Bone Marrow Harvest – Donor

Anesthesia Protocol
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Overview

Bone Marrow Transplantation (BMT) is an oncologic/hematologic technique for treating a variety of malignancies, hematologic diseases and some genetic diseases that involve the hematopoetic or immunologic systems. The technique involves supralethal chemotherapy & or total body irradiation designed to completely ablate all residual neoplasm, hematologic and immunologic function in the patient (recipient). In the absence of hematologic or immunologic function the recipient would die in a short period of time. Therefore, a day or so after the completion of the chemotherapy/radiation the donor bone marrow, which has been harvested from the donor, is infused. A number of factors make it imperative that the recipient receive the donated marrow at the appointed time, shortly after completion of the hemotherapy / radiotherapy. These factors include: - minimizing the risk of infection by having the graft grow and function as early as possible, ensure correct timing of anti rejection drugs in the recipient and possible better success at engraftment. Hence it is critically important that the donor marrow is available for administration at the appointed time.

Once infused the transplanted marrow grows to replace the recipient’s marrow in all hematologic and immunologic functions. The recipient usually shows the first signs of donated marrow engraftment at about 12-15 days following its infusion, with slow progression to a plateau of maximal function over about a year.

The BMT recipient and the donor must be closely matched immunologically in order for the transplanted marrow to be accepted, not attacked, by residual host system and to ensure that, once engrafted, the donor graft does not attack the host tissues. Because of the need for a close immunologic match the majority of donors are related to the recipients, though about 30- 50% of matched donors and recipients are not related.

The Procedure

Donor marrow is obtained by aspirating it from the anesthetised donor’s illium pelvic bones via multiple punctures and aspirations (50-150) with 14-16G cannulae. This requires that the donor be prone, and perhaps supine. The amount of donor marrow (think blood) that is harvested is between 1.0 and 1.5 L. In addition it is not unusual for donors to get a substantial subcutaneous hematoma from the multiple punctures, which may account for another 500-750 ml blood loss. Marrow donation is usually done on an outpatient or limited stay (<24 hours) basis.
**Anesthetic Management**

From this brief description several critical issues about the management of bone marrow donors emerge.

1) It is absolutely essential that the donor is able to donate the marrow on the appointed day. By that day the recipient has already received the supralethal chemotherapy/radiotherapy, has had the hematologic and immunologic functions ablated and hence needs the donor marrow to survive. The donor case cannot be postponed or cancelled for any reason, except a truly life threatening emergency, once the recipient’s chemotherapy/radiotherapy has begun.

2) Donors are largely prone, but may be turned supine during the harvest.

3) Bone marrow harvesting is associated with significant blood loss – up to 2200ml.

4) The donations are done on an Outpatient/Limited stay basis – the donors should be fit to go home the same day, or shortly after.

With these precepts in mind the following anesthesia protocol is suggested.

**Preoperative Workup**

This will be initiated by the FHCRC Pain and Toxicity PA (who is a member of the Anesthesia Dept and has been trained in the Presurgery Clinic at UWMC) at FHCRC OP on First Hill. She will review the donor’s history and physical, fill in the Pre Anesthesia evaluation and discuss the evaluation with the UWMC PSC Attending. If no further workup is needed the UWMC PSC Attending will sign off on the donor. If further work up or therapy is needed, the donor will be referred to the UWMC Medicine Consult Service. Provided the donor remains a candidate for donation after this work up and therapy the PSC Attending will sign off on the donor. Remember it is essential that the donor donates at the appointed time and date and therefore all medical and other barriers must have been removed. Remember also that the safety of the donor is of the utmost importance since the donors derive no medical benefit from the procedure and yet are exposed to the risks of the procedure. Safety of the donor must not be compromised. All medical workup and approval of the donor for the procedure and anesthesia will take place before the recipient receives chemotherapy/radiotherapy.

**Pre BMT harvest donation of autologous blood**

Because of the significant blood loss which may occur with BM harvest some donors may store 1-2 units of autologous blood prior to BM harvest. Assure its presence in house. Assure the pt has the appropriate wristband.

**Immediately Preop**

- Routine consent.
- Discuss the potential need for autologous transfusion and your game plan for dealing with that need *(see below)*
- Plan for a 90-120 minute procedure.
- Start IV of appropriate size (16,14) to permit rapid &/or voluminous infusions.
- Routine monitors (EKG, BP, pulse oximetry). More sophisticated or invasive monitors as the donor’s condition demands.
- Preoperative antibiotics are not routinely used, but check with the harvest team.
- Consider loading with IV fluids.
- Avoid urinary catheter

**Intraop**

- Spinal, epidural or general anesthesia is appropriate. Spinal and epidurals have advantages in that they restrict marrow exposure to pharmaceuticals but experience has shown that hypotension and the prone position is often problematic.
- General anesthesia is acceptable, but one should avoid agents that are metabolized or known to have adverse effects on hematopoiesis – e.g nitrous.
- Specimen techniques include: Propofol / isoflurane, propofol/sevoflurane, mixtures of these including Remifentanil. Propofol alone has the theoretic disadvantage of being extracted with the marrow and given to the recipient.
- Pts are all prone – consider endotracheal intubation.
- Choice of relaxant – routine drugs satisfactory.
- Choice of antiemetics and analgesics based on Outpatient/Limited stay status. Ketorolac is not used routinely because of concerns about bleeding.

The established routine at FHCRC is that autologous blood is available. Because of volume loss it is desirable that the donors receive colloid, or autologous blood, intraoperatively. If the donors do not receive colloid or blood there is a high incidence of post op postural hypotension. Decide on colloid vs autologous blood based on clinical judgement. If you decide on colloid the oncologists reserve the right to tranfuse the autologous blood immediately postoperatively. Be careful to check the donor and the autologous blood as autologous blood transfusions carry a similar risk as allogeneic transfusions of ABO/Rh incompatibility, because of the risk of clerical error and of infection. If autologous blood is not available consider giving Hetastarch. Allogeneic transfusions should be avoided unless required for donor health.

**Postop**

- Rapid wake up.
- Run Hct in postop period.

Pts will either go to Surgicenter or limited stay and home within 24 hours.