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A NOVEL METHOD TO MAINTAIN HIGH FIO₂ WHILE USING SELF INFLATING RESUSCITATOR WITH HIGH MINUTE VENTILATION

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Background and Goal of study: Self inflating resuscitators are widely used for the patients who need positive pressure ventilation during transport. During manual ventilation via self inflating resuscitator, the FiO₂ decreases even with the use of the oxygen reservoir, as minute ventilation increases. Such phenomenon may increase the difficulty and risk of transport of the critically ill patients. Twin self inflating resuscitator was assembled by being modified from two conventional ones to achieve more stable FiO₂.

Materials and Methods: The two kind (parallel and serial type) of twin self inflating resuscitators and one conventional adult self inflating resuscitator were tested on a test lung. In the parallel type, from the two adult self inflating resuscitators, the patient valve assemblies were disconnected and two resuscitator bodies were connected to the one patient valve assembly using Y connector. In the serial type, two adult self inflating resuscitators were connected serially, and from the distal self inflating resuscitator, the patient valve assembly and distal unidirectional valve plate were removed. The resuscitators were compressed at variable tidal volumes, respiratory rates and oxygen flow rates, guided by the monitor. In the

parallel type, two resuscitators were compressed alternately, and in the serial type, only the proximal (patient side) resuscitator was compressed. Every times, the FiO₂ values were recorded after stabilization.

Results and Discussion: With conventional self inflating resuscitator ventilation, the FiO₂ was maintained over 95% until minute ventilation of 7500, 14000, 17500 ml at respectively 5, 10, 15 l/min oxygen flow rate. And, over that minute ventilation, the FiO₂ started to decrease. With parallel type, the FiO₂ started to decrease with the minute ventilation over 12500, 24000ml at 5, 10 l/min oxygen flow rate, and at 15 l/min oxygen flow rate, the FiO₂ decrease was not observed until minute ventilation of 28000ml. In the serial type, the FiO₂ start to decrease at similar minute ventilation with that of the parallel type, but the FiO₂ values were higher. In some kinds of connecting methods, resuscitators did not operate properly. In parallel connecting method, if Y connector is connected proximal to the patient valve assembly, during inspiration, the most of the flow from the compressed resuscitator escaped through the other resuscitator. And, in the serial connecting method, if distal unidirectional valve plate is not removed or proximal unidirectional valve plate is removed, expiration flow trapping developed.

Conclusion(s): By simple connection of two self inflating resuscitators, the FiO₂ during self inflating resuscitator ventilation could be maintained even during almost two times of minute ventilation compared to conventional use of a self inflating resuscitator.