Stevens–Johnson syndrome and toxic epidermal necrolysis in Hong Kong

Christina MT Cheung, Mimi M Chang, Joshua JX Li, Agnes WS Chan *

ABSTRACT

Introduction: Stevens–Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) [hereafter, SJS/TEN] are uncommon but severe mucocutaneous reactions. Although they have been described in many populations worldwide, data from Hong Kong are limited. Here, we explored the epidemiology, disease characteristics, aetiology, morbidity, and mortality of SJS/TEN in Hong Kong.

Methods: This retrospective cohort study included all hospitalised patients who had been diagnosed with SJS/TEN in Prince of Wales Hospital from 1 January 2004 to 31 December 2020.

Results: There were 125 cases of SJS/TEN during the 17-year study period. The annual incidence was 5.07 cases per million. The mean age at onset was 51.4 years. The mean maximal body surface area of epidermal detachment was 23%. Overall, patients in 32% of cases required burns unit or intensive care unit admission. Half of the cases involved concomitant sepsis, and 23.2% of cases resulted in multiorgan failure or disseminated intravascular coagulation. The mean length of stay was 23.9 days. The cause of SJS/TEN was attributed to a drug in 91.9% of cases, including 84.2% that involved anticonvulsants, allopurinol, antibiotics, or analgesics. In most cases, patients received treatment comprising either best supportive care alone (35.2%) or combined with intravenous immunoglobulin (43.2%). The in-hospital mortality rate was 21.6%. Major causes of death were multiorgan failure and/or fulminant sepsis (81.5%).

Conclusion: This study showed that SJS/TEN are uncommon in Hong Kong but can cause substantial morbidity and mortality. Early recognition, prompt withdrawal of offending agents, and multidisciplinary supportive management are essential for improving clinical outcomes.

Hong Kong Med J 2024;30:102–9
https://doi.org/10.12809/hkmj2210131

[1] **CMT Cheung,** MB, ChB, MRCP
[1] **MM Chang,** MB, ChB, FRCP
[2] **JJX Li,** MB, ChB, FHKCPath
[1] **AWS Chan ***, MB, ChB, MRCP

[1] *Department of Medicine and Therapeutics, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong SAR, China*
[2] *Department of Anatomical and Cellular Pathology, Prince of Wales Hospital, The Chinese University of Hong Kong, Hong Kong SAR, China*

* Corresponding author: agneswschan@cuhk.edu.hk

This article was published on 26 Mar 2024 at www.hkmj.org.

New knowledge added by this study

- Stevens–Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are rare severe cutaneous adverse reactions in Hong Kong, with a combined annual incidence of 5.07 cases per million.
- Stevens–Johnson syndrome and TEN cause considerable burdens on the Hong Kong healthcare system due to their prolonged length of stay, high demand for intensive care, and substantial mortality.

Implications for clinical practice or policy

- Clinicians should be aware of the early signs and symptoms of SJS and TEN to enable rapid recognition of the disease and prompt withdrawal of culprit drugs.
- Dedicated multidisciplinary teams should be established in tertiary centres to optimise patient outcomes.

Introduction

Stevens–Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are uncommon but potentially life-threatening severe mucocutaneous reactions characterised by extensive epidermal necrosis and detachment. Both entities are considered variants of a single disease continuum and are classified according to the percentage of body surface area (BSA) with epidermal detachment.[1,2] Although SJS and TEN (hereafter, SJS/TEN) have been described in all ethnicities worldwide,[3] studies of these reactions in Hong Kong have been limited.[4,5] The incidence, clinical characteristics, aetiology, treatment regimen, morbidity, and mortality in the territory are largely unknown. This pilot study aimed to review cases of SJS/TEN over a 17-year period at a tertiary referral centre in Hong Kong, and to aid future research in Hong Kong focused on severe cutaneous adverse reactions.

Methods

This retrospective cohort study included all

hospitalised patients who had been diagnosed with SJS/TEN and were treated in Prince of Wales Hospital (PWH), a major regional hospital under the New Territories East Cluster (NTEC), from 1 January 2004 to 31 December 2020.

Patient identification

Patients with clinical and histological diagnoses of SJS/TEN were identified from the Hospital Authority database using International Classification of Diseases, Ninth Revision, Clinical Modification diagnosis codes and the database of the Department of Anatomical and Cellular Pathology of PWH, respectively.

Inclusion criteria

Diagnoses of SJS/TEN were based on consensus guidelines.[1] Patients were diagnosed with SJS, SJS/TEN overlap, and TEN when they exhibited epidermal detachment levels of <10%, 10% to 30%, and >30%, respectively, with consistent histological features (if skin biopsy was performed). Consistent histological features were regarded as partial- to full-thickness epidermal necrosis.

Exclusion criteria

Patients were excluded if they had an alternative diagnosis, such as severe cutaneous adverse reactions other than SJS/TEN (eg, drug reaction with eosinophilia and systemic symptoms syndrome/acute generalised exanthematous pustulosis/generalised bullous fixed drug eruption), erythema multiforme major, autoimmune blistering disease, acute graft-versus-host disease, and infections such as staphylococcal scalded skin syndrome.

Data collection and statistical analysis

Clinical characteristics were collected from electronic records and, when available, hospital case notes. The following clinical characteristics were recorded and analysed: age at onset, sex, ethnicity, maximal BSA of detached or detachable skin, SCORTEN (Severity-of-Illness Score for Toxic Epidermal Necrolysis) prognostic score,[6] mucosa involved, histology results if available, causative drugs, time from exposure to onset, time from onset to admission and treatment, treatment regimen, disease complications, mortality and its cause, and length of stay. Efforts to identify causative drugs were guided by the ALDEN (algorithm of drug causality for epidermal necrolysis) score,[7] which was retrospectively calculated by two independent investigators. All clinical data were expressed as percentages or means ± standard deviations unless otherwise specified.

This article was written in compliance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) reporting guidelines.

香港一所三級轉診醫院2004年至2020年的史蒂芬強森症候群和中毒性表皮壞死溶解症的研究

張敏彤、張苗、李景曦、陳慧詩

引言：史蒂芬強森症候群和中毒性表皮壞死溶解症（SJS/TEN）是一種罕見但嚴重的皮膚及黏膜過敏反應。儘管世界各地許多人群都曾有過此類症狀的描述，但來自香港的數據有限。我們在本研究探討香港SJS/TEN的流行病學、疾病特徵、病因、發病率和死亡率。

方法：這項回顧性隊列研究納入了2004年1月1日至2020年12月31日期間在威爾斯親王醫院診斷為SJS/TEN的所有住院患者。

結果：在17年的研究期間，共有125個SJS/TEN病例。年發生率為每百萬人5.07例。平均發病年齡為51.4歲。表皮壞死及脫落的平均體表面積為23%。總體而言，32%患者需要入住燒傷病房或深切治療部。一半病例伴隨敗血症，23.2%病例出現多重器官衰竭或瀰漫性血管內凝血。平均住院時間為23.9天。91.9%的SJS/TEN病例歸因於藥物，其中84.2%涉及抗癲癇藥、別嘌醇、抗生素或止痛藥。在多數情況下，患者接受的治療包括最佳支援性治療（35.2%）或合併靜脈注射免疫球蛋白（43.2%）。院內死亡率為21.6%。主要死亡原因是多重器官衰竭和／或暴發性敗血症（81.5%）。

結論：本研究顯示SJS/TEN在香港並不常見，但卻可導致較高的併發症和死亡率。及早識別病症、即時停止服用過敏藥物以及多專科團隊支援治療對於改善臨床結果至關重要。

Results

Using the International Classification of Diseases, Ninth Revision, Clinical Modification diagnosis codes for SJS/TEN, 164 potential patients with 166 cases of SJS/TEN during the period from January 2004 to December 2020 were initially identified. Six additional patients with SJS/TEN were identified from the database of the Department of Anatomical and Cellular Pathology of PWH. Forty-seven patients were excluded due to alternative diagnoses. In total, 123 patients with 125 cases of SJS/TEN were included in the study (Fig).

Demographic characteristics and disease classification

Among the 123 patients with SJS/TEN, 53 were men and 70 were women; the female-to-male ratio was 1.32:1 (Table 1). The mean age at onset was 51.4 years, and most patients were Chinese. Of the 125 cases, 59 were SJS, 27 were SJS-TEN overlap, and 39 were TEN. A small number of patients (n=18, 14.4%) were admitted for other medical issues but developed SJS/TEN after hospitalisation.

Clinical characteristics and clinical course

The mean time from disease onset to hospitalisation

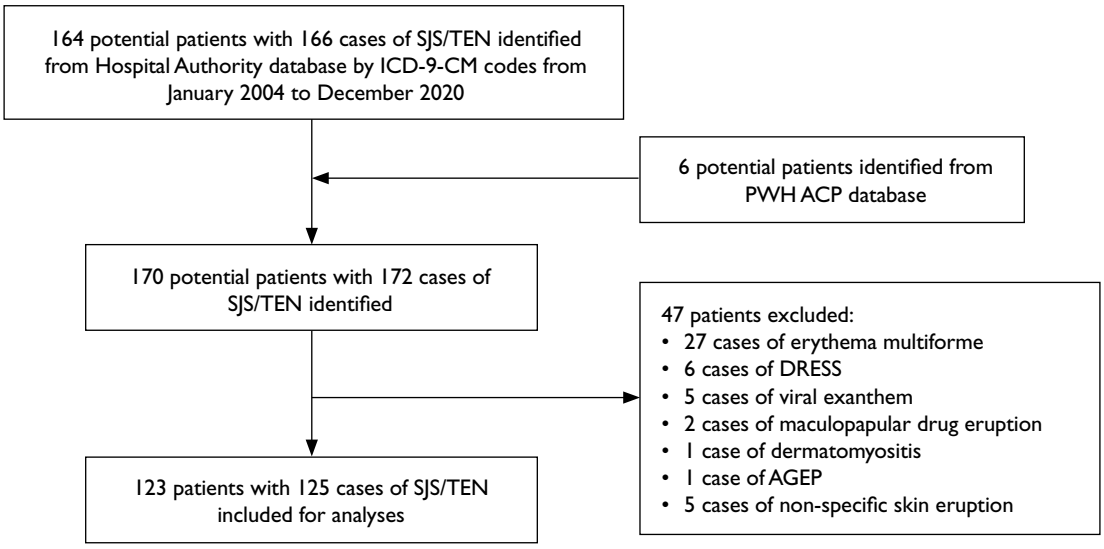

FIG. Flowchart of patient identification and exclusion

Abbreviations: ACP = Department of Anatomical and Cellular Pathology; AGEP = acute generalised exanthematous pustulosis; DRESS = drug reaction with eosinophilia and systemic symptoms; ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification; PWH = Prince of Wales Hospital; SJS = Stevens–Johnson syndrome; TEN = toxic epidermal necrolysis

TABLE 1. Demographic characteristics of patients (n=123) and disease classification in each case (n=125)*

Sex	
Male	53 (43.1%)
Female	70 (56.9%)
Age at onset, y	
Mean ± standard deviation (range)	51.4 ± 24.5 (3-96)
Ethnicity	
Chinese	118 (95.9%)
Thai	1 (0.8%)
Pakistani	1 (0.8%)
Indonesian	1 (0.8%)
Filipino	1 (0.8%)
Caucasian	1 (0.8%)
Disease classification	
SJS	59 (47.2%)
SJS-TEN overlap	27 (21.6%)
TEN	39 (31.2%)
Inpatient-onset SJS/TEN	18 (14.4%)

Abbreviations: SJS = Stevens–Johnson syndrome; TEN = toxic epidermal necrolysis

* Data are shown as No. (%), unless otherwise specified

was 4.9 days (Table 2). Fever was present on admission in 88 cases (70.4%). The mean maximal BSA of epidermal detachment was 23%. Mucosal involvement was common; only five cases (4.0%) lacked mucosal involvement. Skin biopsy was performed in 87 cases (69.6%) and the mean SCORTEN prognostic score was 2.17.

Burns unit or intensive care unit admission was required in 40 cases (32.0%) and half of these cases required invasive mechanical ventilation. In total, 63 cases (50.4%) involved concomitant infection from various sources. Multiorgan failure or disseminated intravascular coagulation occurred in 29 cases (23.2%). The mean length of stay in the hospital was 23.9 days (Table 2).

Aetiology

Stevens–Johnson syndrome and TEN onset was attributed to a drug in 114 of 124 cases (91.9%); one patient developed a second case of SJS/TEN upon accidental re-exposure to the same culprit drug (paracetamol). Four cases (3.2%) were caused by infection, and no cause was identified in six cases (4.8%). The identified culprit drugs are shown in Table 3. The mean time from initiation of the culprit drug to onset of SJS/TEN was 20.5 ± 16.7 days (range, 1-87; median, 15.5).

Treatment

All patients received the best supportive medical care available. In some cases, patients received additional treatment. The numbers and proportions of cases treated with different regimens are shown in Table 4. The mean time between disease onset and active treatment initiation was 7.4 ± 6.1 days (range, 1-34; median, 6).

Intravenous immunoglobulin (IVIG) was

TABLE 2. Clinical characteristics and clinical course (n=125)*

Maximal BSA involved	
Mean ± SD (range)	23% ± 23% (1%-95%)
Mucosal involvement	
Oral	115 (92.0%)
Ocular	78 (62.4%)
Genital	45 (36.0%)
Gastrointestinal/respiratory	8 (6.4%)
None	5 (4.0%)
SCORTEN prognostic score	
Mean ± SD (range)	2.17 ± 1.40 (0-5)
0-1	43 (34.4%)
2	35 (28.0%)
3	23 (18.4%)
4	16 (12.8%)
5	8 (6.4%)
Burns unit/ICU admission	40 (32.0%)
SJS (n=59)	4 (6.8%)
SJS-TEN overlap (n=27)	11 (40.7%)
TEN (n=39)	25 (64.1%)
Intubation	20 (16.0%)
Non-oral nutrition support	49 (39.2%)
Feeding tube	46 (36.8%)
Parenteral nutrition	13 (10.4%)
Time to hospitalisation, d	
Mean ± SD	4.9 ± 5.2
Median (range)	3 (0-27)
Length of stay, d	
Mean ± SD	23.9 ± 30.4
Median (range)	15 (1-228)
Complications	
Multiorgan failure/DIC	29 (23.2%)
Infection	63 (50.4%)
Skin, mucous membrane and soft tissue infection	49 (39.2%)
Urinary tract infection	27 (21.6%)
Chest infection	36 (28.8%)
Septicaemia	17 (13.6%)

Abbreviations: BSA = body surface area; DIC = disseminated intravascular coagulation; ICU = intensive care unit; SCORTEN = Severity-of-Illness Score for Toxic Epidermal Necrolysis; SD = standard deviation; SJS = Stevens–Johnson syndrome; TEN = toxic epidermal necrolysis

* Data are shown as No. (%), unless otherwise specified

TABLE 3. Culprit drugs for Stevens–Johnson syndrome and toxic epidermal necrolysis identified (n=114)*

Anticonvulsants	43 (37.7%)
Phenytoin	14 (12.3%)
Carbamazepine	12 (10.5%)
Lamotrigine	9 (7.9%)
Oxcarbazepine	4 (3.5%)
Sodium valproate	2 (1.8%)
Phenobarbital	1 (0.9%)
Levetiracetam	1 (0.9%)
Antibiotics	27 (23.7%)
Penicillins	11 (9.6%)
Cephalosporins	5 (4.4%)
Macrolides	3 (2.6%)
Co-trimoxazole	3 (2.6%)
Quinolones	3 (2.6%)
Metronidazole	1 (0.9%)
Tetracycline	1 (0.9%)
Allopurinol	17 (14.9%)
Analgesics	9 (7.9%)
NSAIDs including COX-2 inhibitors	6 (5.3%)
Paracetamol	2 (1.8%)
Aspirin	1 (0.9%)
Psychiatric drugs	3 (2.6%)
Benzodiazepine	1 (0.9%)
Zopiclone	1 (0.9%)
Fluoxetine	1 (0.9%)
Miscellaneous	11 (9.6%)
Strontium	2 (1.8%)
Proton pump inhibitors	2 (1.8%)
Fluconazole	1 (0.9%)
Sulfasalazine	1 (0.9%)
Linagliptin	1 (0.9%)
Oxybutynin	1 (0.9%)
Dimercaptopropanesulfonic acid	1 (0.9%)
Immunotherapy	1 (0.9%)
Chinese herbs	1 (0.9%)
Unidentified medications	4 (3.5%)

Abbreviations: COX-2 = cyclooxygenase-2; NSAIDs = non-steroidal anti-inflammatory drugs

* Data are shown as No. (%)

administered in 54 cases. The mean total dose of IVIG was 3.2 g/kg (range, 1.5-6; administered over 2-6 days). High-dose IVIG, defined as ≥3 g/kg, was administered in 40 cases. Systemic steroid regimens considerably varied, with daily doses of prednisolone ranging from 20 to 120 mg (or an equivalent dose). The cyclosporine regimen was 3 mg/kg/day, tapered over 20 to 30 days.

TABLE 4. Treatment regimens (n=125)*

Best supportive therapy alone	44 (35.2%)
IVIG	54 (43.2%)
High-dose (≥3 g/kg)	40 (32.0%)
Low-dose (<3 g/kg)	14 (11.2%)
Systemic steroids	16 (12.8%)
Combination of IVIG and systemic steroids	8 (6.4%)
Cyclosporine	3 (2.4%)

Abbreviation: IVIG = intravenous immunoglobulin
* Data are shown as No. (%)

Mortality

There were 27 deaths in the study cohort, and the overall mortality rate was 21.6%. The mean time from SJS/TEN onset to death was 23.6 ± 19.0 days (range, 5-76). Most patients died from multiorgan failure and/or fulminant sepsis (n=22, 81.5%); other causes of death were acute coronary syndrome (n=2), liver failure (n=1), and sudden cardiac arrest (n=2).

The observed mortality rates were 16.9%, 22.2%, and 28.2% for SJS, SJS-TEN overlap, and TEN, respectively. The SCORTEN-based predicted mortality rates were 14.1%, 28.5%, and 36.9% for SJS, SJS-TEN overlap, and TEN, respectively. Inpatient-onset SJS/TEN had a high mortality rate of 77.8%: 14 deaths among 18 patients who developed SJS/TEN after admission.

Discussion

Epidemiology

Stevens–Johnson syndrome and TEN are recognised worldwide, with several epidemiological studies conducted in Europe and the US. In the 1990s, Roujeau et al[8] reported that the annual incidence of TEN in France was 1.2 cases per million; during the same period, the estimated overall annual incidences of SJS/TEN were 1.89 cases per million in Germany[9] and 4.2 cases per million in the US.[10] In the past decade, two large epidemiological studies in the US[11] and United Kingdom[12] revealed that the overall annual incidences of SJS/TEN were 12.7 and 5.76 cases per million, respectively. In contrast, the epidemiology of SJS/TEN in Asia is not well-documented.[13] In Singapore, based on a small retrospective hospital-based study of 20 patients with TEN, the estimated annual incidence of TEN was 1.4 cases per million[14]; in Korea, a large population-based study indicated that the overall annual incidence of SJS/TEN was 4.9 to 6.5 cases per million.[15] In the present study, there were 125 cases of SJS/TEN during the 17-year study period. Notably, 13 of these cases were transferred from hospitals outside of the NTEC: one was SJS, three were SJS/TEN overlap, and nine were TEN. The NTEC serves a population of 1.3 million.[16] The estimated annual incidence of TEN alone and combined annual incidence of SJS, SJS-TEN overlap, and TEN were 1.36 and 5.07 cases per million, respectively; these incidences are comparable with findings from studies in other countries.

Stevens–Johnson syndrome is approximately threefold more common than TEN.[15,17] However, in the current study, fewer than half of the cases (47.2%) were SJS, whereas 31.2% were TEN. This may be related to referral bias, whereby more severe cases were transferred to the study hospitals, whereas 'milder' cases were managed in regional hospitals where the patients were initially admitted. Prince of Wales Hospital is a tertiary referral centre and one of the few hospitals in Hong Kong with both on-site dermatologists and burns unit support. In our cohort, 31 cases (24.8%) were transferred from peripheral hospitals: 18 (14.4%) arrived from hospitals within the NTEC, whereas 13 (10.4%) arrived from hospitals outside of the NTEC.

Aetiology

Stevens–Johnson syndrome and TEN are most often drug-induced, and a culprit drug is identified in approximately 85% of cases.[7,18] The reactions usually occur between 7 days and 8 weeks after drug ingestion.[19] However, upon rechallenge with the culprit drug, SJS/TEN can develop within hours.[17,19] Efforts to identify causative drugs were guided by the ALDEN score.[7] In cases of SJS/TEN, the most commonly implicated high-risk medications are anticonvulsants, allopurinol, antimicrobials, and oxicam non-steroidal anti-inflammatory drugs.[19,20] In the present study, SJS/TEN onset was attributed to a drug in 114 of 124 cases (91.9%). The mean time between drug initiation and SJS/TEN onset was 20.5 days. Among these 114 cases, 81.6% were caused by the high-risk medications listed above. These findings are comparable with previous reports.

Mortality

Stevens–Johnson syndrome and TEN are associated with high mortality rates, with 1% to 5% in cases of SJS and 25% to 30% in cases of TEN. Survival analyses in multinational European studies (EuroSCAR [European Study of Severe Cutaneous Adverse Reactions] and RegiSCAR [Registry of Severe Cutaneous Adverse Reactions]) have indicated that the overall mortality rate in cases of SJS/TEN is approximately 22% to 23%.[18,20-23] In Asia, reported overall mortality rates vary from 12.3% to 25%.[24-27] Sepsis leading to multiorgan failure is the most common cause of death.[21] Despite the substantial mortality, there currently is no therapeutic regimen with a clear benefit for patients with SJS/TEN.[18,21] Considering the rarity of these diseases, it is difficult

to conduct randomised trials. Early recognition, rapid withdrawal of offending agents, and best supportive care remain the primary components of clinical management.

In the current study, the overall mortality rate was 21.6%; in 81.5% of these cases, the patient died of fulminant sepsis or multiorgan failure. These findings are consistent with existing literature. However, the mortality rate in cases of SJS was much higher in the present study than in previous studies. In the 59 cases of SJS, there were 10 deaths; the mortality rate was 16.9%. Among the 10 patients who died, six experienced complete skin re-epithelisation before death from other medical conditions, which include massive duodenal ulcer bleeding, acute coronary syndrome, metastatic lung cancer, acute liver and renal failure due to herbs, aspiration pneumonia, and sudden cardiac arrest. The remaining four patients had inpatient-onset SJS; they were initially admitted for traumatic intracranial haemorrhage, post-hepatectomy liver failure, convulsions caused by metastatic lung cancer, and post-stroke seizure, respectively. These patients exhibited skin-specific improvements but soon died of aspiration pneumonia and acute renal failure, liver failure, metastatic lung cancer with respiratory failure and liver failure, and sudden cardiac arrest, respectively. The high mortality rate among patients with SJS in the present study could be related to referral bias (as noted in the Epidemiology subsection above); specifically, more severe cases of SJS with co-morbidities and/or complications may have been transferred to our tertiary centre for medical care, whereas less severe cases of SJS might have been managed in regional hospitals where the patients were initially admitted. Indeed, the predicted mortality rate (based on the SCORTEN prognostic score) among cases of SJS in our cohort was 14%; this rate was similar to the observed mortality rate.

In the present study, inpatient-onset SJS/TEN had a high mortality rate (77.8%). Although high mortality of inpatient-onset SJS/TEN was not previously described in the literature, we speculate that this high mortality was related to the underlying medical conditions for which patients were initially admitted. The clinical characteristics of the 14 patients who died are presented in Table 5.

In addition to high mortality, SJS/TEN were associated with high rates of burns unit/intensive care unit admission (32%) and prolonged length of stay (mean=23.9 days) [Table 2], placing a considerable burden on the public healthcare system.

TABLE 5. Subgroup analysis of patients with inpatient-onset Stevens–Johnson syndrome and toxic epidermal necrolysis

Sex/age	Medical history	Cause of admission	Disease category	SCORTEN prognostic score	Cause of death
F/51	Lung cancer with brain, liver, and bone metastasis	Brain metastasis with seizure	SJS	2	Multiorgan failure
F/68	Old stroke and post-stroke epilepsy	Breakthrough seizure	SJS	3	Sudden cardiac arrest
F/88	HT, DM, IHD, and polymyalgia rheumatica	Traumatic ICH	SJS	3	Multiorgan failure
M/67	HT, cirrhosis, and hepatocellular carcinoma	Post-hepatectomy liver failure	SJS	4	Liver failure
M/3	Good prior health	Cyanide poisoning with cardiac arrest	SJS/TEN overlap	3	Sudden cardiac arrest
F/82	Dementia	Road traffic accident with traumatic ICH	SJS/TEN overlap	3	Sepsis
F/82	HT, DM, and end-stage renal failure	Uraemia	SJS/TEN overlap	3	Renal failure
M/82	HT and IHD	Acute cholecystitis	SJS/TEN overlap	5	Multiorgan failure
F/88	HT, CKD, and PVD	Perforated peptic ulcer	SJS/TEN overlap	5	ACS
M/71	HT and hyperlipidaemia	Granulomatosis with polyangiitis	TEN	3	Multiorgan failure
F/72	HT, DM, PVD, old stroke, and dementia	Infected ischaemic foot ulcer	TEN	4	Multiorgan failure
M/74	HT, hyperlipidaemia, IHD, CKD, CHF, and old stroke	Anaemia with ACS and APO	TEN	4	Multiorgan failure
F/96	HT, DM, and history of hemicolectomy	Intestinal obstruction	TEN	4	Multiorgan failure
F/53	CLL on chemotherapy	Neutropenic sepsis	TEN	5	Multiorgan failure

Abbreviations: ACS = acute coronary syndrome; APO = acute pulmonary oedema; CHF = chronic heart failure; CKD = chronic kidney disease; CLL = chronic lymphocytic leukaemia; DM = diabetes mellitus; F = female; HT = hypertension; ICH = intracranial haemorrhage; IHD = ischaemic heart disease; M = male; PVD = peripheral vascular disease; SCORTEN = Severity-of-Illness Score for Toxic Epidermal Necrolysis; SJS = Stevens–Johnson syndrome; TEN = toxic epidermal necrolysis

Limitations and strengths

As a retrospective cohort study, the present study had some intrinsic limitations. Some hospital case notes (ie, from earlier in the study period) were no longer retrievable. Clinical characteristics such as the exact date of disease onset, precise total BSA involved, and detailed drug history (including over-the-counter medications/medications prescribed by private doctors) might not have been available for some of these older cases. Skin biopsies were performed in 70% of cases and might have been omitted in cases of terminal illness. Many patients with milder cases were lost to follow-up after discharge; thus, long-term sequelae were not well-documented.

Additionally, referral bias may have been present because PWH is a tertiary referral centre. Such bias could have led to underestimation of the true incidence of SJS and overestimation of the incidence of TEN; milder cases of SJS might have been managed in regional hospitals, whereas more severe cases of TEN were transferred to our centre for better care. Similarly, there may have been overestimation of various outcome measures including length of stay, complications, and mortality.

Nonetheless, this study had several strengths. To our knowledge, this is one of the largest single-centre studies regarding SJS/TEN in Asia; it included a homogenous group of predominantly Chinese patients. The patients were managed by the same dermatology team with a consistent diagnostic and therapeutic approach throughout the study period. Data collection was adequate, and exhaustive evaluation of drug history was feasible for cases with access to both electronic records and hospital case notes. To ensure accurate identification of causative drugs, the ALDEN score was retrospectively evaluated by two independent dermatology doctors during the study.

Conclusion

This is the first large study in Hong Kong to provide data regarding the epidemiology, disease characteristics and clinical course, aetiology, treatment regimen, and mortality of SJS/TEN. Although uncommon, SJS/TEN is associated with substantial morbidity and mortality. Therefore, in addition to increasing awareness of SJS/TEN among patients and clinicians, efforts should be made to optimise inpatient care among public hospitals in Hong Kong by establishing dedicated multidisciplinary teams that are experienced in the management of SJS/TEN.

Author contributions

Concept or design: CMT Cheung, MM Chang.
Acquisition of data: All authors.
Analysis or interpretation of data: All authors.
Drafting of the manuscript: CMT Cheung, AWS Chan.
Critical revision of the manuscript for important intellectual content: All authors.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

All authors have disclosed no conflicts of interest.

Funding/support

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethics approval

This research was approved by the Joint Chinese University of Hong Kong–New Territories East Cluster Clinical Research Ethics Committee (Ref No.: 2017.424). The requirement for informed consent was waived by the Committee due to the retrospective nature of the research.

References

1. Bastuji-Garin S, Rzany B, Stern RS, Shear NH, Naldi L, Roujeau JC. Clinical classification of cases of toxic epidermal necrolysis, Stevens–Johnson syndrome, and erythema multiforme. Arch Dermatol 1993;129:92-6.
2. Roujeau JC. Stevens–Johnson syndrome and toxic epidermal necrolysis are severity variants of the same disease which differs from erythema multiforme. J Dermatol 1997;24:726-9.
3. Roujeau JC, Chosidow O, Saiag P, Guillaume JC. Toxic epidermal necrolysis (Lyell syndrome). J Am Acad Dermatol 1990;23:1039-58.
4. Ying S, Ho W, Chan HH. Toxic epidermal necrolysis: 10 years experience of a burns centre in Hong Kong. Burns 2001;27:372-5.
5. Yeung CK. Intravenous immunoglobulin treatment for Stevens–Johnson syndrome and toxic epidermal necrolysis [dissertation]. Queen Mary Hospital, The University of Hong Kong; 2004.
6. Bastuji-Garin S, Fouchard N, Bertocchi M, Roujeau JC, Revuz J, Wolkenstein P. SCORTEN: a severity-of-illness score for toxic epidermal necrolysis. J Invest Dermatol 2000;115:149-53.
7. Sassolas B, Haddad C, Mockenhaupt M, et al. ALDEN, an algorithm for assessment of drug causality in Stevens–Johnson syndrome and toxic epidermal necrolysis: comparison with case-control analysis. Clin Pharmacol Ther 2010;88:60-8.
8. Roujeau JC, Guillaume JC, Fabre JP, Penso D, Fléchet ML, Girre JP. Toxic epidermal necrolysis (Lyell syndrome). Incidence and drug etiology in France, 1981-1985. Arch Dermatol 1990;126:37-42.
9. Rzany B, Mockenhaupt M, Baur S, et al. Epidemiology of erythema exsudativum multiforme majus, Stevens–Johnson syndrome, and toxic epidermal necrolysis in Germany (1990-1992): structure and results of a population-based registry. J Clin Epidemiol 1996;49:769-73.

10. Chan HL, Stern RS, Arndt KA, et al. The incidence of erythema multiforme, Stevens–Johnson syndrome, and toxic epidermal necrolysis. A population-based study with particular reference to reactions caused by drugs among outpatients. Arch Dermatol 1990;126:43-7.
11. Hsu DY, Brieva J, Silverberg NB, Silverberg JI. Morbidity and mortality of Stevens–Johnson syndrome and toxic epidermal necrolysis in United States adults. J Invest Dermatol 2016;136:138797.
12. Frey N, Jossi J, Bodmer M, et al. The epidemiology of Stevens–Johnson syndrome and toxic epidermal necrolysis in the UK. J Invest Dermatol 2017;137:1240-7.
13. Lee HY, Martanto W, Thirumoorthy T. Epidemiology of Stevens–Johnson syndrome and toxic epidermal necrolysis in Southeast Asia. Dermatologica Sinica 2013;31:217-20.
14. Chan HL. Toxic epidermal necrolysis in Singapore, 1989 through 1993: incidence and antecedent drug exposure. Arch Dermatol 1995;131:1212-3.
15. Yang MS, Lee JY, Kim J, et al. Incidence of Stevens–Johnson syndrome and toxic epidermal necrolysis: a nationwide population-based study using national health insurance database in Korea. PLoS One 2016;11:e0165933.
16. Hospital Authority, Hong Kong SAR Government. New Territories East Cluster biennial report 2018-2020. Available from: https://www3.ha.org.hk/ntec/clusterreport/clusterreport2018-20/index.html. Accessed 8 Feb 2024.
17. Schwartz RA, McDonough PH, Lee BW. Toxic epidermal necrolysis: Part I. Introduction, history, classification, clinical features, systemic manifestations, etiology, and immunopathogenesis. J Am Acad Dermatol 2013;69:173.e1-13; quiz 185-6.
18. Creamer D, Walsh SA, Dziewulski P, et al. UK guidelines for the management of Stevens–Johnson syndrome/toxic epidermal necrolysis in adults 2016. J Plast Reconstr Aesthet Surg 2016;69:e119-53.
19. Roujeau JC, Kelly JP, Naldi L, et al. Medication use and the risk of Stevens–Johnson syndrome or toxic epidermal necrolysis. N Engl J Med 1995;333:1600-7.
20. Mockenhaupt M, Viboud C, Dunant A, et al. Stevens–Johnson syndrome and toxic epidermal necrolysis: assessment of medication risks with emphasis on recently marketed drugs. The EuroSCAR study. J Invest Dermatol 2008;128:35-44.
21. Schwartz RA, McDonough PH, Lee BW. Toxic epidermal necrolysis: Part II. Prognosis, sequelae, diagnosis, differential diagnosis, prevention, and treatment. J Am Acad Dermatol 2013;69:187.e1-16; quiz 203-4.
22. Roujeau JC, Stern RS. Severe adverse cutaneous reactions to drugs. N Engl J Med 1994;331:1272-85.
23. Sekula P, Dunant A, Mockenhaupt M, et al. Comprehensive survival analysis of a cohort of patients with Stevens–Johnson syndrome and toxic epidermal necrolysis. J Invest Dermatol 2013;133:1197-204.
24. Barvaliya M, Sanmukhani J, Patel T, Paliwal N, Shah H, Tripathi C. Drug-induced Stevens–Johnson syndrome (SJS), toxic epidermal necrolysis (TEN), and SJS-TEN overlap: a multicentric retrospective study. J Postgrad Med 2011;57:115-9.
25. Roongpisuthipong W, Prompongsa S, Klangjareonchai T. Retrospective analysis of corticosteroid treatment in Stevens–Johnson syndrome and/or toxic epidermal necrolysis over a period of 10 years in Vajira Hospital, Navamindradhiraj University, Bangkok. Dermatol Res Pract 2014;2014:237821.
26. Suwarsa O, Yuwita W, Dharmadji HP, Sutedja E. Stevens–Johnson syndrome and toxic epidermal necrolysis in Dr Hasan Sadikin General Hospital Bandung, Indonesia from 2009-2013. Asia Pac Allergy 2016;6:43-7.
27. Lee HY, Fook-Chong S, Koh HY, Thirumoorthy T, Pang SM. Cyclosporine treatment for Stevens–Johnson syndrome/toxic epidermal necrolysis: retrospective analysis of a cohort treated in a specialized referral center. J Am Acad Dermatol 2017;76:106-13.