Changes in sugar content of the brain during narcosis

No registrations found.

Ethical review	Positive opinion
Status	Recruiting
Health condition type	-
Study type	Observational non invasive

Summary

ID

NL-OMON20502

Source
Nationaal Trial Register

Brief title
Cerebrospinal fluid study

Health condition

cerebral glucose metabolism; polyol pathway; Postoperative cognitive dysfunction (POCD); hyperglycemia; delirium; neurocognitive; Cerebrospinal fluid (CSF); sorbitol; fructose; thoracic aortic surgery; Montreal Cognitive Assessment (MoCA)

Liquor cerebrospinalis; hersenvocht; polyol route; cerebraal glucose metabolisme; hyperglykemie; delier; postoperatieve cognitieve dysfunctie (POCD); thoracale aorta chirurgie

Sponsors and support

Primary sponsor: Sponsor: Amsterdam UMC. location AMC, Department of Anesthesiology
Source(s) of monetary or material Support: Subsiding party: European Society of Anesthesiology (ESA)

Intervention

Outcome measures

Primary outcome

The main outcome measures per aim are:

- The changes in cerebral glucose metabolism in the perioperative period as measured by the difference in CSF/plasma ratio* of glucose at different points in time

- The increase in cerebral sorbitol and fructose concentrations in the perioperative pe-riod as measured by the difference in CSF/plasma ratio of sorbitol and fructose at dif-ferent points in time

*The CSF/plasma glucose ratio is used because of our hypothesis that an immediate reduc-tion in cerebral hexokinase activity will cause an increase in cerebral glucose and therefore an increase in the CSF/plasma glucose ratio.

Secondary outcome

- Correlation of perioperative plasma glucose levels with CSF glucose levels

- Correlation between the Montreal Cognitive Assessment score and CSF sorbitol and fructose levels

- Cortisol plasma levels in the perioperative period for the given points in time

- C-reactive protein (CRP) plasma levels in the perioperative period for the given points in time

- Demographics (age, gender, ethnicity)

- Length

- Height

- BMI

- Medical history

- Medication use

- ASA classification

Study description

Background summary

Along with the intended depression of the state of consciousness, anaesthetic drugs decrease cerebral glucose metabolism by 25-63%. Paradoxically, plasma glucose in-creases, because of the surgical stress response and accompanied insulin resistance. This will lead to an acute supply-demand mismatch and excess of glucose in the brain, and we hypothesize that this leads to activation of the neurotoxic polyol pathway. Postoperative cog-nitive dysfunction (POCD) has been reported in relation to hypoglycemia. POCD is also sug-gested to be associated with hyperglycemia, although this is less constantly reported. This hypothesized activation of the neurotoxic polyol pathway may contribute to the relation be-tween hyperglycemia during anaesthesia and postoperative cognitive dysfunction, delirium, and other neurocognitive complications.

Study objective

As plasma glucose during surgery increases, because of the surgical stress response and accompanied insulin resistance, this will lead to an acute supply-demand mismatch and excess of glucose in the brain. We hypothesize that this leads to activation of the neurotoxic polyol pathway. This hypothesized activation of the neurotoxic polyol pathway may contribute to the relation between hyperglycemia during anaesthesia and postoperative cognitive dysfunction, delirium, and other neurocognitive complications.

Study design

A fasting preoperative plasma glucose is determined.

We will collect the first CSF sample from the reservoir 15 minutes before induction of anaes-thesia (t=-15 min), when the patient has had an overnight fast.

When a CSF sample is obtained, a paired plasma sample will be collected from the arterial line.

The second samples are collected before the start of cardiopulmonary bypass and the third samples will be collected after stopping cardiopulmonary bypass. After discharge from the operating theatre, CSF and plasma samples will be taken every morning before breakfast (i.e. fasting) until removal of the catheter, at latest 48 hours after surgery.

An estimated 4-5 repeated paired measurements per patient would be collected.

We will administer a questionnaire to assess pre- and postoperative cognitive dysfunction, as measured by the Montreal Cognitive Assessment (MoCA). The questionnaire is administered on the day before surgery at approximately 1pm and two weeks after surgery at approximately 1pm.

Intervention

No interventions.

Contacts

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Eligibility criteria

Inclusion criteria

Patients undergoing elective thoracic aortic surgery without pre-existing brain disease and without diabetes mellitus who are able and willing to participate in the study and can provide written informed consent. Patients must be 18 years or older.

Exclusion criteria

Patients undergoing elective thoracic aortic surgery with pre-existing brain disease and/or diabetes mellitus. Patients who are unable to understand or fill-in questionnaires in Dutch will also be excluded from the study.

Study design

Design

Study type:	Observational non invasive
Intervention model:	Other
Masking:	Open (masking not used)

Control:	N/A , unknown

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	01-01-2019
Enrollment:	16
Type:	Anticipated

Ethics review

Positive opinion

Date:	13-12-2018
Application type:	First submission

Study registrations

Followed up by the following (possibly more current) registration

ID: 48939
Bron: ToetsingOnline
Titel:

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
NTR-new	NL7427
NTR-old	NTR7669
CCMO	NL65815.018.18
OMON	NL-OMON48939

Study results