Multimodal monitoring does not decrease renal or cardiac impairment after major abdominal surgery

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Background and goal of study

The combined use of new monitoring methods during anaesthesia (monitoring blood flow with assessment of fluid status and regional tissue oxygenation) with adherence to appropriate management protocol might radically improve perioperative outcome of high-risk surgical patients. Only few studies have showed the effect of multimodal monitoring on mortality and complications. Our study presents very homogenous groups of patients undergoing major abdominal surgery, with similar perioperative management and anaesthesia technique. The goal is to assess the differences in incidence of postoperative acute kidney injury and myocardial infarction if the multimodal monitoring is being used intraoperatively.

Materials and methods

Prospective, randomised trial with 2 parallel groups was conducted at the University medical centre (UMC) Ljubljana in years 2015 - 2017. ASA 2-3 high risk surgical patients that underwent major abdominal procedures were included. The study was approved by the national medical ethics committee of Slovenia. In control group, only conventional monitoring was used, but in the multimodal group, intraoperative fluid status was optimised according to blood flow monitoring and tissue oxygenation according to cerebral oxygenation monitoring. Postoperatively, clinical examination and laboratory values (including creatinine and troponin I) were conducted every 24 hours first three days. Acute kidney injury was suspected if ≥ 0.3 mg/dL increase in creatinine level or 1.5 times baseline (KIDGO stage 1). Myocardial infarction was suspected if troponin I was positive according to laboratory reference range.

Results and Discussion

Lee's Revised Cardiac Risk Index	Control group (number of patients)	Multimodal group (number of patients)	P value (Chi - square or Fisher exact test)
II	26	27	0.855
III	12	10	
IV	4	5	
rise in creatinine level (KIDGO stage 1 or more)	3	4	0.500
oliguria (urine output less than 500ml) in first 3 days	1	3	0.247
rise in troponin level	0	3	0.241

There were no clinical signs of myocardial infarction in patients with raised troponin. Median intraoperative fluid load was higher in multimodal group (1650 vs 900 ml, $p=0.000$, Mann-Whitney U test).

At first glance, we can conclude that combination of hemodynamic monitor and measurement of cerebral oxygenation do not provide benefit to patients in our study. However, subsequent analysis has showed that there are some postoperative complications such as need for revision surgery, additional antibiotic treatment required third day after procedure or re-admission to HDU that occur only in control group.

Conclusion

In our study, combined use of hemodynamic monitoring and cerebral monitor does not significantly decrease the incidence of renal or cardiac impairment after major abdominal surgery.

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