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Early Mobilization and Functional Training for Early Recovery after Stevens-Johnson Syndrome: A Case Report

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ABSTRACT

Background: Stevens-Johnson syndrome (SJS) and Toxic Epidermal Necrolysis (TEN) are rare but severe dermatological disorders. Their limited prevalence contributes to low awareness among physical therapists, which may lead to suboptimal rehabilitation and complications from immobility.

Methods: This report describes the physical therapy management of a 20-year-old female with SJS admitted to a rural tertiary care hospital in India. Physical therapy interventions were initiated early and progressed through functional task-based mobilization. Assessments were conducted at baseline, on the 7th and 20th days of admission, and at 1-month follow-up.

Results: Marked functional gains were observed, especially after the 7th day. Improvements were documented in the Intensive Care Unit Mobility Scale (IMS), Functional Status Score for the ICU (FSS-ICU), Barthel Index, and joint range of motion. Early mobilization contributed to reduced musculoskeletal and pulmonary complications, promoting faster recovery and shorter hospital stay.

Conclusion: This case highlights the importance of early, tailored physical therapy in SJS rehabilitation. Interdisciplinary collaboration and functional-task–oriented mobilization are essential to optimize outcomes, reduce morbidity, and enhance overall management of SJS.

Introduction

Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are dermatological conditions that resemble partial-thickness burns. SJS manifests as a mild form of erythema multiforme, while TEN represents the most severe variant. [1,2] Often co-existing due to severe skin reactions, these disorders cause extensive skin peeling akin to second-degree burns, leading to frequent referrals to burn units. [3] Initially described in 1922 by Stevens and Johnson as a febrile illness accompanied by skin and ocular complications, SJS is characterized by significant loss of epithelial tissue. This loss contributes to elevated

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mortality and morbidity rates attributed to bacterial, fungal, respiratory, musculoskeletal, and ocular infections. TEN, a progression from SJS, affects over 30% of the body surface compared to SJS's involvement of less than 10%. The pathophysiology is rooted in granulysin-mediated apoptosis, and reactive oxygen species-induced intracellular damage has also been identified as an initiator in pro-apoptotic system activation and blister formation. [4]

SJS/TEN arise from diverse factors, including medications such as anticonvulsants, sulfonamide antibiotics, allopurinol, nonsteroidal anti-inflammatory drugs (NSAIDs), nevirapine, and certain vaccinations. [5,6] Prevalent among women, elderly individuals, and those with human immunodeficiency virus (HIV)-associated infections, their global incidence is on the rise, ranging from 1.2 to 6 cases per million annually, with the age group of 46 to 63 years most commonly affected [7]. Treatment protocols, often encompassing physiotherapy, exhibit variability across centers. [8,9] However, inadequate awareness among physical therapists regarding the distinctive attributes and clinical progression of SJS/TEN could yield suboptimal care and potential complications. Notably, while literature primarily reports SJS/TEN cases in older populations, scant attention has been given to such occurrences in young individuals, let alone their physiotherapy management.

Presenting a case of a 20-year-old SJS/TEN patient admitted to a rural tertiary care hospital, this report outlines our approach to early physical therapy intervention. Drawing from analogous treatment principles applied to burn victims, our intervention protocol was developed based on burn mobilization guidelines. [10–14] This report aims to shed light on the unique challenges and potential solutions in managing SJS/TEN in a young population, offering insights into physiotherapeutic strategies within the context of a rural tertiary care setting.

Case Report

A 20-year-old female, a college student from a rural region in Karnataka, India, was admitted to the Emergency Care Unit at R.L. Jalappa Hospital and Research Center. She presented with fluid-filled lesions across her face, trunk, and extremities, accompanied by a burning sensation that had developed over three days. Four days prior, she had been in good health but subsequently experienced a high-grade fever for which she sought treatment at a local clinic. Unfortunately, details about the medications administered during this treatment remained undisclosed by her parents. A day after her clinic visit, she began experiencing a burning sensation in her oral cavity and eyes, which was followed by the appearance of fluid-filled lesions and subsequent fluid discharge from these areas throughout her body. Informed consent was obtained before the commencement of the assessment procedure. Ethical approval was obtained from the Centre Ethics Committee of Sri Devaraj Academy of Higher Education and Research (SDUAHER/KLR/R&D/CEC/F/NF/51/2024-25).

The patient had a history of systemic lupus erythematosus (SLE), diagnosed two years earlier, and was under medication, including daily doses of Tab. Hydroxychloroquine (200 mg) and Tablet. Acitretin (25 mg), along with intermittent use of Tab. Methylprednisolone for three to four months. She had previously reported generalized myalgias, oral and throat soreness, and red lesions over her cheeks, earlobes, and foot dorsum, which showed improvement upon taking the medications above.

Upon admission to the Medical Intensive Care Unit (ICU), the patient was diagnosed with SJS due to concerns stemming from cutaneous mucous lesions. Subsequent physical examinations revealed erythema, bullous formations, and necrotic skin tissue, leading to a diagnosis of both SJS and TEN. Her treatment plan included Tab. Teczine (10 mg) twice daily, Inj. Avil, and calamine lotion, while Inj. Hydrocortisone was administered as a stat dose. The patient developed respiratory distress, resulting in a decline in oxygen saturation, and was promptly provided with high-flow oxygen support via an 8-liter oxygen mask. After two days, her oxygen dependency diminished, and she was subsequently referred for physical therapy on the fourth day of her hospitalization.

Physical therapy assessment highlighted the patient's painful range of motion, impaired bed mobility, and compromised general mobility due to the presence of skin lesions and associated pain. The patient underwent assessment employing the ICU Mobility Scale (IMS), the Functional Status Score for the Intensive Care Unit (FSS-ICU), and the Functional Independence Measure. The ICU Mobility Scale measures mobility milestones in critically ill patients, using an 11-point scale to record the highest level of mobilization achieved. A score of 0 denotes no mobility (lying in bed), while a score of 10 signifies independent walking without assistance. IMS is a widely accepted standard tool, exhibiting both construct and predictive validity, serving both clinical and research purposes. The FSS-ICU comprises five physical function tasks—rolling, supine-to-sit transfer, sitting at the bed's edge, sit-to-stand transfer, and walking. Each task is evaluated on an 8-point ordinal scale ranging from 0 (unable to perform) to 7 (complete independence). With scores spanning 0 to 35, higher values indicate greater functional independence. The FSS-ICU demonstrates consistent internal consistency and construct validity.

The Barthel Index, a reliable tool, assesses a patient's functional status via 10 items that encompass self-care, sphincter control, transfers, and locomotion. The total Barthel Index (BI) score ranges from 0 to 100, with higher scores indicating greater independence. Passive range of motion (ROM) for major upper- and lower-limb joints was quantified using a universal goniometer. The mean of three ROM measurements taken during the initial evaluation was recorded as the final score.

At the initial evaluation, the patient scored zero on the IMS, indicating that they were capable of performing in-bed exercises while sitting. The FSS-ICU yielded a score of 9 out of 35, while the BI score stood at 25 out of 100. Passive ROM exhibited over

50% restriction in major joints across both upper and lower limbs. Severe pain caused significant ROM limitations; for instance, right and left shoulder flexion measured 20° and 40°, respectively, whereas right and left shoulder extension measured 15° and 25 °, respectively. Abduction reached 50° on the right and 55° on the left. Elbow joint ROM was 120° bilaterally. In the lower limb, hip joint ROM totaled 60° on the right and 50° on the left for flexion, with bilateral hip extension at 5°, abduction at 10°, and knee joint flexion at 50° to 60°. Notably, pain-induced limb immobility resulted in restricted joint ROM. Conversely, upper limb components (forearm, hand, wrist, ankle) operated within normal ROM limits due to mild to moderate skin necrosis, allowing for active joint movement within the functional range. Refer to Table 1 for comprehensive details of the initial evaluation.

The physical therapy intervention was stratified into three distinct phases, tailored to the patient's overall condition and treatment needs. Phase 1, classified as the early mobilization stage, spanned the patient's stay in the ICU (5 days) and concentrated on addressing bodily impairments and activity limitations. A skilled physiotherapist, boasting four years of experience, was responsible for conducting all assessments and interventions during this phase. Objectives included enhancing joint range of motion, improving bed mobility (encompassing sitting, turning within the bed, assuming a high-seated position, and transitioning to an out-of-bed chair), and promoting early mobilization. The regimen commenced with active and active-assisted joint range of motion exercises for major joints, extending to tolerable ranges over 15 repetitions. After this, bed mobility training commenced, targeting transitions from supine to side lying, progressing to sitting at the edge of the couch, and further incorporating transfers from bed to armchair, and finally to out-of-bed chair sitting. The patient was encouraged to engage in assisted walking for at least 10 feet each day, commencing from day 1. Rigorous vital sign monitoring accompanied all mobilization efforts during this phase, which, notably, did not elicit any adverse events.

Phase 2 of the physical therapy program commenced as the patient transitioned from the general ward to a special care ward on the 6th to the 20th day of admission. Characterized as the mobilization-to-independence phase, its goals aimed to enhance overall engagement in activities of daily living (ADL) while simultaneously addressing impairments and activity limitations. While exercises encompassed both impairment improvement and activity enhancement, the ultimate objective was to advance functional participation. The exercise regimen included active range of motion exercises for upper and lower extremity joints, incorporating free weights and performing 15 to 20 repetitions within a 20-minute timeframe, with intervals for rest. The emphasis then shifted towards addressing activity limitations and facilitating functional participation. This component, lasting 30 minutes per session, involved identifying priority-based functional activity requirements and methodically practicing each task, with an emphasis on task completion. The guiding principles for this phase's training regimen were rooted in a functional task-oriented approach program.[15]

Exercise Program during the 2nd Phase:

The exercise regimen during the 2nd phase comprised the following components:

1. Active Range of Motion (ROM) Exercises: Execute active ROM exercises with necessary assistance, ensuring pain limits are respected. These exercises targeted both upper and lower limb joints, conducted in positions against gravity.
2. Selected Resisted Exercises: Implement selected resisted exercises, focusing on major joints where muscle power was equal to or greater than three on the Manual Muscle Testing (MMT) scale.
3. Mat Activities - Transfers: Engage in mat activities involving various transfers to enhance functional mobility.
4. Gait Training: Progress through gait training with the use of a walker and one-person assistance, aiming for the achievement of independent walking.
5. Functional Activities: Undertake functional activities prioritized based on individual needs and preferences.

Subsequently, the patient received a set of exercise schedules accompanied by detailed descriptions. This encompassed a range of activities, such as general walking around the ward for 10 minutes, spending 45 minutes sitting outside the bed while engaging in cognitive functions, including reading newspapers, books, or participating in cognitive games. The schedule also incorporated a 5-minute diaphragmatic breathing exercise. These supplementary activities were recommended for daily implementation, in addition to the treatment sessions conducted with therapists.

Phase 3 - Beyond the 20th Day:

The third phase of the physical therapy interventions spanned from the 20th day post-admission to the end of the first month. This phase was primarily centered on optimizing functional participation and maintaining physical activity levels. The recommended exercises included brisk walking, active ROM exercises, stair climbing, and other activities based on the patient's interests, designed to improve general endurance. A comprehensive home program was established, focusing on complex motor tasks to enhance endurance, with each task lasting 15 minutes. These tasks included activities such as skipping, running, stair climbing, and jumping. Strength training was incorporated using weighted bags ranging from 2 kg to 4 kg, determined based on the patient's 10 Repetition Maximum (10RM) for major muscle groups, involving 8 to 10 repetitions across three sets.

Table 1: Timeline – Outcome Measures at Baseline, 6th Day, 20th Day, and 1-The Intensive

Outcome	**Initial Score**		**At 6th Day**		**20th day**		**1 month**	
ICU Mobility Scale (11-Point scale)	0		7		11		11	
FSS-ICU (Total- 35)	9		16		35		35	
Barthel index	20		60		90		100	
Range of Motion in degrees (Passive)	Right	Left	Right	Left	Right	Left	Right	Left
Shoulder Flexion	22	40	80	110	165	170	170	170
Shoulder Extension	15	25	22	30	35	38	40	40
Shoulder rotation	25	35	45	60	60	60	80	80
Shoulder Abduction	53	55	95	100	110	110	160	165
Elbow flexion	122	120	130	130	135	135	135	135
Forearm supination	84	85	90	90	90	90	90	90
Forearm pronation	75	75	75	75	75	75	75	75
Wrist flexion	83	80	85	85	85	85	85	85
Wrist extension	65	65	65	65	65	65	65	65
Radial deviation	20	20	20	20	20	20	20	20
Ulnar deviation	40	45	45	45	45	45	45	45
Hip Flexion	60	50	90	90	90	90	105	100
Hip extension	5	5	8	8	10	10	15	10
Hip abduction	15	10	20	20	20	20	20	20
Hip adduction	12	15	15	15	15	30	20	30
Hip rotation	10	10	25	20	45	45	45	50
Knee flexion and extension	55	50	85	80	110	105	105	105
Ankle plantar flexion	40	43	40	43	45	45	45	45
Ankle dorsiflexion	18	20	20	20	20	20	20	20

Care Unit (ICU) Mobility Scale (maximum score: 10) and the Functional Status Score for the Intensive Care Unit (FSS-ICU; maximum score: 35) are standardized measures used to assess functional mobility and physical status in critically ill patients. The Barthel Index (maximum score: 100) evaluates independence in activities of daily living. Passive Range of Motion (ROM) was measured in degrees for major joints on both the right and left sides using a goniometer. Values were recorded at four time points: baseline (Day 0), 6th day, 20th day, and 1 month post-intervention.

Significantly, this home program was reinforced through periodic phone call follow-ups to ensure adherence and continuity. The culmination of this holistic intervention approach was the formulation of a personalized home program, guided by principles aimed at enhancing functional capacity and sustaining physical activity levels. This program was designed to foster ongoing progress and well-being beyond the clinical care period.

The outcomes measured at baseline improved by nearly 50% by the end of the 6th day and continued to show further improvement during the 20th-day and 1-month assessment periods (Table 1). At discharge (20th day), the patient had achieved complete independence as measured by the Barthel Index. The ROM impairment was mild, ranging from 2 to 5 degrees in small joints and 10 to 20 degrees in large joints. Refer to Table 1.

Discussion

Patients diagnosed with severe TEN or SJS are typically managed in burns departments, following treatment protocols akin to those used for burn patients. [8,16] While occurrences of such cases are infrequent, patients are often referred to physical therapists to mitigate potential musculoskeletal and pulmonary complications. Given the scarcity of records about physical therapy for TEN, we aimed to present the physical therapy protocol employed in a referred case. A marked enhancement in both function and impairment was evident from baseline measurements when compared to outcomes at the 6th, 20th, and 1-month marks. Importantly, no adverse events or harmful effects were reported during or after the physical therapy sessions. The necessity and intensity of the prescribed exercises may vary depending on the severity, extent, and stage of the disease. This report could serve as a valuable guide for future physiotherapists in crafting treatment protocols.

For assessment, the ICU Mobility Scale was employed, recognized for its high validity and responsiveness in measuring ICU mobility.[17] Similarly, the FSS-ICU demonstrates strong validity and internal consistency in gauging patients' functional status in critical care settings.[18] A follow-up conversation with the patient during the 3rd month post-disease revealed that while her physical functions had returned to normal, social participation remained challenging. The altered physical appearance resulting from the disease, including semi-baldness and burn scars, led to apprehensions about resuming college or attending family functions. This finding underscores the importance of incorporating social participation into long-term interventions and serves as a guide for more comprehensive outcome planning.

This marks the first report detailing physical therapy interventions for SJS, meticulously elucidating the treatment protocol. Given the potential variance in impairments and functional limitations, both short-term and long-term physical impairments may manifest in clinical scenarios. Early patient mobilization through active engagement in diverse functional tasks is pivotal for rapid recovery, mitigating musculoskeletal and pulmonary complications, and reducing hospitalization duration. Often, therapeutic focus remains confined to inpatient rehabilitation, with outpatient care rarely considered. Following discharge, lingering physical impairments and challenges in social participation

necessitate targeted outpatient counseling and continued support.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

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