

Exploring Omentum as an Alternative Site for Islet Cell Transplantation in Type 1 Diabetes Mellitus: Procedure and Benefit

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Abstract

Treating T1DM has advanced with pancreatic islet transplantation, which is performed by the infusion of islets into the hepatic portal system. They entail high-risk factors after transplantation, such as portal vein thrombosis or an increase in portal pressure, prompting exploration of alternative sites such as the omentum.

Introduction

T1DM is an autoimmune response targeting insulin-producing β -cells, resulting in the absence or near absence of circulating C-peptide. Hepatic portal infusion of the β -cell system aids glycemic control, making the liver the primary site for transplantation, but carries the risk of portal vein thrombosis, elevation of portal pressure followed by uncontrolled bleeding, and loss of islet due to IBMIR when encountered with the recipient's blood. Alternative sites, including the omentum, peritoneum, spleen, renal subcapsule, and gastric submucosa, can be used, out of which the omentum stands out as it offers advantages such as accessibility, ample surface area, high vascularization, and portal venous drainage, making them attractive for islet transplantation.

Method

This literature review involved a comprehensive search through databases such as PubMed and Google Scholar using timelines from 2020 to 2024 using keywords like T1DM, Islet Cell Transplantation, Alternative Transplant Site, Liver, and Omentum.

Result

Islet encapsulation in a semi-permeable hydrogel membrane permits the passage of oxygen, glucose, insulin, and nutrients while preventing immune cell attachment and antibodies towards the graft, resulting in a delay in rejection. Studies in insulin-dependent rats demonstrate the efficacy of encapsulated islet transplantation in restoring glycemic control. There are two types of encapsulation: macroencapsulation and microencapsulation, the latter being more frequently used

Conclusion

T1DM is an autoimmune disorder causing β -insulin-producing cells of the pancreas to undergo destruction. From all the collected data, omentum presents as a promising alternative site for unpurified or encapsulated islet transplantation with reduced complications. However, its limitations are the inability to acquire multiple transplants, ruling out the site for laparotomy. Relaparotomy is seen to be associated with pain, incisional hernia, ileus, and a higher risk of wound infection. This necessitates more clinical evidence to improve the safety, efficacy, and suitability of the omentum as the preferred site.

Keyword

T1DM, Islet Cell Transplantation, Alternative Transplant Site, Liver, and Omentum