EFFECT OF PERIOPERATIVE FLUID THERAPY ON BLOOD OSMOLALITY IN PATIENTS UNDERGOING ELECTIVE ORTHOPAEDIC SURGERY

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INTRODUCTION

Plasma osmolality is an important determinant for fluid shift across the capillary wall. A decrease in plasma osmolality leads to tissue edema, which impairs tissue perfusion. Perioperative fluid infusion may affect the blood osmolality, because theoretical fluid osmolality is different than real [1]. Several studies have documented that crystalloids infusion affects plasma osmolality whereas colloid fluids are iso-oncotic [2].

THE AIM

The aim of this study was to analyse the plasma osmolality in patients treated with crystalloids or gelatine infusions.

METHODS

Adult patients undergoing elective knee arthroplasty surgery under spinal anaesthesia were enrolled. All fluids were administered at the dose 10 – 15 mL/kg/h during surgery.

Exclusions:

- ASA III
- Severe lung, heart and CNS diseases
- Chronic kidney disease
- Massive fluid resuscitation following perioperative bleeding
- Complicated perioperative period

Patients were divided into four groups:
R – patients receiving Ringer solution
P – Plasmalyte®
S – Sterofundin® ISO
G – Gelaspan®.

Plasma osmolality was measured at 3 time - points.
A Just before surgery
B 3 h after surgery
C 24 h after surgery

RESULTS

80 patients (33 female and 47 male) aged 34 – 84 were studied.

1. The baseline osmolality was comparable in all patients.
2. Plasma osmolality decreased in group R and P at time point C ($p < 0.01$), whereas was practically unchanged in group S and G.
3. At time point C we noted significant differences in plasma osmolality between groups R and S ($p < 0.05$), P and S ($p < 0.05$) and P and G ($p < 0.05$) (Fig.1).

Figure 1. Changes in plasma osmolality in patients undergoing elective orthopaedic surgery treated with solution Ringer, Plasmalyte®, Sterofundin® ISO and Gelaspan®.

* - $p < 0.05$ – differences between plasma osmolality before surgery and 24 hours after surgery.
†, ‡ and § - $p < 0.05$ – differences in plasma osmolality between groups: R and S, P and S and P and G, respectively.

CONCLUSIONS

1. Some crystalloids infusion, such as Ringer solution or Plasmalyte®, decreases plasma osmolality whereas Sterofundin® ISO infusion does not affect it.
2. Gelatine infusion does not affect plasma osmolality.