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■ Editorial ■

## The Future of Research on Extracorporeal Membrane Oxygenation (ECMO)

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Since extracorporeal membrane oxygenation (ECMO) was introduced as a treatment modality for respiratory failure in 1972 by Hill et al.,[1] it has provided support to patients with inadequate oxygen delivery for days to weeks. Clinicians have used ECMO to increase oxygen delivery in severe lung disease, ineffective cardiac output from circulatory failure, or combined cardiopulmonary failure. ECMO has typically been applied in rescue situations that were refractory to conventional therapy.[2] Recently, researchers in the U.S., Germany, and Taiwan reported a rapid increase in the use of ECMO in their countries.[3-5] Diseases such as the H1N1 pandemic influenza,[6] the development of ECMO technology,[7] and the publication of randomized clinical trials have likely contributed to an increase in the use of ECMO.[8]

In contrast to the growing worldwide use of ECMO, evidence of its use in critical care situations is still lacking.[9] In particular, there is not much evidence supporting ECMO use in adult patients with Acute Respiratory Distress Syndrome (ARDS) and there is a paucity of rigorous experiments on its use in these patients.[10] Only 4 randomized clinical trials on the use of extracorporeal life support in ARDS have been previously reported.[11-14] Most of the existing publications on ECMO use are observational studies of a retrospective review, clinical experiences, and clinical reports.

Last year, the Korean Journal of Critical Care Medicine (KJCCM) published 11 papers which described the use of ECMO. Most of them were clinical reports of various clinical situations related to ECMO use, and one publication was an original article of a retrospective review. Publications such as clinical or case reports may not provide direct evidence, however they can provide important information and influence clinicians to consider new or different treatments in certain clinical situations. This issue of KJCCM includes two new case reports on the use of ECMO. The first case report describes a transient complication of ECMO that was corrected in a neonate,[15] and the second is a case on ECMO use in aspiration pneumonia in a single lung.[16] Both cases are conceivable situations for clinicians similar to previous case reports published in this journal.

A key question is how to organize such case reports or series so that they provide findings that are close to evidence. To cite one example, ECMO complications can arise either from patient factors or ECMO circuit components. Due to the diversity in indi-

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cations (e.g., patient factors) and ECMO techniques (e.g., ECMO circuit components), detailed and replicable methods for conducting ECMO have not been described. This diversity and absence of adequately explicit protocols both contribute to the development of variable complications that are difficult to categorize. Cheng et al.[17] conducted a meta-analysis on ECMO complications during treatment of cardiogenic shock or cardiac arrest in adult patients. They simplified the analysis by selecting only venoarterial type ECMO and only cardiogenic shock or cardiac arrest patients. They also only included studies that reported complication rates on 10 or more patients.

Enlarging sample size allows a retrospective cohort study publication to be classified as more of a systematic review. In particular, tertiary referral centers are able to collect and analyze data from many ECMO cases more easily.[18,19] Because each institution has their own standard circuit, a single center study has the advantage of consistent analysis. If studies are not conducted at a single center or do not have enough cases, data can be collected from several centers through networks, as in the study by Kanji et al.[20]

ECMO case reports are consistently submitted to KJCCM. Performing studies to collect, categorize, and analyze ECMO experiences is worth attempting for critical care physicians who are working at a critical care unit. This place of work is a very intimate factor in ECMO research, since many different departments are involved in the ECMO procedure, all of which specialize in intensive or critical care. Whether a department, an institute, or a society takes the lead, we look forward to the submission of more research beyond simple case reports on ECMO use in the future.

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