

Title: HORMONAL AND METABOLIC CHANGES DURING NEUROLEPT AND ISOFLURANE ANESTHESIA

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Introduction. The sympatho-adrenal response to anesthesia and surgery have been studied by several investigators. From their reports it can be stated that plasma catecholamine (CA) levels are higher during surgery under neurolept anesthesia (NLA)¹ compared to inhalation anesthesia with halothane² and enflurane³. The present investigation examines a) the sympatho-adrenal response to surgery under NLA and isoflurane anesthesia and b) whether differences in CA levels under these anesthetic techniques are associated with other differences in the endocrine metabolic response to surgery.

Methods. 12 patients scheduled for cholecystectomy gave informed consent for the study which was approved by the local Ethical Committee. They were randomly divided into two groups and anesthetized either with isoflurane (1.5 MAC) after thiopental induction or with NLA; consisting of fentanyl 10 µg/kg and droperidol 0.25 mg/kg for induction followed by fentanyl 3.5 µg/kg/h as a continuous infusion for maintenance. Pancuronium was used for muscle relaxation and all patients were mechanically ventilated to normocapnia with N₂O:O₂, 2:1. Plasma levels of adrenaline (A), noradrenaline (NA), glucose, insulin, c-peptide, glucagon, growth hormone, cortisol, FFA, glycerol, β-OH-butyric acid and lactate were determined at 11 carefully defined events before during and after anesthesia and surgery. Oxygen consumption (VO₂) was measured with the aid of a mass spectrometer. Heart rate and systemic arterial pressure were monitored via a radial arterial line. Oesophageal temperature was measured with a thermistor.

Results. Adrenaline levels fluctuated in the NLA patients. During periods of stress such as intubation, skin incision and abdominal surgery A concentrations were 4 - 6 times (p < 0.05) greater compared with the isoflurane patients in whom A levels were very stable. During periods lacking surgical stress i.e. anesthesia before start of surgery and after cholangiography A levels were identical in the two groups. NA concentrations also fluctuated with stress but with less variations between the two anesthetics. The NLA patients had statistically lower insulin and higher glucose, cortisol, FFA and glycerol levels than the isoflurane patients. VO₂ was 18% larger during surgery in the NLA group compared with the isoflurane

group (p < 0.05). Mean arterial blood pressure was 27% higher during surgery in the NLA patients. No differences in blood gases and temperature between the groups were noted. No differences in hormonal metabolic parameters were found the day after surgery.

Discussion. Isoflurane 1.5 MAC in N₂O:O₂ 2:1 was more effective in blocking the sympatho-adrenal response to surgery, judged from circulating CA levels, than conventional NLA. Adrenaline is known to increase glukogenesis, breakdown of triglycerides and to inhibit insulin secretion. The increased A that we found in the NLA group may therefore be responsible for the differences in intraoperative endocrine metabolic response between the two anesthetics. However, different ability in blocking other neurogenic stimuli may also have contributed to these results.

We conclude that isoflurane is more effective than conventional neurolept technique in blocking intraoperative endocrine metabolic responses to surgery. This may be of importance in choice of anesthetic to patients with reduced functional capacity of vital organs.

References.

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