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Commentary

Bone Marrow Transplantation Procedure in Thalassemia

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DESCRIPTION

Thalassemia is a hereditary blood condition in which the body produces less hemoglobin than normal. Thalassemia is classified into different categories. The indications and symptoms are determined by the kind and severity of the ailment. Thalassemia symptoms might include weakness due to fatigue, pale or yellowish skin deformities of the facial bones, slow expansion, stomach bloating, dark feces etc. Thalassemia is caused by DNA abnormalities in cells that produce hemoglobin, the material in red blood cells that transports oxygen throughout the body. Thalassemia-related mutations are transferred from parents to offspring.

The production of either the alpha or beta chains is decreased in thalassemia, resulting in either alpha- or beta-thalassemia.

Alpha-thalassemia

The amount of gene mutations that inherit from parents determines how severe the condition will be. If more genes get mutated, the thalassemia will be more severe.

Beta-thalassemia: The severity of beta-thalassemia is determined by which section of the hemoglobin molecule is damaged.

Bone marrow transplantation procedure

Test for compatibility: The physicians conduct a test in the lab known as cross-matching to ensure that no response is caused when the donor's cells are introduced to the recipient's blood then the first blood tests have revealed that the donor and recipient's Human Leukocyte Antigen (HLA) are compatible. If there is no response, the transplanting surgery can proceed. In extremely rare circumstances, the recipient's blood may reject HLA-compatible donors' blood during the cross-matching test, in such case the doctor decides not to proceed with the transplantation surgery.

Donation of stem cells: Stem cells are often extracted from the healthy donor's pelvic bone (iliac crest) (bone marrow donation). However, the least invasive method now available is peripheral donation, which involves taking stem cells straight from the donor's circulation using a syringe. On rare cases, when specialized personnel and techniques are available, stem cells from cord blood are extracted through the newborn baby's umbilical cord; in this scenario, the number of stem cells collected may provide difficulties for the transplant's effectiveness.

Myeloablation: This technique prepares (or conditions) the patient to receive stem cells from the donor. Prior to the transplant, the patient is subjected to a period of therapy that eliminates the patient's own bone marrow cells in order to make and build the environment for the donor's cells, a procedure known as myeloablation. This is accomplished mostly by chemotherapy (drugs that kill bone marrow cells) or, in rare cases, irradiation (which is no longer indicated in non-malignant illnesses such as thalassaemia).

Transplantation: Similar to a typical blood transfusion, the donor's stem cells are transfused into the recipient's circulation. Once in the recipient's blood, the donor's stem cells move to the bone marrow, which is found in the big bones of the body and they begin to produce normal, healthy blood cells, including red blood cells. This procedure takes around 2-3 weeks.

Cure: If the transplant is successful, the recipient's bone marrow activity is taken over by the healthy donor's stem cells, which have a normal -globin gene, and they continue to create healthy red blood cells in the patient's body. This indicates that the patient's -thalassemia has been cured.

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