Risk Factors and Their Relative Strengths for New-Onset Diabetes After Transplantation (NODAT)

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Objectives

To determine the risk factors for new-onset diabetes after transplantation (NODAT)

Methods

This is a retrospective observational cohort study. All adult patients transplanted over a 9-year period were included provided that they had no evidence of pre-transplant diabetes and had a functioning graft for ≥12 months. Data collected include age, sex, family history (FH) of diabetes, BMI and type of donor source.

The pre-transplant fasting blood sugar (FBS) levels, at and during the first 24 hours post transplantation, at 6 months and 12 months post-transplant were measured.

Results

There were 279 patients in the study with a mean age of 36.3±13.2 years, mean BMI of 26.5±7.2 and mean pre-transplant FBS of 5.0±0.8 mmol/l, which rose to 9.6± 4.8 mmol/l after 24 hours with the highest level during the first 24 hours being 14.1-±8.3 mmol/l.

Fifty-seven patients (20.4%) developed NODAT. This group was significantly older (43.6±10.7 versus 34.2±13.1 years respectively; p=0.000), heavier (78.8±13.7 versus 66.9±19.2 kgs respectively; p=0.000), with higher BMI (30.6±5.0 versus 25.8±7.0 respectively; p=0.000) than the group that did not. They also had a higher FBS level after 24 hours of transplantation (10.9±4.1 versus 9.4±4.9 mmol/l respectively; p=0.03), at 6 months (7.9±3.7 versus 5.3±1.0 mmol/l respectively; p=0.000) and at 12 months (9.0±3.8 versus 5.3±1.0 mmol/l respectively; p=0.000). No significant differences were observed between the two groups in height, FBS in the pre transplant workup or serum creatinine levels at 6 or 12 months.

The incidence of NODAT was not affected by gender (13% in males and 18.5% in females) (p=0.2) or by kidney donor type (15.8% for LD and 15.0% for DD) (p=0.9). However, it was significantly higher in those with a FH of DM than to those without (37.2 % and 1.2 %) respectively (P=0.000) (RR 31.3; 95% CI 7.7-126)

In the group with NODAT, 18.0% had a FBS at 24 hours >6 (mmol/l) but only 4% with FBS at 24 hours < 6 (mmol/l) (p=0.001) (RR 1.3 95% CI 1.08 to 1.27), 36.6 % were aged >35 year but only 8.8 % were aged < 35 years (p=0.000) (RR 1.44 95% CI 1.218 to 1.696), 25.5 % had a BMI >26.1 but only 5.9 % had a BMI of < 26.1 (p=0.000) (RR 1.26 95% CI 1.136 to 1.406) and 37.7 % had a FH of DM but only 1.2 % had no FH of DM (p=0.000) (RR 31.3 95% CI 7.730 to 126.812)

The risk was not altered by gender (p=0.2 RR 1.07) (95% CI 0.96-1.18) or transplant donor type (P=1.0 RR 1.05) (95% CI 0.597-1.84)

Multivariate analysis confirmed FH of DM, age and FBS level at 24 hours as independent risk factors

Table. Relative Risks of developing DM according to FBS levels at 24 hours post-transplantation

FBS @ 24 hours	Developed DM (%)	P value	RR for DM	95% CI
< 6 (mmol/l)	4.0%	0.01	0.22	0.056 - 0.889
>6 (mmol/l)	18.0%		1.2	1.077- 1.272

Conclusion

A fifth of the patients developed NODAT with the risk factors being older age, higher BMI, higher FBS 24 hours after transplantation and family history of DM.

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