Diagnosis, treatment and management of glucometabolic disorders emerging after kidney transplantation

A consensus statement by the Scandinavian Post-Transplant Diabetes Expert Group

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Recommendation 1

It is well documented that many patients on the waiting list for transplantation have undiagnosed diabetes. They should be characterized annually according to absence or presence of diabetes:

- Fasting plasma glucose (FPG) should be measured annually
- An OGGT should be performed once before transplantation in all patients on the waiting list
- Diabetes is diagnosed when FPG ≥ 7 mmol/l and/ or 2-hr plasma glucose ≥ 11.1 mmol/l after a 75-g OGTT measured on at least two occasions.

Recommendation 2

Before transplantation risk factors for development of NODAT are well documented, and should be identified and treated:

- Besides age, ethnicity and family history of diabetes, some risk factors are modifiable such as obesity, the metabolic syndrome and glucose intolerance. An appropriate screening should be performed before transplantation to identify patients with higher risk for NODAT. Risk factor intervention should be started already in the period before transplantation directed towards:
- Overweight
- Sedentary lifestyle (exercise)
- Smoking
- HCV infection
- Extreme overweight; consider bariatric surgery

Recommendation 3

Patients with diabetes and poor glycemic control have an increased morbidity and mortality during hospitalization

Plasma glucose should be monitored at least 4 times daily in diabetic and non-diabetic patients during primary hospitalization after transplantation to diagnose NODAT and provide an overall optimal immunosuppressive and metabolic treatment of known diabetes and NODAT after transplantation**.** Patients with diabetes, cystic fibrosis or NODAT should be started out with insulin and not oral agents during the first days. If the insulin dose required per 24-h is modest (below 20 IE per day) they could be changed to oral anti-hyperglycemic agents.

Treatment targets

During hospitalization (as in general) the treatment targets should be:

- Fasting morning plasma glucose 4-7 mmol/l
- Pre-prandial plasma glucose 4-10 mmol/l
- Plasma glucose at night time 4-10 mmol/l

The treatment targets should not be too low and the treatment not too aggressive. The risk of hyperglycemia should be weighed against the risk of hypoglycemia.

Consider to use a progressive strategy in the supplementation of insulin where the use of steroid is increased, remembering that the usual insulin demand is increased by approximately 40% when treating with a prednisolone dose of 50 mg

Recommendation 4

Use of steroids, calcineurin inhibitors and mTor inhibitors are known modifiable risk factors of NODAT

In patients with diabetes or NODAT, or high risk of NODAT before transplantation, the immunosuppressive treatment should be tailored to prevent evolution of diabetes, but not on the expence of rejection episodes. If possible, it should be considered to aim at low dose steroids, low trough levels of CNI inhibitors and withholding use of mTOR inhibitors.

Recommendation 5

Patients with NODAT are at risk of diabetic complications and have a high risk of cardiovascular morbidity and mortality. They should be treated according to current guidelines on treatment of patients with diabetes to the extent these do not have a negative impact on the function and survival of the transplanted organ. Such guidelines include:

- Measure FPG annually for a minimum of 5 years, and longer in patients at higher risk of diabetes i.e. cystic fibrosis, to diagnose NODAT
- Measure FPG when significant changes in immunosuppressive changes are implemented
- Lifestyle advise (weight, smoking habits, exercise)
- Antihypertensive treatment to target < 130/80 mmHg, including RAS blockade if possible. Blood pressure must also be measured in the standing position to disclose orthostatic hypotension.

- Treating dyslipidemia to target LDL-cholesterol< 3.0 mmol/l
- Treating glycemic control to target HbA1c< 7 % (51 IFCC units)
- Close collaboration with endocrinologists, ophtalmologists