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Deposited on: 27 November 2020

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## **Meralgia paraesthetica in intensive care unit survivors of COVID-19**

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**Keywords:** COVID-19; ARDS; proning; outcomes

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As the coronavirus disease-2019 (COVID-19) pandemic has progressed we have seen reported mortality rates fall [1], however, limited information is available regarding morbidity and longer-term outcomes in COVID-19 survivors. Data suggests that prolonged intensive care unit (ICU) admissions, ventilation and sedation result in a poorer long-term health related quality of life outcomes [2]. Less is known about the recovery trajectory of COVID-19 pneumonia patients.

Although the predominant clinical presentation of COVID-19 is respiratory disease, data have recently emerged detailing the wide array of neurological sequelae. These range from more common manifestations such as headache and anosmia to less common symptoms of seizure and acute cerebrovascular disease [3]. Among the under-reported sequelae of COVID-19 is the occurrence of meralgia paraesthetica, a mononeuropathy causing pain, paraesthesia and sensory loss within the distribution of the lateral cutaneous nerve of the thigh [4]. In this observational study, we describe our experience of meralgia paraesthetica in patients followed-up in our ICU recovery clinic following admission for COVID-19 pneumonia.

We conducted an observational cohort study, adhering to the strengthening the reporting of observational studies in epidemiology (STROBE) guidelines. Ethical approval was granted by The North West (Liverpool Central) Research Ethics Committee, and all patients provided informed consent. Between 12–16 weeks after ICU discharge, patients from a single centre in Glasgow, UK, were invited to attend the multi-disciplinary follow-up clinic [5]. Data were collected following the virtual clinic appointment via telephone.

Inclusion criteria were patients admitted between the 14<sup>th</sup> March and April 28<sup>th</sup> 2020 with COVID-19 respiratory failure, aged  $\geq 18$  years old who required level 3 ICU care and survived to hospital discharge. All patients were asked about the presence and location of new onset pain since ICU discharge. Meralgia paraesthetica was defined as new pain and/or sensory disturbance in the outer aspect of the thigh.

Fifty-one patients were admitted to the ICU with COVID-19 respiratory failure and thirty-nine patients survived to hospital discharge. Thirty-three (85%) patients were reviewed virtually at the follow-up clinic, median time to follow up 13 (13–17 [8–26]) weeks. Non-attenders either declined the appointment or were not contactable. Thirty patients were available to take part in data collection following this virtual clinic appointment (Fig. 1). Complete hospital records were available

in all 30 patients. Twenty-eight patients (93%) were ventilated, median days ventilated was 14 (6–24 [0–43]). Fourteen patients (47%) were prone at least once to treat COVID-19-associated acute respiratory distress syndrome (Table 1). Our ICU followed a proning protocol with planned proning durations of 16-hour periods [6].

Meralgia paraesthetica was diagnosed in 10 patients (33%), all of whom had bilateral pain in the lateral cutaneous nerve distribution. All cases of pain were chronic by definition and managed by the multi-disciplinary team at the recovery clinic. Of the 14 patients prone, four (29%) reported meralgia paraesthetica, two of these patients were classified as obese. Of particular interest, the same criteria for diagnosis of meralgia paraesthetica was fulfilled in a further six (37.5%) of the 16 patients who did not receive prone positioning as part of their COVID-19 management, of which, one patient was obese. Neither prone positioning nor obesity appeared to be associated to this mononeuropathy in our patient group. Similarly, there was no clear association between dialysis line placement or renal replacement therapy; only one patient who developed meralgia paraesthetica received renal replacement therapy. Seven (23%) patients in the cohort had diabetes mellitus, four of which developed meralgia paraesthetica. While meralgia paraesthetica is known to be associated with diabetes mellitus [7], only four of the 10 patients who developed meralgia paraesthetica had diabetes.

Putting our results into context, in a cohort of non-COVID-19 ICU patients, 66% of patients reported chronic pain following ICU admission, with the shoulder joint the most frequently affected joint [8]. Approximately 40% of these non-COVID-19 ICU patients described generalised lower limb pain, however this was not specifically in a distribution suggestive of meralgia paraesthetica. Meralgia paraesthetica has intermittently been described in case reports following prone position in the ICU, however, in this small cohort study, this does not appear to be the driving mechanism for this pain development [9].

We have since considered whether reduced patient mobilisation had an impact on patients developing meralgia paraesthetica. Due to the increased physical workload and the high number of visiting staff members within our ICU during the COVID-19 pandemic, our patients were mobilised less frequently which may have impacted on the development of this mononeuropathy. We have also considered whether there is a potential association between the pro-inflammatory hypercoagulable state seen in COVID-19 and developing pain [10]. Similarly, neurological sequelae

seen in COVID-19 patients could in itself be a contributing factor to these cases of meralgia paraesthetica.

This observational study demonstrated that 33% of patients reported meralgia paraesthetica. Although this study gives early learning on an important issue, there are limitations. This is single-centre data and does not include COVID-19 patients admitted outside of the ICU, therefore is not generalisable. Further data are required before a definitive association can be demonstrated.

### **Acknowledgements**

Ethical approval was granted by The North West (Liverpool Central) Research Ethics Committee, REC Number: 17/NM/0199 for this study. JM is funded by a THIS.Institute, University of Cambridge Research Fellowship (PD-2019-02-16).

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**Table 1.** Demographics of participants included in this study. Data are n (%) or median (IQR [range]).

| <b>Demographics</b>            | <b>n= 30</b>       |
|--------------------------------|--------------------|
| Gender (male)                  | 22 (73%)           |
| Age (years)                    | 58 (48-66 [26–72]) |
| APACHE score                   | 16 (12–20 [4–29])  |
| Length of ICU stay (days)      | 15 (8–31 [1–49])   |
| Duration of ventilation (days) | 14 (6–24 [0–43])   |
| Diabetes                       | 7 (23%)            |
| BMI > 30 kg.m <sup>-2</sup>    | 11 (37%)           |
| Prone position                 | 14 (47%)           |
| RRT                            | 7 (23%)            |

APACHE, acute physiology and chronic health Evaluation; ICU, intensive care unit; BMI, body mass index; RRT, renal replacement therapy.

**Figure 1.** Flowchart of participant inclusion in this study.

