

Current Possibilities in Use of a Centrifugal Pump in the Cardiac Surgery

Abstract

Currently, the most commonly used technical solution for pumping blood during extracorporeal circulation during cardiac surgery, as well as for some types of ECMO (extracorporeal membrane oxygenation) are either a roller pump or centrifugal pump. Due to its advantages the centrifugal pump is mainly used for prolonged extracorporeal circulation in cardiac surgery and as a heart and / or lung support system. In current literature there is a lack of compelling scientific evidence that would clearly support its use in a routine cardiac surgery.

The aim of our study was to compare both types of currently used blood pumps in longer cardiac procedures with deep hypothermic circulation arrest. In a randomized clinical study we had selected a group of patients that underwent a pulmonary endarterectomy (PEA) in order to demonstrate the positive effects of the centrifugal pump on the postoperative inflammatory reactions. There were no statistically significant differences between these two pumps when other clinical and laboratory parameters were observed.

Based on the hypothesis that significant temperature changes during cardiac procedure with a deep hypothermia can affect sealing pressure of the endotracheal tube cuff, we performed a randomized clinical trial comparing the incidence of microaspiration in patients undergoing PEA. We came to the conclusion that in order to prevent a leaking of the hypopharynx content into the trachea and the prevention of the tracheal wall ischemia is an optimal endotracheal tube cuff pressure with a constant periprocedural monitoring.

During another randomized clinical study, we had also demonstrated the positive effects of aprotinin on the intensity of inflammatory response associated with an extracorporeal circulation and deep hypothermic circulatory arrest. We had also showed that procalcitonin and IL6 can predict an early infectious complications.

General University hospital had established a special ECMO team that deals with heart and / or lung failure in adults and children. This special team integrated expertise of various professions such as perfusionists. The role of perfusionists was the technical support of the extracorporeal circulation, as well as the introduction of a centrifugal pump into the clinical practice. The success of this method was demonstrated on a group of patients treated with ECMO. Some of the patients were transported between different medical centers after ECMO cannulation due to the complicated healthcare patients transport policies.

Key words:

Roller pump, centrifugal pump, pulmonary endarterectomy, extracorporeal membrane oxygenation, systemic inflammatory response