Transfusion of irradiated intraoperatively collected autologous blood in orthopaedic tumour surgery: a possible alternative to the allogeneic blood transfusion

Introduction
Surgical treatment of orthopaedic patients is sometimes accompanied with significant intraoperative and/or postoperative blood loss, thus leading to a need of blood transfusion. The need for blood transfusion in orthopaedic tumor operations is sometimes even greater than in non-oncology operations. The system of intraoperative cell salvage could be a possible option, but since the tumour cells might be present within the scavenged blood it is unclear whether it is contraindicated due to high risk of tumor dissemination.

There are two possible ways used in attempt to eradicate tumor cells from the intraoperative collected autologous blood. (1) A leukocyte depletion filter is used as an effective system for tumor cells removal, and is used in various surgical fields. (2) Irradiation of the intraoperative collected autologous blood transfusions should theoretically destroy all viable tumor cells, thus making it usable for retransfusion.

The aim of this report is to review the current evidence for cell salvage in orthopaedic tumor operations. We also present our experience with the pilot study of the irradiated intraoperative collected autologous blood transfusions in orthopaedic tumor surgery.

Materials and methods
We searched the Medline/PubMed, Web of Science, Scopus, and Cochrane Database of Systematic Reviews in order to find the clinical application of using intraoperative collected autologous blood transfusions in orthopaedic oncology surgery.

In our pilot study we considered using irradiated intraoperative collected autologous blood transfusions in cases where significant blood loss was expected, and in a patients with a tumors with a higher risk of intraoperative bleeding (like renal cell carcinoma metastasis). We have available gamma irradiation of the autologous blood on-site, which could be used when needed. Used radiation dose was 60 Gy.

Results
The publications regarding autologous blood transfusion in orthopaedic tumor surgery is scarce. In-vitro studies have shown that filtering and irradiating the salvaged blood eradicate tumour cells or significantly reduce the number of tumour cells. According to available publications, in the non-orthopaedic tumor operations there is no evidence of a negative clinical/oncological impact of the autotransfusion.

In our pilot we included five patients: three with pathologic pelvis fracture due to renal cell carcinoma (n=2) and breast carcinoma (n=1), one with one with pathologic proximal humerus fracture due to multiple myeloma, and one with 5th thoracic vertebrae metastasis due to angiosarcoma. We transfused an average 380 ml (range: 130 ml to 950 ml) of the irradiated intraoperative collected autologous blood. None of our patients had postoperative infection or any transfusion reaction. The follow-up was to short for the analysis of the tumor recurrence.

Conclusion
The present literature lacks the recommendations regarding the use of autologous transfusion in orthopaedic tumor surgery. Due to risks and benefits of both autologous cell salvaged blood in comparison to allogeneic blood the efforts are needed towards autologous transfusion. The ongoing study of the clinical application of the irradiated intraoperative collected autologous blood transfusion in a larger number of patients by stated group of authors is in progress.

Keywords: , , ,
Authors: , , ,
References: ,

Authors

Marko Bergovec 1, Adolf Rudorfer 2, Andreas Fellner 2, Bernadette Liegl Atzwanger 3, Daniela Hirzberger 1, Jörg Friesenbichler 1, Florian Ludwig Amerstorfer 1, Andreas Leithner 1,
1. Department of Orthopaedic Surgery, Medical University Graz, Graz, AUSTRIA
2. Department of Anesthesiology, Medical University Graz, Graz, AUSTRIA
3. Institute of Pathology, Medical University Graz, Austria, AUSTRIA

Authors (raw format)
Bergovec Marko - email: marko.bergovec@medunigraz.at Institution: Department of Orthopaedic Surgery, Medical University Graz Department: City: Graz Country: AUSTRIA Speaker: Yes

Rudorfer Adolf - email: adolf.rudorfer@medunigraz.at Institution: Department of Anesthesiology, Medical University Graz Department: City: Graz Country: AUSTRIA Speaker: No

Fellner Andreas - email: andreas.fellner@medunigraz.at Institution: Department of Anesthesiology, Medical University Graz Department: City: Graz Country: AUSTRIA Speaker: No

Liegl Atzwanger Bernadette - email: bernadette.liegl.atzwanger@medunigraz.at Institution: Institute of Pathology, Medical University Graz Department: City: Graz Country: AUSTRIA Speaker: No

Hirzberger Daniela - email: daniela.hirzberger@medunigraz.at Institution: Department of Orthopaedic Surgery, Medical University Graz Department: City: Graz Country: AUSTRIA Speaker: No

Friesenbichler Jörg - email: joerg.friesenbichler@medunigraz.at Institution: Department of Orthopaedic Surgery, Medical University Graz Department: City: Graz Country: AUSTRIA Speaker: No

Amerstorfer Florian Ludwig - email: florianludwig.amerstorfer@klinikum-graz.at Institution: Department of Orthopaedic Surgery, Medical University Graz Department: City: Graz Country: AUSTRIA Speaker: No

Leithner Andreas - email: andreas.leithner@medunigraz.at Institution: Department of Orthopaedic Surgery, Medical University Graz Department: City: Graz Country: AUSTRIA Speaker: No