

The Era of Goal Directed Therapies in Paediatric Anaesthesia and Critical Care

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Abstract

Introduction: Goal directed transfusion, fluid and haemodynamic therapies as well as enhanced recovery after surgery pathways have shown improved postoperative outcome in adult surgery. In the paediatric surgical population research in these fields needs to be developed.

Objective: Objective of this editorial is to provide some evidence to improve clinical practice in terms of postoperative outcome in children.

Methods: Mini-narrative review of personal research work on postoperative paediatric outcome improvement.

Results: This research work has demonstrated that:

1. Perioperative morbidity and mortality in surgical children is multifactorial.
2. By identifying each factor we can anticipate preventive measures preoperatively, intraoperatively and postoperatively.
3. Some questions remain unanswered concerning some issues in fields where research with trials with less biases need to be developed.

Conclusions: Postoperative outcome improvement needs corrective and preventive measures applied on several factors preoperatively, intraoperatively and postoperatively. We need to predefine goals perioperatively. These aims are perioperative patient management for optimal outcome.

Keywords: Goal Directed Therapies; Paediatric Anaesthesia; Critical Care

Introduction

Postoperative outcome of surgical critical paediatric patients may depend on several factors: intraoperative transfusion [1], ASA status [1], emergency situations [1], nutritional status [2]. Goal directed transfusion, fluid and haemodynamic therapies as well as enhanced recovery after surgery pathways have shown improved postoperative outcome in adult surgery [3-5].

In the paediatric surgical population research in these fields needs to be developed because evidence is lacking. Since children are not small adults what is validated in adults cannot always be extrapolated in children. For this reason, specific paediatric research is to be organised in this direction in order to have clear guidelines for child care [6].

Methods

We describe briefly here our trials results.

Results

The first 4 trials with more than 500 children concerned transfusion and morbi-mortality factors in three different surgical specialties: paediatric abdominal surgery, orthopedic surgery and neurosurgery [1,7-9]. In these retrospective studies we demonstrated that transfusion, ASA score status and emergency surgery were independent predictors of adverse outcome (postoperative complications, repeated surgery, increased length of hospital stay and length of mechanical ventilation). This research work showed that the ASA (American Society of Anesthesiologists) score status was the predictor of mortality.

The fifth study with 41 children having scoliosis surgery showed that the length of hospital stay was predictive of postoperative complications [10].

To complete our research in terms of corrective measures to be applied on the predictors of adverse outcome for improvement we conducted a systematic review and meta-analysis concerning three subjects.

In the first meta-analysis of 23 randomised and nonrandomised trials, we aimed to assess the impact of goal-directed fluid and haemodynamic therapy (GDFHT) in children on postoperative outcome [11]. This study revealed that in children GDFHT was not developed compared to adults and demonstrated that there were biomarkers of adverse postoperative outcome in paediatric cardiac surgical patients. So, with this meta-analysis we suggest to develop prospective randomised controlled trials with GDFHT to assess the impact of this therapy on postoperative outcome in children.

In the second meta-analysis of 9 randomised and non-randomised trials, we aimed to determine the impact of goal-directed transfusion protocols with viscoelastic methods (thromboelastography/TEG or rotational thromboelastometry/ROTEM) on postoperative outcome in children [12,13]. This trial showed that morbi-mortality, the number of patients intraoperatively transfused with packed red blood cells and platelets were not different. Nevertheless, we demonstrated that the number of patients transfused with fresh frozen plasma and length of hospital stay were reduced in the TEG/ROTEM groups. The number of patients who received intraoperative fibrinogen or cryoprecipitate was increased in the TEG/ROTEM groups. This meta-analysis gave us supplemental evidence that in haemorrhagic paediatric surgeries transfusion protocols using TEG/ROTEM should be used to diminish fresh frozen plasma transfusion and length of hospital stay.

In the third and last meta-analysis of 6 non randomised trials we aimed to assess the impact of enhanced rapid recovery after surgery (ERAS) in children on postoperative complications and length of hospital stay [14,15]. This study demonstrated that in children compared to adults, this clinical practice is just beginning to develop. We evidenced with this trial that in children when ERAS was applied, postoperative complications in terms of infections, reoperations and length of hospital stay were reduced. With this meta-analysis we suggest to develop ERAS in children and also recommend to develop prospective randomised controlled trials (RCT) to confirm these results.

Conclusions

We identified multiple factors of postoperative outcome in children. We proposed implementation of improvement measures based on existing evidence. Some of this evidence need to be confirmed in RCT's. But in the absence of RCT we can apply already corrective measures using available clinical data evidence that is to say retrospective and prospective non randomised trials to improve postoperative outcome in children.

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Conflict of Interests

None.

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