

Prone Positioning Plexopathies – a Retrospective Case Series

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SQA21

Introduction

Due to the COVID-19 pandemic, and increased use of prone positioning, there has been an increase in observed plexopathies.

Objectives

To retrospectively analyse data of all COVID-19 admissions to the ICU of an acute hospital, to identify both the prevalence and risk factors for nerve injuries post prone positioning. As well as reviewing current guidance to facilitate best practice and optimise rehabilitation following nerve injury.

Methods

Data from the Norfolk and Norwich University Hospital, a large teaching hospital, was retrospectively collected from the hospitals electronic clinical records system. Data was reviewed for all COVID-19 patients admitted from March-June 2020 and October 2020-March 2021. Patients with nerve injuries were diagnosed from physiotherapy assessment as there were no electrophysiology studies available.

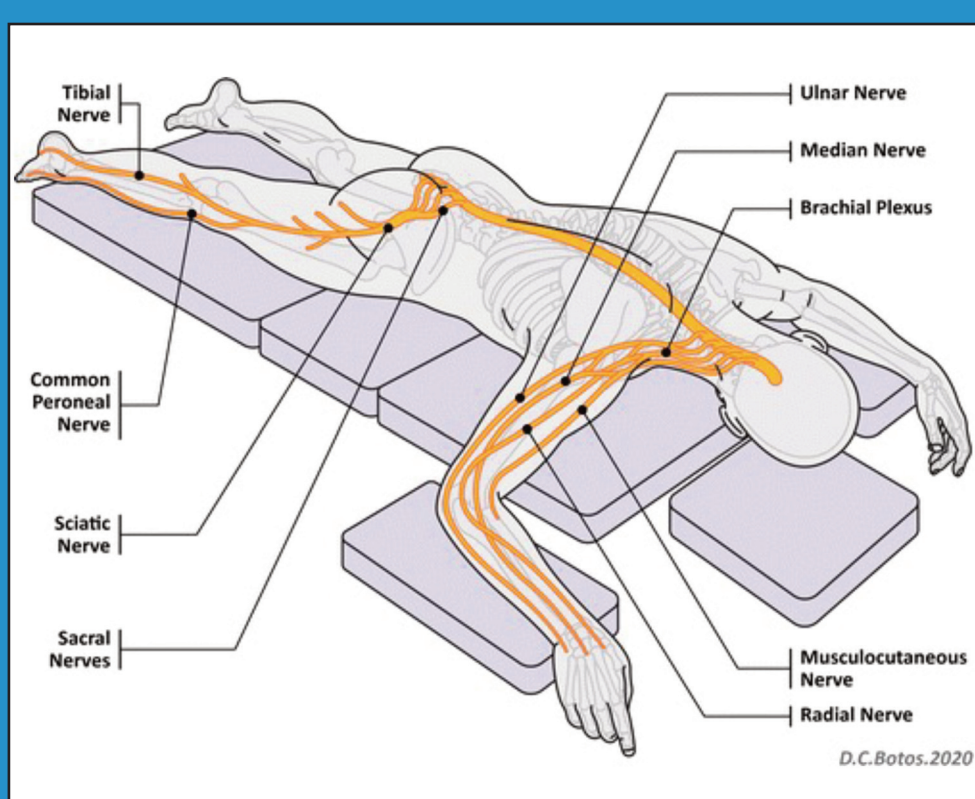


Figure 1: Illustration shows peripheral nerve anatomy in prone position. Original artwork by David Botos." Fernandez CE, Franz CK, Ko JH, Walter JM, Koralnik IJ, Ahlawat S, Deshmukh S. Imaging review of peripheral nerve injuries in patients with COVID-19. Radiology. 2021 Mar;298(3):E117-30.

Results

45 patients were admitted during the first wave. Of these, 1 peroneal nerve injury was identified (2.2% of all patients). Throughout the second wave 225 patients were admitted, with 10 isolated nerve injuries identified in 7 patients. These included 6 lower limb injuries (peroneal nerve) and 4 upper limb injuries (brachial plexus or ulnar nerve). This equates to 3.1% of patients. All these patients were nursed prone during their ICU admission, and no nerve injuries were found in patients who were not proned. Characteristics of the patients can be seen in table 1.

Patient	Sex	Age	Weight (KG) on admission	Co-morbidities	Area of nerve injury (UL vs LL)	Proned episodes	Total hours proned	Total intensive care LOS (days)
1	M	55	89	Nil	Unilateral Lower Limb	Unknown	Unknown	86
2	F	43	108	T2DM Endometrial carcinoma Depression High cholesterol HTN PCOS, Depression	Bilateral Lower Limb	1	Unknown	26
3	F	54	100 (estimated)	Asthma, T2DM, HTN, High BMI	Unilateral Lower Limb	NNUH x1 Unknown in parent hospital	18 Hours + unknown	41
4	M	48	128.7	HTN, Smoker, Pre-diabetic	Unilateral Upper Limb	6	106	30
5	M	52	109.4	Asthma, HTN, Obesity, Ex-smoker	Unilateral Lower Limb	Unknown	Unknown	182
6	M	71	95	High Cholesterol, HTN, MI with PCI stent (2001), depression	Unilateral Lower Limb	3	51	51
7	M	64	100 (estimated)	Bronchitis, Previous Head Injury and associated memory loss	Unilateral Lower Limb & Bilateral Upper Limb	3	53	64
8	F	52	117.1	Hypothyroidism, hypertension, obesity, Glaucoma	Unilateral Upper Limb	1	15	30

Table 1. Patient Characteristics.

In comparison, Miller et al. (2021) found 5.9% of all COVID-19 patients admitted to a large UK hospital suffered an upper limb nerve injury. Malik et al. (2020) found nerve injuries (upper and lower) in 14% of patients. However, both studies took place in rehab settings, not acute.

On average, nerve injuries were diagnosed on day 26 of admission. Early diagnosis is difficult due to prolonged sedation, delirium, and ICU-acquired weakness masking nerve injuries. Therefore, it is likely that the incidence of injury is higher than demonstrated in this series.

Data was missing for 4 patients who were transferred in from other ICUs in the region. However, number of prone episodes varied from 1 to 6, and total hours spent in prone varied from 15 to 106.

Conclusion

This case series demonstrates that nerve injuries are a consequence of prone positioning. Although a very small sample, there seems to be no relation to the frequency of proning or the number of hour's proned.

Achieving optimum positioning to avoid complications is imperative. This was likely made more difficult in the pandemic due to the cohort of patients (high BMI, large number of co-morbidities) and undue stress with temporary surge support staff and an extreme number of patients.

Guidance has now been published for positioning to avoid brachial plexus injuries (Quick & Brown, 2020). However, there is no guidance published regarding lower limb injuries, which in this case series were more common. In our trust we are in the process of adjusting our proning SOP accordingly to include the above guidelines, as well as an awareness of lower limb positioning to avoid compression or traction. It is important that there is a clear individualised pathway in place.

References

- 1) Malik GR, Wolfe AR, Soriano R, Rydberg L, Wolfe LF, Deshmukh S, Ko JH, Nussbaum RP, Dreyer SD, Jayabalan P, Walter JM. Injury-prone: peripheral nerve injuries associated with prone positioning for COVID-19-related acute respiratory distress syndrome. BJA: British Journal of Anaesthesia. 2020 Dec;125(6):e478. 2) Miller C, O'Sullivan J, Jeffrey J, Power D. Brachial plexus neuropathies during the COVID-19 pandemic: a retrospective case series of 15 patients in critical care. Physical therapy. 2021 Jan;101(1):pzaa191. 3) Quick TJ, Brown H, Unit PN. A commentary on prone position plexopathy during the COVID-19 pandemic. British Orthopaedic Association. 2020.

No conflicts of interest.