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Response to Letter

Community-Acquired Pneumonia in Pediatric Patients With Acute Neuromuscular Respiratory Failure: A Microbiologic Perspective

Dear Editor,

We are grateful to read the comments sent to the *journal* by Dr. Massimiliano Don regarding our article "Combined noninvasive ventilation and mechanical in-exsufflator in the treatment of pediatric acute neuromuscular respiratory failure".[1] These valuable comments bring our attention to the microbiologic aspect of pneumonia in pediatric patients with neuromuscular diseases (NMD), an important issue that has not been well addressed. To date, early or prophylactic use of antibiotics as clinical management plans for community-acquired pneumonia (CAP) in NMD children are suggested.[2–4] However, the literature is sparse regarding the etiology of CAP in these children and beneficial evidence of empiric antibiotics in these populations is still lacking. Thus, we are in line with Dr. Massimiliano Don that investigations elucidating the etiology of CAP may improve outcome of these patients and avoid adverse effects of unnecessary antibiotics. To this end, we re-analyzed our data in our article,[1] and tried to explore possible microbial factors associated with the outcome of these patients receiving noninvasive ventilation (NIV) and mechanical in-exsufflator (MIE) due to pneumonia.

To compare the differences between success group ($n = 12$) and failure group ($n = 4$) in our patients, we analyzed infection-related variables including presence of fever at admission to our pediatric intensive care unit, pathogen survey by sputum culture, serum mycoplasma antibody or nasopharyngeal antigen detection of respiratory syncytial virus (RSV), and inflammatory markers including white blood cell count and serum C-reactive protein (CRP). However, we found that there were no significant differences of these variables. The presence of fever at admission was comparable, 42% (5/12) versus 50% (2/4) between success group and failure group. In the success group, there are only four events with identified pathogens, including two with RSV and two with mycoplasma pneumonia, while in the failure group there is one with mycoplasma pneumonia infection and one with streptococcus infection. Comparing the success group with the failure group, the initial WBC counts were $9{,}263 \pm 2{,}618\ \mu l^{-1}$ versus $10{,}225 \pm 2{,}646\ \mu l^{-1}$ ($P = 0.54$) and the initial CRP levels were 17.6 ± 14.6 mg/L versus 21.7 ± 22.8 mg/L ($P = 0.68$, normal range = 0–6 mg/L). Take together, we did not find any prognostic factor associated with outcomes of NIV/MIE use in our study. In addition, we speculate that in those events without identifiable pathogen ($n = 10$, 67%), virus infection may be the most probable etiology given with the low average WBC counts and CRP levels. Of note, the small sample sizes in our study lacked the statistical power to rigorously conclude the validity of these lacks of difference. Future studies, properly powered, will determine with more certainty whether these preliminary observations are correct.

Despite advances of bacteriological identification procedures in the pathogen survey of pneumonia, the frequency of microbiologically documented CAP is only around 25% among in-patients.[5] Furthermore, in those patients with pneumonia not receiving endotracheal intubation, the diagnostic reliability of deep cough-produced sputum and nasopharyngeal aspirates remains uncertain because of the problem of contamination with upper airway flora.[6] Accordingly, in children with severe CAP without intubation, their inability to produce effective cough often preclude the reliability of pathogen investigations in pneumonia.

Conflict of interest: None.

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Similarly, in NMD patients with NIV, even with the assistance of MIE, whether the diagnostic reliability of cough-produced sputum can be increased is unknown.

In conclusion, we agree with Dr. Massimiliano Don that in NMD patients, prospective studies should be conducted based on thorough CAP definition with proper sample size and sophisticated microbiological work-up. Future studies in NMD patients may address particular issues including whether the etiology of CAP is a risk factor for mortality, and whether MIE can improve the diagnostic reliability of cough-produced sputum in those without intubation. The knowledge of these particularities is of great importance not only for intensivists dealing in ARF, but also for the neurologists who can be faced so often with the diagnostic and prognostic challenges of CAP in NMD patients.

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REFERENCES

1. Chen TH, Hsu JH, Wu JR, Dai ZK, Chen IC, Liang WC, Yang SN, Jong YJ. Combined noninvasive ventilation and mechanical in-exsufflator in the treatment of pediatric acute neuromuscular respiratory failure. Pediatr Pulmonol 2013. doi: 10.1002/ppul.22827
2. Bushby K, Finkel R, Birnkrant DJ, Case LE, Clemens PR, Cripe L, Kaul A, Kinnett K, McDonald C, Pandya S, Poysky J, Shapiro F, Tomezsko J. Constantin C; DMD Care Considerations Working Group. Diagnosis and management of Duchenne muscular dystrophy, part 2: implementation of multidisciplinary care. Lancet Neurol 2010;9:177–189.
3. Wang CH, Finkel RS, Bertini ES, Schroth M, Simonds A, Wong B, Aloysius A, Morrison L, Main M, Crawford TO, Trela A. Participants of the International Conference on SMA Standard of Care. Consensus statement for standard of care in spinal muscular atrophy. J Child Neurol 2007;22:1027–1049.
4. Hull J, Aniapravan R, Chan E, Chatwin M, Forton J, Gallagher J, Gibson N, Gordon J, Hughes I, McCulloch R, Russell RR, Simonds A. British Thoracic Society guideline for respiratory management of children with neuromuscular weakness. Thorax 2012;67:i1–i40.
5. De Pascale G, Bello G, Tumbarello M, Antonelli M. Severe pneumonia in intensive care: cause, diagnosis, treatment and management: a review of the literature. Curr Opin Pulm Med 2012;18:213–221.
6. Bartlett JG. Diagnostic tests for agents of community-acquired pneumonia. Clin Infect Dis 2011;52:296–304.