Comment on "Tranexamic acid for control of blood loss in bilateral total knee replacement in a single stage"

Sir,

We agree with the authors that there is limited literature regarding the use of tranexamic acid (TEA) in patients undergoing concurrent bilateral total knee arthroplasty (TKA).[1] Although, TEA has been very effective in controlling overall blood loss in TKA and need for a transfusion, but the optimal dose, timing of administration and even the route of administration has been a matter of debate.

Various studies have recommended different dosages and timings for TEA administration. Two injections of TEA, one given preoperatively and one on deflation of the tourniquet, significantly reduce blood loss without increasing the risk of thromboembolic complications.[2] Another study has proposed that before deflation of the tourniquet, 15 mg/kg of TEA when given intravenously followed by two 10-mg/kg additional doses significantly reduce blood loss.[3] Single dose of TEA has also been shown to be equally efficient in controlling blood loss during TKA.[4] In some studies, three dosage TEA have been used, the 1st 30 min before tourniquet release, and two subsequent injections at the gap of 3 hours each. In a study conducted by us, using three dosages regimen in patients undergoing simultaneous bilateral TKA, the mean amount of blood collected in the drain in the first 24 hours was significantly lower in the group receiving TEA when compared to placebo (292.9 vs. 568.3 ml). The mean amount of blood collected on the second day was also lower in the TEA group (63.7 vs. 115.7 ml). The present study with two doses of TEA has shown that the total postoperative drain output is lower in patients who receive TEA as compared to the control group (275 vs. 810 ml).[1]

Fibrinolysis is a cascade that is easier to inhibit in its early phase. TEA inhibits clot lysis more efficiently when administered before clot formation than after the fibrin clot is formed, i.e., it is not effective once plasminogen is bound to the fibrin surface.[5] This probably explains why TEA has little effect when administered at the end of surgery and must be given prior to the onset of actual bleeding during surgery. Fibrinolytic response following surgery is biphasic with an increased fibrinolytic activity during the first hours, followed by a fibrinolytic shutdown that peaks at around 24 hours,[6] with maximum effect in first 6 hours and hence it is more rationale to use it in three dosages for 6 hours in perioperative period.

Since the systemic administration of TEA carries the risk of thromboembolic events such as deep vein thrombosis or pulmonary embolism, certain studies have been published to see the efficacy of TEA by oral and topical form in reducing the bleeding after TKA. In TKA with cement, topical application of TEA directly into the surgical wound reduces postoperative bleeding by 20-25%, or 300-400 ml, with no clinically important increase in complications.[7] In spite of these potential benefits, the innovative idea of topical application of TEA has not been studied in TKA. It has also been observed that the blood-sparing efficacy of oral TEA is similar to that of IV TEA.[8] Contrary to majority of studies, one study has shown that TEA is not effective in prevention of hidden blood loss during TKA.[9]

We believe that more multicentric trials using larger number of patients are required to establish a definitive protocol for the use of TEA in TKA, with special reference to the dosage, timing and route of administration.

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References

1. Dhillon MS, Bali K, Prabhakar S. Tranexamic acid for control of blood loss in bilateral total knee replacement in a single stage. Indian J Orthop 2011;45:148-52.
2. Tanaka N, Sakahashi H, Sato E, Hirose K, Ishima T, Ishii S. Timing of the administration of TA for maximum reduction in blood loss in arthroplasty of the knee. J Bone Joint Surg Br 2001;83:702-5.
3. Hiippala ST, Strid LJ, Wennerstrand MI, Arvela JV, Niemelä HM, Mäntylä SK, *et al.* Radically decreases blood loss and transfusions associated with TKA. Anesth Analg 1997;84:839-44.
4. Ralley FE, Berta D, Binns V, Howard J, Naudie DD. One intraoperative dose of TA for patients having primary hip or knee arthroplasty. Clin Orthop Relat Res. 2010;468:1905-11.
5. Krishnamurti C, Vukelja SJ, Alving BM. Inhibitory effects of lysine analogues on t-PA induced whole blood clot lysis. Thromb Res 1994;73:419-30.
6. Risberg B. The response of the fibrinolytic system in trauma. Acta Chir Scand Suppl 1985;522: 245-71.
7. Wong J, Abrishami A, El Beheiry H, Mahomed NN, Roderick Davey J, Gandhi R, *et al.* Topical application of TA reduces postoperative blood loss in TKA a randomized, controlled trial. J Bone Joint Surg Am 2010;92:2503-13.
8. Zohar E, Ellis M, Ifrach N, Stern A, Sapir O, Fredman B. The

postoperative blood-sparing efficacy of oral versus intravenous TA after total knee replacement. Anesth Analg 2004;99:1679-83.
9. Good L, Peterson E, Lisander B. TA decreases external blood loss but not hidden blood loss in total knee replacement. Br J Anaesth 2003;90:596-9.

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