


A critical care follow-up service evaluation: Acquired peripheral nerve injury after admission with COVID-19 respiratory disease

Journal of the Intensive Care Society
2022, Vol. 0(0) 1–2
© The Intensive Care Society 2022
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/17511437221075291
journals.sagepub.com/home/jics


Ellen C Barton¹, Gearoid Crosbie¹, Sophie Hobson², Janis Harvey², Ahmad Abu-Arafeh³, John A Livesey¹ and Elizabeth Wilson¹

Abstract

Anticipated sequelae of critical care admission for COVID-19 disease remain unclear. Our Edinburgh-based critical care follow-up service identified patterns with nerve injury in 13 of 35 patients who attended following a critical care admission between 15/03/2020 and 25/12/2020. This included 7 cases of meralgia parasthetica, 1 brachial plexopathy, 2 common peroneal neuropathies and 3 ulnar neuropathies. All cases of upper limb neuropathy and foot drop occurred in patients in whom prone positioning was used, with meralgia parasthetica occurring additionally in patients who remained supine.

Keywords

Prone position, COVID-19, peripheral nerve injuries, quality improvement, critical care follow-up

Introduction

Late manifestations of COVID-19 disease and the consequences of treatment are becoming apparent. Our critical care follow-up service observed patients presenting with different patterns of neuropathies.

Methods

All critical care survivors of COVID-19 symptomatic of post-intensive care syndrome received face-to-face review in our critical care follow-up clinic in Edinburgh, UK (additional to physiotherapist review prior to hospital discharge). Patients included were identified retrospectively for a critical care admission precipitated by COVID-19 disease during the period 15/03/2020 to 25/12/2020 and data obtained from electronic patient records. Our local Quality Improvement Team deemed this a service evaluation and ethical approval was not required.

Results

All 90 survivors of critical care admission for COVID-19 disease were contacted by telephone as part of our follow-up service. Thirty-five described symptoms of post-intensive care syndrome which would benefit from review at our multi-disciplinary clinic. The remainder did not feel they warranted review and were content with simple telephone advice. Twenty-four (69%) were male, with median age 56 years (interquartile range (IQR): 47–60) and body mass index 31.7 (IQR: 27–36.4). Median ICU length of stay was 21 days (IQR: 12–39). Thirty-two patients (91%) required mechanical ventilation, of whom 24 (68%) received prone positioning (Table 1).

Nerve injuries were identified in 13 patients: 7 cases of meralgia parasthetica (MP), 1 brachial plexopathy (BP), 2 common peroneal neuropathies (CPN) and 3 ulnar neuropathies (UN). All cases of upper limb neuropathy and CPN were identifiable prior to hospital discharge but some cases of MP were only identified at clinic review. Median time from ICU discharge to clinic follow up was 135 days (IQR: 94–161 days).

The most serious injuries of BP, CPN and UN universally occurred in patients in whom prone positioning was used (either conventional or conscious). Two (29%) cases of MP occurred in patients who remained supine. The number and duration of episodes in the prone position were uniform and within a narrow range. The number of ventilator days for the patient with BP was notably longer (49 days).

Discussion

We observed a high number of nerve injuries in patients admitted for COVID-19 disease, with more significant injury occurring where prone positioning was used.

¹Department of Critical Care, Royal Infirmary of Edinburgh, Edinburgh, UK

²Department of Physiotherapy, Royal Infirmary of Edinburgh, Edinburgh, UK

³Department of Critical Care, Western General Hospital, Edinburgh, UK

Corresponding author:

John A Livesey, Specialty Registrar in Critical Care Medicine & Anaesthesia Ward 118, Royal Infirmary of Edinburgh, 51 Little France Crescent, Edinburgh, EH16 4SA, UK.
Email: john.livesey@nhslothian.scot.nhs.uk

Table 1. Association of nerve injury with requirements for mechanical ventilation and prone positioning.

	No nerve injury	Meralgia parasthetica	Brachial plexopathy	Foot drop	Ulnar neuropathy
<i>n</i>	22	7	1	2	3
			<i>n</i> (%)		
Required ventilation	22 (100)	6 (86)	1 (100)	2 (100)	2 (67)
Required conventional prone positioning	14 (64)	5 (71)	1 (100)	2 (100)	2 (67)
Required conscious prone positioning *	3 (14)	2 (29)	0	0	2 (67)
No requirement for conventional or conscious prone positioning	7 (32)	2 (29)	0	0	0
			<i>Median (IQR)</i>		
Ventilator days (<i>where ventilated</i>)	21 (11, 32)	12 (9, 38)	49 (-,-)	20 (8, 31)	21 (14, 27)
Number of episodes of conventional prone positioning (<i>where used</i>)	1 (0, 2)	2 (0, 3)	1 (100)	1 (1, 1)	4 (3, 4)
Duration of conventional prone positioning episodes (<i>where used</i>) [hrs]	16 (14.1, 18.8)	16 (15.5, 16)	8.25 (-,-)	15.5 (15, 16)	17.9 (17.8, 18)

*Some patients required conscious prone positioning prior to invasive ventilation and conventional prone positioning.

International consensus guidelines recommend the 'swimmer position'¹⁻³ for safe prone positioning of ventilated patients. The upper limb movements required can lead to neuropathy from traction and compression, and asymmetrical pressure distribution at the pelvis or knee may cause lower limb nerve compression against bony prominences.

We recognise that nerve injury is rarely commented on in studies related to critical care follow-up and the true incidence remains unknown. Notably, large studies of prone positioning such as the PROSEVA trial⁴ do not list nerve injury when reporting on complications. This may be because it is difficult to differentiate nerve injury from critical care weakness early on; however, we found all upper limb and common peroneal nerve injuries identifiable prior to hospital discharge.

We recognise the limitations of this evaluation, most significantly the risk of selection bias from those who were screened and triaged as asymptomatic by telephone consultation and consequently did not attend a face-to-face clinic review. Establishing causality is beyond its scope but several scenarios could be plausible.

The volume of patients presenting contemporaneously may simply have allowed identification of injury patterns that were previously unrecognised, or the risk of nerve injury where prone positioning was used could have been increased due to poor technique by staff new to critical care and experienced staff dealing with an unprecedented volume of patients.

Alternatively, this cohort may be inherently at higher risk of nerve injury, either due to the prevalence of comorbidities such as diabetes mellitus, or an independent mechanism related to infection with the SARS-CoV-2 virus. Further work would be required to attempt to answer this question.

Conclusion

Nerve injury occurred frequently in our cohort with more significant injury observed in those in whom prone

positioning was used. Careful technique when positioning patients prone remains extremely important.

Early differentiation of specific nerve injuries in patients recovering from critical illness can be challenging. Reassuringly, severe cases appear likely to be diagnosed during hospital admission; however, patients with less severe injury are at risk of discharge to primary care undiagnosed and untreated. We suggest nerve injury should be actively screened for during recovery, and our experience supports the role of face-to-face follow-up clinics in identifying complications of critical care. It is vital that critical care rehabilitation and follow-up services receive adequate resourcing beyond the pandemic.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

- Oliveira VM, Weschenfelder ME, Deponti G, et al. Good practices for prone positioning at the bedside: construction of a care protocol. *Rev Assoc Med Bras (1992)* 2016; 62(3): 287–293.
- Bamford P, Denmade C, Newmarch C, et al. *Guidance for Prone Positioning in Adult Critical Care: Intensive Care Society*, 2019. Available from https://www.ics.ac.uk/ICS/ICS/Pdfs/Prone_Position_Guidance_in_Adult_Critical_Care.aspx
- Bamford P, Brown H, and Quick T. *Guidance for: Prevention, Diagnosis and Management Of Plexopathy During Prone Positioning*. Intensive Care Society British Orthopaedic Society 2020.
- Guérin C, Reignier J, Richard JC, et al. Prone positioning in severe acute respiratory distress syndrome. *N Engl J Med* 2013; 368(23): 2159–2168.