Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Surgery

Lightning-Induced Burns: A Report of Two Cases

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DOI: https://doi.org/10.36347/sjmcr.2026.v14i11.064 | **Received:** 16.09.2026 | **Accepted:** 13.11.2026 | **Published:** 17.11.2026

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Abstract | **Case Report**

Introduction. Lightning strikes can cause cutaneous and systemic injuries whose severity does not always correlate. We report two cases illustrating the diversity of lesions encountered in plastic surgery and their associated complications. ***Case presentations.*** The first patient, aged 14 years, presented with a linear cervical mark after being struck by lightning at home. Acute respiratory failure required mechanical ventilation. Severe left ventricular dysfunction, with an ejection fraction of 20–25%, resolved by the following day, when the ejection fraction reached 70%. The second patient, aged 30 years, had a dorsal burn described as superficial partial-thickness, involving an estimated 5% of the total body surface area, with a reported initial loss of consciousness. He was conscious and respiratory and hemodynamically stable on admission. ***Conclusion.*** These cases highlight the importance of careful documentation of cutaneous findings and systemic assessment after lightning strikes, regardless of the apparent extent of visible lesions.

Keywords. Lightning strike; cutaneous burn; plastic surgery; myocardial stunning; case series.

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INTRODUCTION

Lightning injury results from an extremely high-intensity electrical discharge occurring over a very short period. Although cutaneous findings may be the most immediately visible manifestations, the consequences can extend to the cardiovascular, respiratory, neurological, muscular, and renal systems [1,2]. Skin findings range from transient discoloration or characteristic branching markings to genuine burns of variable depth. Importantly, the appearance and surface area of a skin lesion cannot be used as a reliable surrogate for the severity of internal injury. This distinction is particularly relevant to plastic surgeons, who may be asked to assess the wound while systemic complications are being investigated or treated. We describe two patients with contrasting cutaneous presentations and early systemic courses, emphasizing the complementary roles of local examination, serial reassessment, and multidisciplinary evaluation.

CASE PRESENTATIONS

Case 1

A 14-year-old adolescent with no known medical history was admitted to the pediatric intensive care unit approximately two hours after being struck by lightning at home on March 25, 2026. The medical record described a lesion in the anterolateral neck region. The clinical photograph showed a reddish-brown linear band in the submental and anterior cervical regions (Figure 1). No obvious tissue loss was visible in the photograph. The affected surface area and lesion depth were not specified.

On admission, the patient had an altered level of consciousness, with a Glasgow Coma Scale score of 13/15. He was tachypneic at 60 breaths/min and had severe hypoxemia on room air. His heart rate was 120 beats/min and blood pressure was 94/46 mmHg. Respiratory compromise required intubation and mechanical ventilation.

Initial laboratory findings included high-sensitivity troponin I of 1,123.4 and creatine phosphokinase (CPK) of 689, as recorded in the report; units were not specified. Echocardiography on March 26 showed severe left ventricular systolic dysfunction, described as myocardial stunning, with an estimated ejection fraction of 20–25%. On March 27, repeat echocardiography showed preserved systolic function and an ejection fraction of 70%. Troponin decreased to 506.3 and then 115.1. CPK increased to 3,687 before declining to 1,843.

Following extubation, respiratory support was gradually reduced. By April 2, the patient was described as breathing comfortably and hemodynamically stable,

with an oxygen saturation of 95% while receiving oxygen at 2 L/min. No local surgical procedure was reported. The medical record did not specify the healing course of the cervical mark.

Case 2

A 30-year-old man with no known medical history was admitted to the resuscitation area on September 9, 2025, following a lightning strike. An initial loss of consciousness was reported. On admission, he was conscious and hemodynamically and respiratory stable. Cardiovascular and pulmonary examinations revealed no clinical abnormalities.

Local examination described a superficial partial-thickness (second-degree) burn extending from the posterior cervical region to the coccygeal region, involving an estimated 5% of the total body surface area. The photograph showed a long, shiny, red midline area bordered by darker regions along the back (Figure 2). The depth of each of these areas cannot be determined from the photograph alone.

The patient was hospitalized in the resuscitation area. Initial management included two peripheral intravenous lines, fluid resuscitation, monitoring, urinary catheterization, analgesia, and local wound care with dressings. An electrocardiogram, laboratory tests including troponin, CPK, and lactate dehydrogenase, and cardiology and neurology consultations were requested. The results of these investigations, burn progression, and discharge date were unavailable.



Figure 1: Reddish-brown linear cutaneous mark in the submental and anterior cervical regions in the first patient. The depth of the lesion cannot be determined from this photograph



Figure 2: Midline dorsal burn extending from the posterior cervical region toward the coccygeal region in the second patient. Clinically estimated total body surface area burned: 5%

DISCUSSION

The principal observation in this report is the marked discrepancy between the visible skin findings and the early systemic manifestations of lightning injury. In the first patient, a limited linear cervical mark accompanied profound respiratory compromise and severe but rapidly reversible left ventricular systolic dysfunction. In the second, a more conspicuous longitudinal dorsal burn, clinically estimated to involve 5% of total body surface area, was associated with initially stable respiratory and hemodynamic findings. These observations do not establish a relationship between lesion morphology and prognosis; rather, they illustrate why the extent of visible injury should not determine the intensity of the initial systemic assessment [1,2].

Lightning exposure may affect several organ systems through mechanisms that are not fully characterized by the appearance of the skin. Cardiac manifestations are particularly important because clinically significant dysfunction can occur even when external injury appears modest [2]. In Case 1, the documented improvement in left ventricular ejection fraction from 20–25% to 70% over approximately one day, together with falling troponin values, is compatible with transient myocardial stunning. The available record does not establish a specific pathophysiological mechanism or exclude other contributors to the acute clinical presentation. For Case 2, the absence of the requested cardiac test results prevents any assertion that myocardial injury was absent; initial clinical stability should therefore be described separately from the results of investigations that were not available.

From a plastic surgery perspective, the clinical assessment should distinguish a true burn from a transient cutaneous mark and document anatomical distribution, estimated surface area, color, epidermal integrity, suspected depth, and associated soft-tissue findings. Standardized clinical photography can support comparison over time, but photographs alone cannot reliably determine burn depth or the need for an intervention. Serial examinations are especially valuable when the initial appearance is uncertain, because subsequent wound evolution may clarify tissue viability, healing potential, and whether additional local treatment is required. In Case 1, the photographed cervical mark showed no obvious tissue loss; the record did not specify its depth or subsequent healing. In Case 2, the dorsal lesion was described clinically as a superficial partial-thickness burn, although the depth of each differently colored region could not be confirmed from the photograph alone. These distinctions should be retained rather than assigning an unsupported definitive depth to either image.

The morphology of the lesions also warrants careful interpretation. Neither photograph shows the characteristic branching pattern of Lichtenberg figures, which are transient skin markings associated with lightning strikes and should not be classified as burns [3]. The linear appearance of the cervical mark and the elongated dorsal burn are descriptive observations; the available information does not establish the precise electrical pathway or mechanism producing these patterns. Their clinical significance lies in the need to evaluate the patient as a whole rather than relying on a presumed mechanism inferred from the skin.

Early care must integrate wound assessment with monitoring for extracutaneous injury. In these cases, the systemic priorities differed substantially: the first patient required airway management and intensive cardiorespiratory support, whereas the second underwent initial monitoring and investigations after an episode of reported loss of consciousness. For patients presenting after lightning exposure, coordination between emergency or critical care teams and relevant specialties is essential when indicated by the clinical findings [1,2]. The plastic surgeon's contribution includes accurate wound characterization, appropriate local care, and reassessment for delayed tissue changes or sequelae, without allowing a visually dramatic lesion to overshadow potentially serious systemic complications.

This report has several limitations. It is a descriptive account of only two patients and cannot establish the frequency of specific injuries or identify predictors of severity. Long-term cutaneous follow-up was unavailable for both patients, preventing assessment of healing time, scarring, pigmentation changes, or the eventual need for reconstructive treatment. For the second patient, the results of the requested cardiac and laboratory investigations, the subsequent hospital course, and discharge date were not available. In addition, units were missing from some laboratory values recorded for the first patient. We have therefore avoided interpreting those measurements against laboratory reference ranges or drawing conclusions unsupported by the available records. Despite these limitations, the cases offer a clinically useful contrast between cutaneous appearance and early systemic involvement, reinforcing the importance of precise documentation and coordinated assessment.

CONCLUSION

These two cases highlight the heterogeneity of skin findings after lightning injury and the potential mismatch between visible lesions and systemic severity. A limited cervical mark may coexist with major cardiorespiratory dysfunction, while a more extensive-appearing burn does not, by itself, establish the presence or absence of internal injury. Detailed initial skin examination, photographic documentation, and serial reassessment should be integrated with appropriate cardiovascular, respiratory, neurological, muscular, and

renal evaluation. Longer-term follow-up is needed to characterize wound healing and cutaneous sequelae.

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