**THE EFFECT OF ANGIOTENSIN II IN SEPTIC DISTRIBUTIVE SHOCK**

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**Introduction**

Angiotensin II (ATII) is a vasoconstrictor that increases blood pressure in adults with septic or other distributive shock (1). The latest expert consensus on the use of angiotensin II for management of distributive shock recognised ATII as a useful treatment to reduce catecholamine requirements in treating vasopressor - resistant septic shock (2). ATII effect on microcirculation is only a hypothesis and was never compared in clinical trials. The aim of this study was to evaluate microcirculation in distributive septic shock patients, while using ATII as a second vasopressor.

**Methods**

Patients hospitalised in the Intensive Care Unit of the Hospital of Lithuanian University of Health Sciences Kaunas Clinics were evaluated. The main inclusion criteria was septic distributive shock with the dose of noradrenaline higher than 0,2 mcg/kg/min and the need of a second vasopressor to maintain mean arterial pressure (MAP). We used a PiCCO catheter for invasive hemodynamic monitoring. The study took 12 hours. Primary endpoint was to compare microcirculation for patients with septic distributive shock. Measuring points were before study, 1 hour study and 12 hours after study. The aim was to compare the differences of microcirculation during time. We analysed microcirculation using Automatic Vascular Analysis software 3.2. Flow characteristics of the microvasculature are quantified using the microcirculatory flow index (MFI) according to the recommendations from the consensus on microcirculatory imaging by De Backer et al. (3). This index is calculated after the images are divided into four quadrants, and the predominant type of flow are estimated in vessels smaller than 25 μm by the operator. The final MFI score is a value obtained from the average score of the four areas.

**Results**

We present primary results of 6 patients. Table presents the MFI in every measuring point.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Number** | **1** | **2** | **3** | **4** | **5** | **6** |
| **0 hour** | **2,75** | **2,75** | **2,5** | **2,5** | **1,25** | **2,0** |
| **1 hour** | **2,0** | **2** | **2,5** | **2,75** | **2,25** | **2,0** |
| **12 hours** | - | **3** | **2,75** | **2,75** | **0** | **1,5** |

**Conclusion**

The initial findings suggest that ATII may have a variable impact on microcirculation in patients with septic distributive shock. Further analysis is necessary to draw definitive conclusions regarding the therapeutic benefits and microcirculatory effects of ATII in this context.

**References**

1. Giapreza, product information. https://www.ema.europa.eu/en/medicines/human/EPAR/giapreza
2. Landoni, G., Cortegiani, A., Bignami, E. *et al.* The use of angiotensin II for the management of distributive shock: expert consensus statements. *J Anesth Analg Crit Care* **4**, 56 (2024). <https://doi.org/10.1186/s44158-024-00186-y>
3. De Backer D, Hollenberg S, Boerma C, Goedhart P, Büchele G, Ospina-Tascon G, Dobbe I, Ince C. How to evaluate the microcirculation: report of a round table conference. Crit Care. 2007;11(5):R101. doi: 10.1186/cc6118. PMID: 17845716; PMCID: PMC2556744.

**EFFECT OF REMOTE ISCHEMIC CONDITIONING ON PERIPHERAL PERFUSION IN PATIENTS FOLLOWING LIVER TRANSPLANTATION**

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**Introduction**

Remote ischemic conditioning (RIC) is a technique that involves brief, controlled episodes of ischemia in a distant organ or limb to protect organs from ischemia-reperfusion injury (1). Studies showed that changes in peripheral perfusion may be associated with outcomes (2,3). There is a lack of studies directly examining changes in tissue perfusion during RIC, particularly in patients after liver transplantation. The aim of our study was to evaluate the impact of RIC on peripheral perfusion index in patients after liver transplantation.

**Methods**

The RIC intervention comprised 3 cycles of brachial cuff inflation to 200 mmHg for 5 min followed by deflation to 0 mmHg another 5 min. The procedure took 30 min. Peripheral perfusion index (PI) was measured throughout the RIC procedure on the third or fourth finger of the hand opposite to the one on which the RIC cuff was applied. Systemic hemodynamic parameters were monitored using PiCCO monitor (Pulsion Medical Systems, Munich, Germany). Data are reported as medians along with the 25th and 75th percentiles.

**Results**

The study enrolled nine patients, comprising four females and five males. The study was conducted 12.5 hours after admission to the ICU after liver transplantation. The median SAPS II and SOFA scores were 32 (25–36) and 7 (6–7), respectively. We found a significant increase in PI compared to baseline (12.0(5.5-14.0) vs 9.5(3.7-13) %, p=0.046) during the first inflation of brachial cuff and the trend of increasing PI during the second inflation. We also found a significant correlation between PI changes induced by the first and second inflations of brachial cuff (r=0.75, p=0.049). Simultaneously, we observed a significant increase in SVI during the first and second cuff inflations.

**Conclusions**

RIC may induce changes in the peripheral perfusion index that are of systemic origin. The most pronounced change was observed during the first inflation of the brachial cuff.

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**References**

1. Ho AFW, et al. Remote ischemic conditioning in emergency medicine-clinical frontiers and research opportunities. Shock. 2020;53:269–76.
2. He HW, et al. The peripheral perfusion index and transcutaneous oxygen challenge test are predictive of mortality in septic patients after resuscitation. Crit Care. (2013) 17:R116.
3. Das M, et al. Prognostic performance of peripheral perfusion index and shock index combined with ESI to predict hospital outcome. Am J Emerg Med. 2020 Oct;38(10):2055-2059.

**EXPLORING THE EFFECTS OF INTRA-ABDOMINAL PRESSURE AND ABDOMINAL PERFUSION PRESSURE ON ACUTE KIDNEY INJURY IN ORTHOTOPIC LIVER TRANSPLANT PATIENTS**

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**Abstract**

**Introduction**

Patients undergoing orthotopic liver transplantation are susceptible to the development of intra-abdominal hypertension and abdominal compartment syndrome, and approximately forty percent of the patients develop postoperative acute kidney injury (AKI). There is a shortage of prospective cohort studies examining the association of elevated intra-abdominal pressure (IAP) and the incidence of AKI, and existing evidence is compromised by varied definitions of IAP and AKI. We hypothesize that IAP is associated with AKI incidence and severity in OLT patients.

**Objectives**

This study aims to investigate the association between IAP and AKI in approximately 30 orthotopic liver transplant patients.

**Methods**

A prospective cohort study in orthotopic liver transplant patients admitted to the University Medical Center Groningen, the Netherlands was started in July 2024. Intra-abdominal pressure is measured via the bladder using the Accuryn Monitoring system. Primary outcome is AKI incidence, according to the KDIGO-criteria, within the first 7 days of hospital admission after transplantation. Furthermore, kidney-specific biomarkers are measured both during and after surgery to assess kidney function.

**Expected Results**

This study was started in July 2024 and is still ongoing. Thus far 7 patients undergoing orthotopic liver transplant have been included.

**Conclusions**

In this ungoing study the association between IAP and AKI will be studied in approximately 30 patients undergoing orthotopic liver transplantation.

**INTOKSIKACIJA INSULINU. KLINIKINIS ATVEJIS**

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**ĮVADAS.** Insulino intoksikacija – būklė, kuomet organizme yra per didelis insulino kiekis. Tai gali pasireikšti dėl netinkamos insulino dozės sergant cukriniu diabetu arba, dėl tyčinio insulino vartojimo asmenims, kurie perdozuoja insulino dėl sucidinių ketinimų. Insulino perdozavimas, gali sukelti sunkią hipoglikemiją, dėl kurios išsivysto hipoglikeminė koma, o laiku nesuteikus pagalbos – smegenų pažeidimas ar mirtis [1]. Šis klinikinis atvejis yra apie paciento, nesergančio cukriniu diabetu, tačiau pavartojusio didelę dozę insulino suicidiniais tikslais, ligos eigą.

**KLINIKINIS ATVEJIS.** Į ligoninę atvežtas 40 metų vyras, kuris bandė nusižudyti, perdozuodamas insulino (1500VV), nors cukrinio diabeto diagnozė anamnezėje nėra fiksuota. Pacientui GMP pradėtas hipoglikemijos gydymas 1 mg gliukagonu bei 40% 40 ml gliukozės boliusu, kadangi nustatytas glikemijos kiekis kraujyje siekė 1,4 mmol/l. Per pirmąsias tris paras pacientas buvo nuolat stebimas ir gydomas intensyviosios terapijos skyriuje dėl hipoglikemijos ir dėl kilusių komplikacijų – hipokalemijos. Gliukozės kiekis kraujyje buvo monitoruojamas 3 paras kas 2-3 valandas, gydymo metu glikemija svyravo nuo 1,4 mmol/l iki 4,6 mmol/l, kol buvo pasiekta normali gliukozės koncentracija kraujyje. Nepaisant nuolatinės infuzijos 10% gliukozės tirpalu, per šį laikotarpį 4 kartus pasikartojo traukuliai, kuriuos sukėlė staiga sumažėjęs gliukozės kiekis kraujyje. Traukulių epizodai buvo sėkmingai kontroliuojami 40% 40 ml gliukozės tirpalo vienkartiniais boliusais. Po trijų parų gydymo intensyviosios terapijos skyriuje paciento būklė stabilizavosi, gliukozės kiekis kraujyje buvo valdomas, o hipoglikemija bei traukuliai nebesikartojo. Pacientas buvo perkeltas į psichiatrijos skyrių tolesniam stebėjimui bei gydymui po savižudybės bandymo.

**DISKUSIJA.** Insulinas yra svarbus baltyminis hormonas, atliekantis įvairias sintetines ir metabolines funkcijas, per didelis kiekis kraujyje gali būti siejamas su hipoglikemija, dėl ko, gali pasireikšti traukuliai ar koma bei kitos komplikacijos, pavyzdžiui, elektrolitų disbalansas. Insulinas turi įtakos kalio pernašai iš kraujo į ląsteles, todėl yra būtinas kalio sekimas viso gydymo metu. Hipokalemija gali sąlygoti širdies veiklos, medžiagų apykaitos ir kitų organų funkcijos sutrikimus [2,3]. Ši intoksikacija reikalauja skubaus ir neretai gyvybę gelbstinčio gydymo. Esant itin žemam gliukozės kiekiui kraujyje pirmo pasirinkimo gydymas – intraveninės gliukozės skyrimas boliusu, o kaip papildomas gydymas gali būti skiriamas 1 mg gliukagono į raumenį, vėliau tęsiant nuolatinę 10% gliukozės tirpalo infuziją. Viso gydymo metu svarbu monitoruoti gliukozės kiekį kraujyje bei koreguoti infuzijos greitį [1].

**IŠVADOS.** Šiuo atveju, insulino perdozavusio paciento būklė buvo sėkmingai stabilizuota po gydymo intensyviosios terapijos skyriuje, apimančio hipoglikemijos valdymą gliukozės infuzijomis bei traukulių kontrolę.

**ŠALTINIAI**

1. Johansen NJ, Christensen MB. A Systematic Review on Insulin Overdose Cases: Clinical Course, Complications and Treatment Options. Basic Clin Pharmacol Toxicol [Internet]. 2018 Jun 1 [cited 2024 Sep 14];122(6):650–9. Available from: https://pubmed.ncbi.nlm.nih.gov/29316226/

2. Yuan Y, Yu Z, Tong F, Zhao S, Li Y, Shi Q, et al. A retrospective study of 29 fatal cases of insulin overdose. Forensic Sci Int. 2024 Aug 1;361:112126.

3. EFRIMESCU CI, YAGOUB E, DOYLE R. Intentional Insulin Overdose Associated with Minimal Hypoglycemic Symptoms in a Non-Diabetic Patient. Maedica (Bucur) [Internet]. 2013 Sep [cited 2024 Sep 14];8(4):365. Available from: /pmc/articles/PMC3968474/

**HEMODYNAMIC RESPONSIVENESS AFTER REMOTE ISCHEMIC CONDITIONING IN PATIENTS AFTER LIVER TRANSPLANTATION**

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**Introduction**

Remote ischemic conditioning (RIC) is a technique that involves subjecting tissues or organs to intermittent periods of ischemia and reperfusion, thereby inducing protective effects on distant target organs. RIC has been evaluated in various clinical contexts, such as cardiac surgery, stroke, sepsis, and renal transplantation, and has demonstrated potential benefits in enhancing organ protection and improving patient outcomes (1,2). RICs may have a modulating effect on both parasympathetic and sympathetic autonomic nervous system, has the potential to improve endothelial function (3,4). However, it is not clear to what extent this is clinically relevant in patients after liver transplantation, especially in determining their hemodynamic responsiveness. In clinical practice, the passive leg raising (PLR) as a test of hemodynamic responsiveness is used to determine fluid responsiveness. The objective of this study was to evaluate the hemodynamic response to PLR before and after RIC.

**Methods**

Patients admitted to the ICU after cadaveric liver transplantation were enrolled in the study. PLR was performed followed by RIC, which comprised of intermittent arm ischemia-reperfusion through 3 cycles of 5-minute inflation to 200 mmHg and 5-minute deflation of a brachial blood-pressure cuff. Afterwards PLR was repeated. Hemodynamic parameters were monitored using PiCCO monitor (Pulsion Medical Systems, Munich, Germany). Patients were classified as fluid responsive when stroke volume index (SVI) increased more than 10%. Data are reported as medians along with the 25th and 75th percentiles.

**Results**

Ten patients after liver transplantation, out of whom four were female and six were male, were enrolled in this study. Median age was 53 (49-57). The median Simplified Acute Physiology Score (SAPS) II and Sequential Organ Failure Assessment (SOFA) scores were 32 (25-36) and 7 (6-7) respectively. Three out of ten patients were classified as fluid responders. No significant changes in SVI were observed during PLR when comparing pre- and post-RIC. A significant correlation in SVI was found before and after RIC (r = 0.86, p = 0.001). Additionally, no significant differences were observed in heart rate, mean arterial pressure, central venous pressure, or cardiac index before and after RIC.

**Conclusions**

In patients after liver transplantation, RIC did not affect systemic hemodynamic response to PLR. The majority of patients studied following liver transplantation were fluid non-responders.

**Funding**: This project has received funding from the Research Council of Lithuania (LMTLT), agreement No S-MIP-23-79.

**References**

1. Le Page S, et al. Remote ischemic conditioning: Current clinical perspectives. Journal of Cardiology. 2015: 91–6

2. Kiudulaite I, et al. Effects of remote ischemic conditioning on microcirculatory alterations in patients with sepsis: a single-arm clinical trial. Ann Intensive Care. 2021;1:11(1).

3. Noronha Osório D, et al. BMC Cardiovascular Disorders. 2019; 19:211.

4. Manchurov V, et al. Remote ischemic preconditioning and endothelial function in patients with acute myocardial infarction and primary PCI. Am J Med. 2014;127:670–3.