

Struck By Lightning: A case report

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Case Description

A 14-year-old previously healthy male presented to inpatient rehabilitation one month after being struck by lightning leading to cardiac arrest. Injuries included extensive burns, cervical spinal cord edema, T2-T4 & T6 compression fractures, cerebral infarction of the parietal lobe, four-limb compartment syndrome requiring fasciotomies, respiratory failure, and multiple wounds at lightning entry and exit sites.

His acute hospital course was additionally complicated by rhabdomyolysis, acute kidney injury, and hypertension.

Initial ASIA impairment scale grade was level C with intact deep anal sensation and 1/5 strength of bilateral extensor hallucis longus. During his inpatient rehabilitation stay, he also experienced sinus tachycardia, orthostatic hypotension, left sided flank pain, muscle spasms, and a sacral pressure ulcer.

After 10 days, he demonstrated return of voluntary urinary control despite lack of bladder sensation. Hip adductors were the first to recover with ongoing motor return noted throughout his rehabilitation admission. At two months, the patient was safely discharged home with day rehabilitation for ongoing intensive therapy.

Images



Rehabilitation Interventions

Interventions during this crucial recovery period focused on restoring motor function, utilizing functional electrical stimulation and assisted treadmill training while remaining attentive to complications from rhabdomyolysis and acute renal insufficiency. Comprehensive cognitive evaluation and family education and training were also essential to his functional recovery.

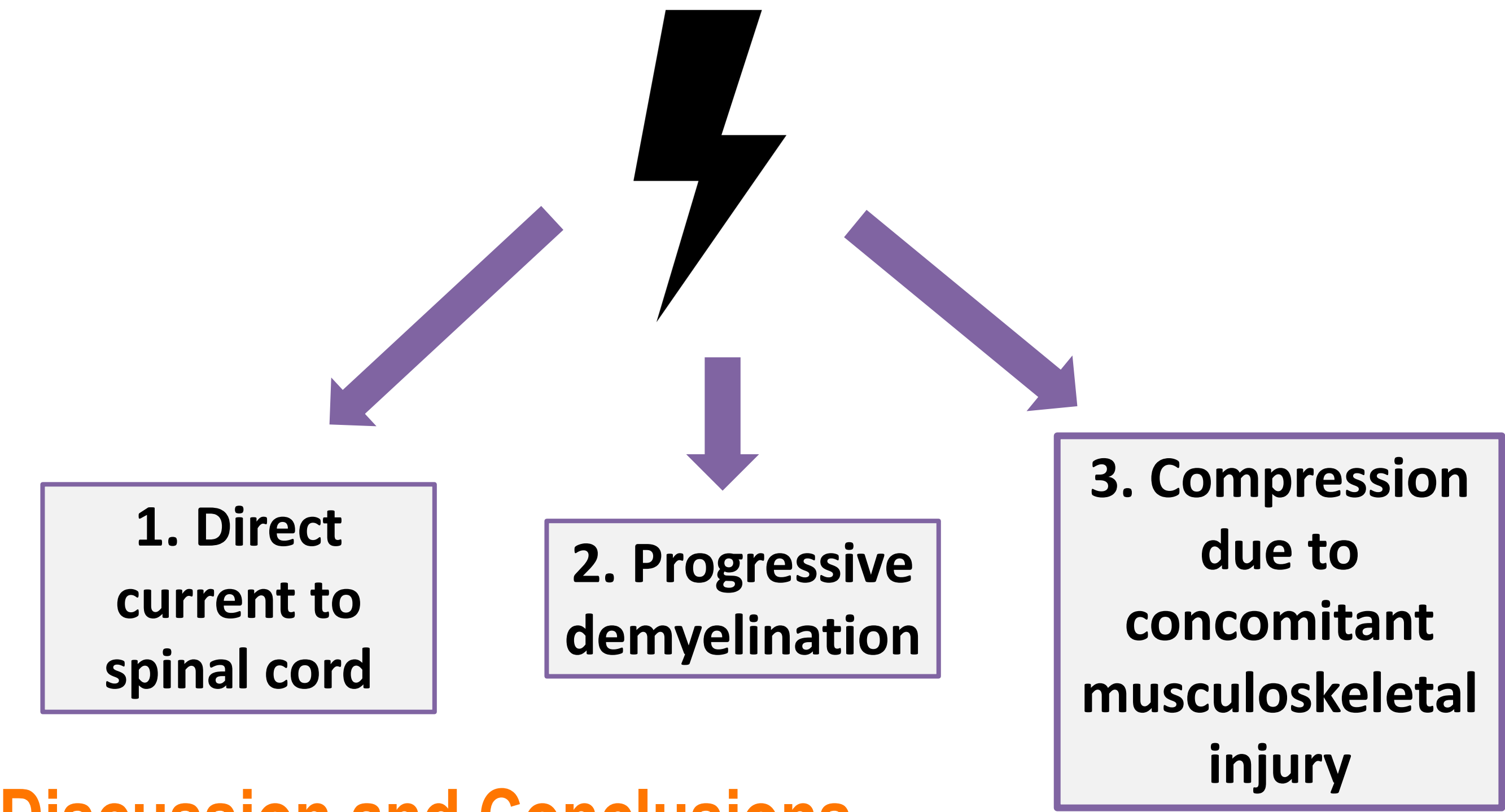
Functional Independence Measures for Activities of Daily Living

Item	Admission	Discharge
SELF CARE		
Eating	3	6
Oral hygiene	3	6
Bathe self	1	3
Upper body dressing	3	5
Lower body dressing	1	3
Footwear on/off	1	2
Toileting hygiene	1	4
TRANSFERS		
Bed to chair	1	3
Toilet transfer	1	3
Tub/shower transfer	-	2
CONTINENCE		
Bladder, %	0	100
Bowel, %	0	100

Item	Admission	Discharge
LOCOMOTION		
Walk 10 feet	1	2
Walk 50 feet w/ 2 turns	-	2
Wheel 150 feet	1	6
Wheel 50 feet w/ 2 turns	1	6
4 steps	-	1
COMMUNICATION		
Comprehension	6	7
Expression	7	7
SOCIAL COGNITION		
Social interaction	6	7
Problem solving	4	7
Memory	5	7

FIM Levels:
0=Activity doesn't occur
1 =Total assistance
2=Maximal assistance
3=Moderate Assistance
4=Minimal Assistance
5=Supervision
6=Modified Independence
7=Complete Independence

Proposed Mechanisms of Injury



Discussion and Conclusions

The unpredictable nature and amount of electrical current experienced during a lightning strike may lead to variable neurologic insult and multi-organ injuries making the management and prognostication of recovery particularly difficult. The cervical edema noted on our patient’s outside MRI coincided with proximal greater than distal upper extremity muscle weakness and patchy asymmetric lower extremity motor presentation and recovery.

Lightning strike induced SCI and related organ systems injuries pose unique clinical challenges for physiatrists. Understanding the central nervous system complications and pathophysiology can aid in successful management and recovery of patients.

References

- Lammertse DP. Neurorehabilitation of spinal cord injuries following lightning and electrical trauma. NeuroRehabilitation. 2005;20(1):9-14.
- Andrews CJ, Reisner AD. Neurological and neuropsychological consequences of electrical and lightning shock: review and theories of causation. Neural Regen Res. 2017;12:677–686.
- Tadler M, Rüegg E, Niquille M, et al. Multi-organ injuries due to a lightning strike: a case report highlighting the importance of a multi-disciplinary approach. Case Reports Plast Surg Hand Surg. 2017;4(1):1-4.