КЛЮЧЕВЫЕ СЛОВА
Гиперкоагуляция, метаболический синдром, инсулинорезистентность.

ИНФОРМАЦИЯ О ФИНАНСИРОВАНИИ
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THE EFFECT OF PREOPERATIVE BLOOD GLUCOSE CONTROL ON POSTOPERATIVE VALUES
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Background and aims. It has been largely studied and proven that tight glycemic control is necessary for the favorable outcome of coronary artery bypass graft (CABG) as it is associated with less morbidity and mortality. Insulin is considered as the fastest and safest means to control blood glucose in patients with type 2 diabetes mellitus (T2DM) in perioperative period. The aim of our study was to assess the preoperative risk factors for hyperglycemia after CABG.

Material and methods. 70 insulin-naive T2DM patients undergoing CABG were included in the study. Anthropometric, biochemical and hormonal examinations were performed before the operation. Hyperglycemia was managed with insulin. Continuous intravenous insulin infusion was used according to the Portland Protocol until the third postoperative day (target serum glucose concentration <180 mg/dl). Patients were switched to subcutaneous insulin injections using intermediate and fast acting insulin after moving to the ward (Insulatard 100 IU/ml, Actrapid 100 IU/ml, Novo Nordisk A/S) until the day of discharge. All patients had 3—4 times daily capillary blood glucose check in the ward and mean daily glucose value was calculated.

Results. The postoperative blood glucose values correlated significantly with the preoperative HbA1c values (p<0.05). The daily dose of insulin required to correct hyperglycemia correlated more with HbA1c values (p<0.005) than with patients’ weight (p>0.05).

Conclusion. The preoperative good metabolic control in necessary for the patients awaiting CABG. The value of HbA1c should be considered to estimate the daily dose of insulin.

KEYWORDS
Type 2 diabetes mellitus, insulin, CABG; HbA1c

ВЗЯНИЕ КОНТРОЛЯ ГЛИКЕМИИ В ПРЕДОПЕРАЦИОННОМ ПЕРИОДЕ НА ИСХОДЫ ХИРУРГИЧЕСКОГО ВМЕШАТЕЛЬСТВА
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Введение и цель. Известным и доказанным фактом успешного проведения аортокоронарного шунтирования (АКШ) считается достижение целевых значений гликемии в строго регламентированных рамках, поскольку ассоциируется со снижением развития осложнений и смертности в послеоперационном периоде. Использование инсулина считается самым быстрым и безопасным методом контроля гликемии у пациентов с сахарным диабетом 2-го типа (СД2).

Цель исследования — проведение оценки предоперационных факторов риска в условиях гипогликемии после АКШ.

Материал и методы. В исследование были включены 70 пациентов с СД2 на инсулинотерапии после АКШ. Предоперационное обследование включало определение антропометрических, биохимических и гормональных показателей. Гипергликемия копировалась введением инсулина. Непрерывная внутривенная инсулинотерапия проводилась согласно Польскому Протоколу до 3-го послеоперационного дня включительно (целевыми значениями гликемии считались <180 мг/дл). Перевод на подкожное введение инсулина короткого и ультракороткого действия осуществлялся после перевода пациента в палату (Insulatard 100 IU/ml, Actrapid 100 IU/ml, Novo Nordisk A/S) вплоть до выписки. Всем пациентам проводился ежедневный контроль уровня глюкозы в капиллярной крови (в среднем 3—4 раза в день с подсчетом среднего уровня гликемии за сутки).

Результаты. Значения гликемии в послеоперационном периоде коррелируют с уровнем HbA1c, в предоперационном (р<0.05). Суточные дозы инсулина имеют более сильную корреляционную взаимосвязь с уровнем HbA1c (р<0.005), чем с массой тела пациента (р>0.05).

Выводы. Достижение целевых значений гликемии является обязательным для пациентов, ожидающих АКШ. Для расчета оптимальных доз инсулина следует рассматривать исходный уровень HbA1c.

КЛЮЧЕВЫЕ СЛОВА
Сахарный диабет 2-го типа, аортокоронарное шунтирование, HbA1c, инсулинотерапия.
The degree of coronary atherosclerosis was determined by coronary angiography (CAG) in all patients. The blood samples were collected from the aorta during CAG and cubital vein simultaneously; immediately centrifuged (15000g min), supernatants were stored at −70°C until analysis were done. Serum was analyzed by ELISA (IFA). The critical significance level (p) for statistical hypothesis testing was set at <0.05.

Results. Average β-FGF, TGF-β1, AGE, RAGE in the second group was significantly higher than in the first (p<0.005). Increased level of the AGE, RAGE and TGFβ1 was positive correlated with low-density lipoprotein and triglycerides (R=0.049; p<0.005). IL-6 was significantly higher in the second group. There was the significant correlate relationship between the levels AGE, RAGE, TGFβ1, β-FGF and IL-6 with DM duration (R=−0.120; p=0.009), direct association with HbA1c (R=0.429; p=0.006). There were significantly higher level of the AGE, TGFβ1 and β-FGF in aortic blood than in peripheral venous blood (p<0.005). IL-6 level had opposite features: serum IL-6 was higher in venous than arterial blood. The patients with DM had three-vessel disease often (73%) then the patients without DM (R=0.021; p<0.005), which was direct correlated with level TGFβ1 (R=0.03; p<0.005). There weren’t any differences in α-TNF level between two groups.

Discussion. High AGE, TGFβ1 level and positive correlation with atherogenic lipids may indicate the role of the connective tissue remodeling in pathogenesis of the coronary atherosclerosis. As the longer DM duration led to increasing AGE, TGFβ1 and IL-6 levels the chronic hyperglycemia can restructure the vascular wall. Higher AGE, TGFβ1 and β-FGF levels in aorta then in peripheral blood may show the involvement of the cardiomyocytes in these growth factors metabolism.

Conclusion. DM existence with CAD was characterized by higher AGE, RAGE, TGFβ1 and IL-6 levels, which was direct correlated with the atherogenic lipids. Patients with type 2 DM and CAD had more severe coronary artery disease.

KEYWORDS
Coronary heart disease; diabetes; growth factors; fibroblast; advanced glycation end products.

FUNDING ACKNOWLEDGEMENTS
The study was performed with support from Russian Science Foundation (grant №15-15-30040).

CONCLUSION
The existence of diabetes with CAD was characterized by the significant increase of the AGE, RAGE, TGFβ1 and β-FGF in arterial blood as compared with venous blood. The patients with DM and CAD had more severe coronary artery disease.

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