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TEN YEARS EXPERIENCE WITH BLOOD SALVAGE IN CANCER SURGERY AND ITS EFFECT ON OUTCOME

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Background: The demand for blood in cancer surgery is high and increasing. Transfusion related immunomodulation induced by the allogeneic barrier and by storage lesions with an increased risk of postoperative infections and tumor recurrence is especially relevant to these patients. The contraindication of intraoperative blood salvage in cancer surgery can be overcome by blood irradiation, since effective elimination of tumor cells by 50Gy irradiation, namely at least a 12log reduction in proliferating cells, and high quality of the irradiated RBC have been demonstrated. In contrast, leukocyte depletion filters allow only limited reduction (3-4log) in tumor cell number.
Aims: The purpose of the study was to evaluate feasibility and efficacy of the combination of blood salvage and blood irradiation for tumor surgery in clinical practice. In addition, the impact of blood salvage on the outcome of cancer patients should be tested in a procedure with a relevant rate of transfusion.
Methods: Wound blood was collected and processed during surgery of primary tumors or metastasis. Washed RBC were transferred to an irradiation bag (BT500, Sorin) and irradiated with 50Gy (IBL437, CISbio) prior to retransfusion. Survival of patients with spinal metastasis was evaluated 2 years after surgery.
Results: Tumor cells were detected in wound blood in 92% of 235 tested cases in numbers up to 10,000,000. We found no safety with 'small tumors', or a 'large surgical safety margin'. Intraoperative blood salvage with blood irradiation was performed in 1300 cancer patients including surgery of abdominal and bone tumors, spinal and hip metastasis, liver resection and transplantation. Tumor surgery has doubled our use of blood salvage. Irradiated blood was back to the patient within 20-30 min. Efficient reduction in allogeneic blood transfusions was observed. This method made tumor surgery available for Jehovah's Witness patients. Retrospective data of our patients with spinal metastasis (n=118) showed a significantly better outcome with autotransfusion. Mean blood loss during surgery was about 3.0 litres in both groups, and a mean of 3.7 units of RBC, or 3.4, respectively, were transfused. Median survival time was 6.0 months in patients receiving banked blood exclusively, and 10.8 months in the patients with autologous transfusion. The difference in the Kaplan-Meier survival curves was statistically significant with p= 0.001 in the log-rank test.
Conclusions: Blood irradiation is necessary prior to retransfusion to eliminate proliferating tumor cells contaminating salvaged blood. A dose of 50Gy is safe in eliminating tumor cells of any type and any clinically relevant number, and safe in not interfering with the excellent quality of the fresh, autologous RBC. Blood salvage supports blood supply in major cancer surgery, reduces transfusion risks, saves blood resources, and might even improve the outcome of cancer patients. Our data on patients with spinal metastasis provide a basis for a randomized, prospective multicenter study overcoming the drawbacks like low transfusion rate and storage lesions of former trials to demonstrate an advantage of autologous blood for cancer patients. ernilhansen@gmx.de