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Short Communication

Practical Application of Basic Concepts: Tranexamic Acid and Lowering Blood Transfusions in the Fragility Hip Fracture Population

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DESCRIPTION

Fragility fractures of the proximal femur remain a common source of morbidity and mortality in the United States of America and worldwide. Although definitions vary by center, at our institution we define a fragility fracture as any fracture in a patient over the age of 50 that occurs after a fall from a standing height or similar low energy mechanism [1]. There were 10 million fragility hip fractures worldwide in 2019, with that number expected to nearly double by 2050 [2,3]. Loss of functional status and walking ability is nearly the rule after hip fractures, and many patients lose the ability to live independently. The lifetime risk of a hip fracture in white women is 1 in 6, *versus* 1 in 9 for breast cancer [4]. Mortality rates after hip fracture approach 10% at 30 days, and rise to nearly 30% by 1 year [5].

The reasons for such poor outcomes are no doubt myriad, with poor baseline health status combining with injury and surgical factors as well as prolonged immobility. Considerable research effort has been aimed at improving poor outcomes and mortality with a focus on expediting surgical treatment of fragility hip fractures. Extensive data shows fewer complications, shorter hospital length of stay, and lower mortality when hip fracture patients have surgery within 48 hours [6].

Reduction of blood loss and transfusion utilization have also been part of the effort to improve outcomes. Hip fracture patients who receive a blood transfusion have nearly a 2.5 times higher risk of mortality at 1 year [7]. Transfusion rates for hip fracture patients vary, but have been reported as high as 64% [8]. Evidence has been mounting in recent years that Tranexamic Acid (TXA) can be a safe and effective tool to limit blood loss and transfusions in total joint arthroplasty patients [9]. Principles learned have also been extended now to fracture patients in general, and fragility hip fracture patients more specifically [8]. Tranexamic acid blocks lysine binding sites on plasminogen, thereby stabilizing existing clots by preventing breakdown of fibrin monomers.

Although more work is required to elucidate the most effective dosing regimen, our data indicates that intravenous administration of 1g TXA upon induction of anesthesia for hip fracture surgery reduces transfusion risk by 65% *versus* controls, and by 48% *versus* patients who received locally injected TXA into the surgical incision at closure [1]. We observed no increase in complication risk or venous thromboembolism, which is consistent with prior literature [8]. We also observed a statistically significant reduction in 30 day readmission risk for patients receiving intravenous TXA, but further research is needed to determine any causal relationship.

Multiple dosing of TXA may offer an even more powerful reduction in blood loss and transfusion risk. Data suggests a four intravenous dose regimen (admission, infusion prior to surgery, at time of surgery, and a final dose several hours after surgery) may be superior to a single dose [10]. We have been emulating this dosing pattern, and although data is preliminary, results have been encouraging thus far. Blood loss associated with a fracture starts immediately and will continue throughout the perioperative period. It therefore stands to reason that prolonging the duration of an effective TXA tissue concentration can help to limit persistent bleeding in the hip fracture patient.

Future research should be targeted at other ways to limit blood loss and transfusion, as our data still show a transfusion rate of 21%, even in patients receiving IV TXA. Refinement of TXA administration schedules and dosing, surgical timing, anesthetic techniques and multidisciplinary care for hip fracture patients all show promise in the continuing effort to improve fragility hip fracture outcomes. The use of TXA is another in a long list of examples of knowledge gained in one discipline having practical applications for improving outcomes for patients in another discipline. With continued research and effort by many specialties we are confident that further progress can be made to improve the treatment of this vulnerable patient population.

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