveric allografts and/or E-Z derm™ (Molnlycke Health Care, US, LLC, Norcross, GA), a porcine derived xenograft. Prefabricated Biobrane™ gloves were used for hands. Air mattresses were used in patients with involvement of back, buttock and the posterior surfaces of the limbs. Thermoregulated environments were used during dressing changes to prevent hypothermia.

All patients made a timely recovery with a mean stay in the specialist burns unit of 22 days (range = 12–32 days) and a mean out-patient follow up of 14.8 month (range = 12–18 months).

Table 1 Clinical classification of epidermolysis spectrum.[17]

	Erythema multiforme	Stevens–Johnson syndrome	SJS/TEN cross over	TEN
% TBSA	<10	<10	10–30	>30

TBSA: total body surface area, SJS: Stevens–Johnson syndrome.

Discussion

Diagnosis

Stevens–Johnson syndrome and TEN fall within the same spectrum.[2,11,12] Bastuji-Garin et al. in 1993 define the diagnostic criteria based on the TBSA of epidermal detachment and the morphology of the skin lesions (Table 1).[2,4]

Chave and colleagues proposed in 2005 that the surface area to be included when diagnosing TEN should be limited