



# Inevitable Massive Transfusion for Spine Surgery in Patients with Multiple Myeloma



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## Abstract

The incidence of Multiple Myeloma (MM) is about 1% of all malignancies and 15% of hematologic malignancies. There are several difficulties during the intra operative management of patients with MM. In recent years, Tranexamic Acid (TXA) has been reported to be used safely without increasing the risk of venous thromboembolism and other complications. The present case report aimed to introduce the management of massive bleeding of a MM patient undergoing lumbar instrumentation.

**Keywords:** Tranexamic acid; Massive transfusion; Spine surgery; Multiple myeloma

## Introduction

The incidence of Multiple Myeloma (MM) is about 1% of all malignancies and 15% of hematologic malignancies [1]. There are several difficulties during the intraoperative management of patients with MM; malignant hematological disorders and thrombosis may be an issue. As immunomodulation may occur with allogenic transfusion, the use of cell saver is a source of major controversy [2]. In recent years, Tranexamic Acid (TXA) has been reported to be used safely without increasing the risk of venous thromboembolism and other complications [3]. The present case report aimed to introduce the management of massive bleeding of a patient operated with lumbar instrumentation in between T1-T10, vertebroplasty and 2 level laminectomy due to a MM mass located in thoracic vertebrae T2-T3.

## Case Report

A male 60 year old patient in 70kg had a background of hypertension and MM history diagnosed about one year ago. The patient operated for inguinal hernia repair, meniscus and vertebroplasty surgeries was also given chemotherapy and radiotherapy due to MM 9 months ago. He was in a therapy including metoprolol succinate 25mg, aciclovir 200mg, nifedipine 30mg and lansoprazol 30mg. Physical examination of the patient showed his functional capacity as 4 MET, with a risk of unstable angina. ECG showed sinus rhythm at a rate of 66bpm, detecting ST depression in D2, D3, AvF derivations. His echocardiography indicated the ejection fraction as 57%, 1 positive mitral insufficiency, 2-3 positive aortic insufficiency, 1 positive tricuspid insufficiency, systolic pulmonary arterial pressure as 27mmHg, type 4 atrial septal

aneurysm and dilatation (4.8mm) in ascending aorta. In cardiology consultation, Myocardial Perfusion Scintigraphy was requested. An inferoseptal perfusion defect was detected and found to be compatible with ischemia. Coronary angiography of the patient indicated a 30% obstruction in the Left Anterior Descending (LAD) artery, recommending a medical therapy. Preoperative laboratory findings were as follows: Hematocrit: 29.6%, Hemoglobin: 11.2g/dL, Platelets: 76000/mcL, Leukocyte: 5000/mcL, PT: 13, 7sec, a PTT: 28.0sec, INR: 1.16, creatinine: 1.1mg/dL, Glucose: 87mg/dL, Sodium: 132mEq/L, Potassium: 4.2mEq/L, Sedimentation: 1<sup>st</sup> hour 79mm/h, 2<sup>nd</sup> hour 102mm/h.

Following the chemotherapy and radiotherapy treatment, relapsed malign melanoma emerged in the patient and thrombocytopenia developed in dependent on bone marrow infiltration. Preoperative hematology consultation was requested. Rare macrothrombocytes were detected in the peripheral smears. In the morning of surgery, 1U apheresis thrombocyte transfusion was applied to the patient. Thereafter, the platelet level increased up to 106000/mcL and the patient was taken into operation.

In his electromyography, polyneuropathy correlated with the chemotherapy and lack of deep tendon reflex in right leg was found. Operations on the patient were planned as thoracic instrumentation, vertebroplasty and 2 level laminectomy in between T1-T10 due to a MM mass located in thoracic vertebrae T2-T3.

Intravenous injections of propofol 2.5mg/kg, fentanyl 2mcg/kg, rocuronium 0.6mg/kg were administered to the patient. Then, 25mg/kg dose of TXA was administered as IV bolus to the

patient for bleeding prophylaxis. At the perioperative period, the patient was hemodynamically stable. Mean arterial pressure did not decline under 60mmHg. In fluid management, crystalloids and gelatins were used together. Maintenance of crystalloids was calculated and added as 1mL/kg dose for 10 hours. Until bleeding reached to approximately 800mL, 2 gelofusine infusions were administered. For the reason that the bleeding continued, 1U Erythrocyte Suspension (ES) transfusion was applied. Thereafter, the bleeding reached to 1800mL. At this stage, second and third ES transfusions were applied and third gelofusine was administered. Urine excretion reached to 350mL, CVP was 19mmHg. Hemogram, blood gas, PT, PTT, INR were re-studied from blood sample of the patient. INR was 1.65, PT: 16,9sec and a PTT: 45.1sec, Htc: 24.5%, Platelet: 70000/mcL, Fibrinogen: 122000mg/dL. Two Units of Fresh Frozen Plasma (FFP) were administered.

Initial body temperature was 36.1 °C slightly decreased to 35.8 °C. All fluids and blood products of the patient were administered as warmed up. Since the patient was laid down in prone position on the frame, all extremities were covered by cottons and lower extremities were covered by heater blanket against heat loss. Totally 4U FFP, 6U ES transfusion, as well as 30mL calcium gluconate were administered IV. Total urine excretion was 750mL, anesthesia lasted for 8hour 45min and operation duration was 8 hours. At the end of operation, CVP was 5mmHg at supine position; laboratory results indicated an INR: 1.24, PT: 14.7sec, a PTT: 39.7sec, fibrinogen: 164000mg/dL. Since Htc was 24.6%, 7th ES transfusion was performed; the patient was transferred to surgical intensive care unit. In blood gas, pH was 7.40, PCO<sub>2</sub>: 36 mmHg, PO<sub>2</sub>: 187mmHg, HCO<sub>3</sub>: 22.4mEq/L, BE: -4mEq/L, Lactate: 1.0mg/dL, Potassium: 4.2mEq/L, Sodium: 136mEq/L, Glucose: 132mg/dL. During skin closure, 1U apheresis thrombocyte suspension was administered. Thereafter, the control hemogram showed the platelet level as 90000/mcL. Totally 1500mL physiological serum, 3000mL Isolyte S, 1500mL gelofusine, 7U ES, 4U FFP was administered. There was no leakage as a massive bleeding during all stages of the operation. There was not disseminated intravascular coagulation either.

At first postoperative day, one more U of apheresis thrombocyte suspension was transfused in the intensive care unit due to the regression of Platelet level to 69000/mcL. Htc was 30.7%, Hb: 11.9 g/dL, Leukocyte: 5250/mcL, PT: 14.8sec, aPTT: 31.7sec, INR: 1.25, LDH: 952U/L, CPK: 1248U/L, BUN: 13mg/dL, creatinine: 0.7mg/dL, albumin: 3.1g/dL. At first postoperative day, the patient was extubated. At 3<sup>rd</sup> day, he was transferred to orthopedics ward. At the end of treatment laboratory results were as follows: Htc was 27.7%, Hb: 10.1g/dL, Leukocyte: 6340/mcL, Platelet: 79000/mcL, albumin: 3.0g/dL, CRP: 26mg/L, BUN: 12mg/dL, Creatinine: 0.8mg/dL. Postoperative IV Patient Controlled Analgesia was administered content with meperidine.

## Discussion

Preoperative thrombocytopenia occurred in this patient was the main factor on increasing the bleeding. On the other hand, using a cell saver was not possible in this MM case; thereby 25mg/kg IV

bolus dose of TXA was administered to the patient at the beginning of operation. Our purpose of this was to prevent more increase in bleeding by using an anti fibrinolytic agent, as well as averting loss of coagulation factors due to bleeding. One of the most large-scaled studies using TXA, CRASH 2 research, a placebo controlled randomized study, stated to administer either 1g IV bolus dose of TXA or placebo to totally 20.111 traumatic patients at the first 8 hours [4]. This study reported no increased risk of thrombosis, even found a significant decrease in incidence of fatal and non-fatal thrombotic cases of TXA administered patients.

A recently published meta-analysis evaluating 73 randomized controlled studies analyzed the data of 4174 patients undergoing major orthopedic surgery with a high risk of thromboembolism and 2779 control patients [5]. According to the results, the thromboembolism incidence of the patients administered with TXA was 2.1% while not-administered incidence was 2.0%. Consistent with these studies, our case report also revealed that TXA can be used safely. The fact that we could not use a cell saver due to a cancer operation history of the patient, increased bleeding in this major surgery. However, TXA application limited the bleeding without any more increase. Massive transfusion was applied to the patient. We could not prevent this condition but we consider that the bleeding would seriously increase in case of not using TXA.

If this patient got an IV iron therapy from the beginning of the preoperative period, we consider that his perioperative bleeding could be limited. Because, delivered to the anesthesia clinic, Hb value of the patient was 11.2g/dL and he was anemic according to the criteria of World Health Organization [6]. However, we did not have enough time for an iron therapy for this patient undergoing a cancer surgery. Yet the amount of transfused blood could be reduced in this patient if his anemia was cured with an oral or IV iron therapy.

A Cochrane review has reported that 76% of the patients in the preoperative period are anemic [7]. Transfusion need in the preoperative period was reported to decline for 30% on the patients who are cured with iron therapy.

## Conclusion

In the reported case, we have demonstrated that optimizing coagulation through goal directed use of blood products with the administration of TXA can reduce bleeding in major orthopedic surgery.

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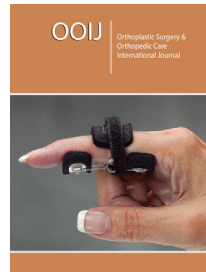
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