

Plasma glutamine levels before cardiac surgery are related to post-surgery infections; an observational study.

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Introduction

In our unit a low plasma glutamine level was found in 34 percent of patients after elective cardiothoracic surgery. This could be a result of inflammation caused by surgical stress or the use of extracorporeal circulation (ECC). It is also possible that plasma glutamine levels were already lowered before surgery and reflect an impaired metabolic state.

In the present study point of care plasma glutamine levels were measured before and after cardiac surgery and we questioned whether there is a relation between plasma glutamine levels and duration of ECC and the occurrence of postoperative infections

Methods

A single-centre prospective, observational study in a closed-format, 20-bed, mixed ICU in a tertiary teaching hospital. Consecutive patients who underwent elective cardiac surgery with extracorporeal circulation were included. Blood samples were collected on the day prior to surgery and at admission on the ICU. Point of care measurement of plasma glutamine level was performed with the Bioprofile 100 plus analyser (Nova Biomedical U.K., Cheshire, UK).

The study was approved by the local Medical Ethics Committee (Regional Review Committee Patient-related Research, Medical Centre Leeuwarden, nWMO 115, April 28th 2015, and registered at ClinicalTrials.gov, number NCT02444780).

Results

Ninety (17 F/ 73 M) patients were included. Patients characteristics at admission on the ICU were mean age 68 (\pm 8.3) years, BMI 27.6 (\pm 4.2) and APACHE IV 46 (\pm 12.8). The median duration of extracorporeal circulation and aortic clamp time were 90 [67.8-118.3] and 59.5 [42-83.3] minutes, respectively.

Mean pre-operative plasma glutamine level was 0.42 ± 0.10 mmol/l and post-operative 0.38 ± 0.09 mmol/l ($p < 0.001$). There was no relation between duration of extracorporeal circulation and changes in plasma glutamine levels. During their post-operative admission a positive culture was found in 14 patients; 8 airway, 3 urine, 2 wound and 1 blood. Five patients were treated with antibiotics. CRP was only measured on indication, the highest mean CRP was 72 [47-117] U/l.

A logistic regression analysis showed a significant correlation between the presence of a positive culture during the post-operative course and pre-operative plasma glutamine levels ($p = 0.04$).

Conclusion

Plasma glutamine levels are significantly lower after cardiac surgery compared to pre-operative levels. We did not find a relation between the decrease in plasma glutamine levels and the duration of extracorporeal circulation. The decrease in plasma glutamine levels is more likely the result of surgical stress rather than the extracorporeal circulation.

There was a correlation between pre-operative plasma glutamine levels and the presence of a positive culture after cardiac surgery. A post-operative infection can adversely affect long term survival. Whether it is possible to identify patients with a higher risk of developing infections by measuring plasma glutamine level prior to surgery needs further evaluation. Point of care glutamine measurement is a useful aid for identifying patients with glutamine deficiency and may in the future assist with decisions about glutamine supplementation.