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Correspondence on: Abnormal coagulation parameters are associated with poor prognosis in patients with novel coronavirus pneumonia

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Recently published article by Dr Tang and colleagues on ''Abnormal coagulation parameters are associated with poor prognosis in patients with novel coronavirus pneumonia'' highlighted that disseminated intravascular coagulation is common severe respiratory failure patients with Covid 19[1]. Novel Coronavirus (Covid-19) infection leading to pneumonia and severe acute respiratory distress syndrome (ARDS) was first reported in Wuhan, Hubei Province, China and has

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subsequently spread to almost all other countries in the world. On 11/03/2020, WHO declared the Covid-19 outbreak a global pandemic. Patients with severe illness may develop dyspnoea and hypoxemia within 1 week after onset of the disease, which may quickly progress to ARDS or end-organ failure

Dr Tang and colleagues reported in their retrospective study of 183 consecutive patients with confirmed Covid-19 pneumonia at Tongji hospital in China[1] showing that patients who died (11.5%) had significantly higher D-dimer and fibrin degradation product (FDP) levels, longer prothrombin time (PT) and activated partial thromboplastin time (APTT) at presentation compared to those who survived. Of non-survivors, 71.4% met the International Society on Thrombosis and Haemostasis (ISTH) diagnostic criteria for overt disseminated intravascular coagulation (DIC) (≥5 points)[2] (Table 1) compared to 0.6% of survivors. The median time from admission to DIC was 4 days (range, 1-12 days). It was evident that abnormal coagulation parameters (prolonged Prothrombin time [PT] and raised D dimer) are predictors of a poor prognosis and may be important therapeutic targets.

In another study with 201 patients, 84 patients developed ARDS. Patients who developed ARDS had significantly higher PT [median (interquartile range)] of 11.7 sec(11.10 -12.4 vs 10.6sec (10.1-11.5), p <.001, and D-dimer of 1.16 µg/mL (0.46 - 5.37) vs 0.52µg/mL (0.33 - 0.93), p<0.001 at presentation compared to those did not develop ARDS[1]. Out of 84 patients who developed ARDS, 52.8% (44/84) patients died and these patients had significantly higher D-dimer levels [median (interquartile range)] 3.95 µg/mL (1.15 -10.96) compared those who survived (0.49 µg/mL (0.31 -1.18), p=0.001[3]. Interestingly, thrombocytopenia does not seem to be common and was present in only 37/201(18.8%) compared to >50% patients presenting with ARDS due to other causes such as bacterial and other viral infections [4].

We would like to highlight the implications of DIC associated with Covid-19 in patients receiving veno-venous extracorporeal membrane oxygenation (VV-ECMO) as high proportion of Covid-19 patients developing ARDS means that many will also require veno- VV-ECMO. We have previously reported on the high frequency of intracranial haemorrhage in patients receiving VVECMO and so the high frequency in COVID19 is of concern[5]. However, the lack of thrombocytopenia may be beneficial as we found this to be a risk factor for ICH [5]. The studies

cited above have led to suggestions that DIC may be a useful prognostic marker, but the anticoagulation required for VVECMO and the activation of coagulation from artificial surfaces may confound interpretation. In particular, a sudden rise in D-dimer may due to pump head thrombosis.

In summary, patients with severe Covid 19 are at greater risk of DIC which may be further complicated by the effects of the ECMO circuit and the combination may increase thrombo-haemorrhagic morbidity. We expect that careful correction of the DIC, and systemic anticoagulation will be required, and standard protocols may need adapting to this new disorder.

Authorship contributions

DRJ Arachchillage wrote the first draft. M Laffan reviewed the manuscript and both authors approved the final manuscript.

Conflict of interest

The authors state that they have no conflict of interest

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Table 1. International Society on Thrombosis and Haemostasis (ISTH) diagnostic criteria for disseminated intravascular coagulation (DIC)

Parameter	Score
Platelet count	
>100 x 10^9/L	0
50-100 X 10^9/L	1

<50X10^9/L	2
D dimer No increase Moderate increase (1-10 times upper limit of normal) Strong increase (>10 times upper limit of normal)	 0 2 3
Fibrinogen >1.0g/L ≤ 1.0g/L	 0 1
Prothrombin time prolongation <3seconds 3-6 seconds >6 seconds	 0 1 2
Overt Disseminated Intravascular Coagulation	**≥ 5**

Adapted from Taylor *et al*, 2001 [3]