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Microvascular and Macrovascular Complications in type 1 Diabetes Following Islet Transplantation

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Abstract

High rates of microvascular and macrovascular disease-related morbidity and mortality are common in type 1 diabetes, which has a significant financial impact on society. The National Institute for Health and Care Excellence (NICE) recommends islet cell transplantation (ICT) as a treatment option for people with type 1 diabetes who suffer from debilitating hypoglycemia. This includes people who are in renal failure, where kidney transplantation may be necessary. Improving glycaemic control, reducing severe hypoglycemia, stabilizing glycaemic variability, and restoring awareness of hypoglycemia where it has been compromised are the primary goals of ICT.

Keywords: Distress • Pregnancy • Stillbirth • Histological

Introduction

Although not the primary objective, insulin independence ought to be considered a therapeutic objective as well. Small studies and no large clinical trials have examined the effect of ICT on the progression of microvascular and macrovascular diabetes complications. The adverse effects on lipid metabolism, hypertension, and renal function of lifelong immunosuppression must also be taken into consideration if transplant rejection is to be avoided. The evidence regarding the progression of microvascular and macrovascular disease following transplantation as well as the role that ICT plays in the management of type 1 diabetes are the subjects of this review. We conclude that ICT stabilizes or improves microvascular complications like neuropathy and retinopathy. Coexisting kidney transplantation and immunosuppression, which can result in an early decline in renal function, can complicate effects on nephropathy.

Literature Review

An estimated 422 million adults worldwide suffer from diabetes, which is associated with significant mortality and morbidity from microvascular and macrovascular complications. Neuropathy, nephropathy, and retinopathy are examples of microvascular complications. The most common cause of blindness in people with type 1 diabetes (T1D) is diabetic retinopathy. Up to 40% of people with T1D will develop diabetic nephropathy in their lifetime, of which 75% will develop end stage renal disease within 10 years.3 Macrovascular complications include myocardial ischaemia, myocardial infarction, and stroke. However, there is evidence that long-term renal outcomes are stable. Surrogate markers of macrovascular disease have been positively impacted by ICT, according to short-term studies; However, there aren't any long-term studies or trials in this area.

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Discussion

Data from the Diabetes Control and Complications Trial (DCCT) cohort has shown that those with T1D have a cumulative incidence of cardiovascular disease of 14% after 30 years of diabetes.5 Management of T1D focuses on structured education Islet cell transplantation (ICT) is a minimally invasive procedure that may be indicated in those with recurrent severe hypoglycaemia (SH), which is defined by the American Diabetes Association as severe cognitive impairment requiring external assistance for recovery,10 where treatment has been optimized.6 At 10-year follow-up, the risk of progression of diabetic retinopathy was reduced by 53%.7 Similar benefits were seen in relation to nephropathy outcomes with a reduction in the incidence of microalbuminuri The projected benefits of improved glycaemic control must be balanced against the risks of long-term immunosuppression, such as the risk of infection and the increased risk of cancer. It can also result in insulin independence and reduce hypoglycemia and glycaemic lability.11 In this review, we will discuss the indications for ICT, the procedure and immunosuppression used, metabolic and quality of life outcomes, and the evidence to date of the impact that ICT has on microvascular and macrovascular disease in the early post-transplant period, which we have considered up to 2 years post-transplant, the intermediate period between 2 and 5 years post-transplant, and, in the long term, over 5 years post-transplant. Cardiovascular disease continues to be the leading cause of death following whole organ [1-5]

Conclusion

When insulin therapy has been intensified and there are no contraindications to immunosuppression, islet transplantation alone is recommended for individuals with T1D who have SH and IAH. There is evidence that islet transplantation confers benefits on microvascular endpoints such as retinopathy and neuropathy. These benefits include improved glycaemic control, reduced hypoglycaemia with improved awareness of hypoglycaemia, diminished glycaemic variability with less dependence on insulin, and improved quality of life. The short-term effects on renal function indicate that immunosuppressive medication has a nephrotoxic effect, but the long-term effects appear to stabilize renal function. For those with coinciding renal transfers, nephropathy results and macrovascular benefits have been demonstrated to be similar with those getting SPK. Long-term macrovascular outcomes require prospective research, but post-islet transplantation improvements in surrogate cardiovascular disease markers are available. There will be opportunities to consider these alternatives in suitable patients in the future as adjuvant cell therapies and insulin pump and sensor technologies advance.

Acknowledgement

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Conflict of Interest

There are no conflicts of interest by author.

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