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Introduction

Tranexamic acid is a synthetic reversible competitive inhibitor that exerts its action on plasminogen, preventing plasmin formation and deterring fibrinolysis.[1] Current FDA-approved indications of TXA include heavy menstrual bleeding and short-term blood loss prevention in patients with hemophilia following tooth extraction.[1] TXA has more recently been utilized in the management of massive hemorrhagic trauma patients despite this being an off-label use. While TXA has shown promise as a hemostatic agent for this patient population, considerations in the pre-hospital and hospital settings must be examined for its integration into massive hemorrhage protocols.

Pre-Hospital Setting

Massive hemorrhagic trauma demands immediate medical attention to prevent hypovolemic shock, making timing a high priority in appropriate management. The optimum time to administer TXA is within three hours of injury, as it exerts its maximum effects on plasminogen during this time frame.[2] While TXA is commonly administered intravenously, intramuscular injection can meet the demands of massive hemorrhagic trauma when IV cannulation is difficult to establish.[2] TXA administration beyond the 3-hour window appears to increase bleeding risk.[3] Feasibility of TXA underscores its value in a pre-hospital setting, remaining stable between -20°C to 50°C for 12 weeks and costing between $48 and $64 per life-year saved.[3]

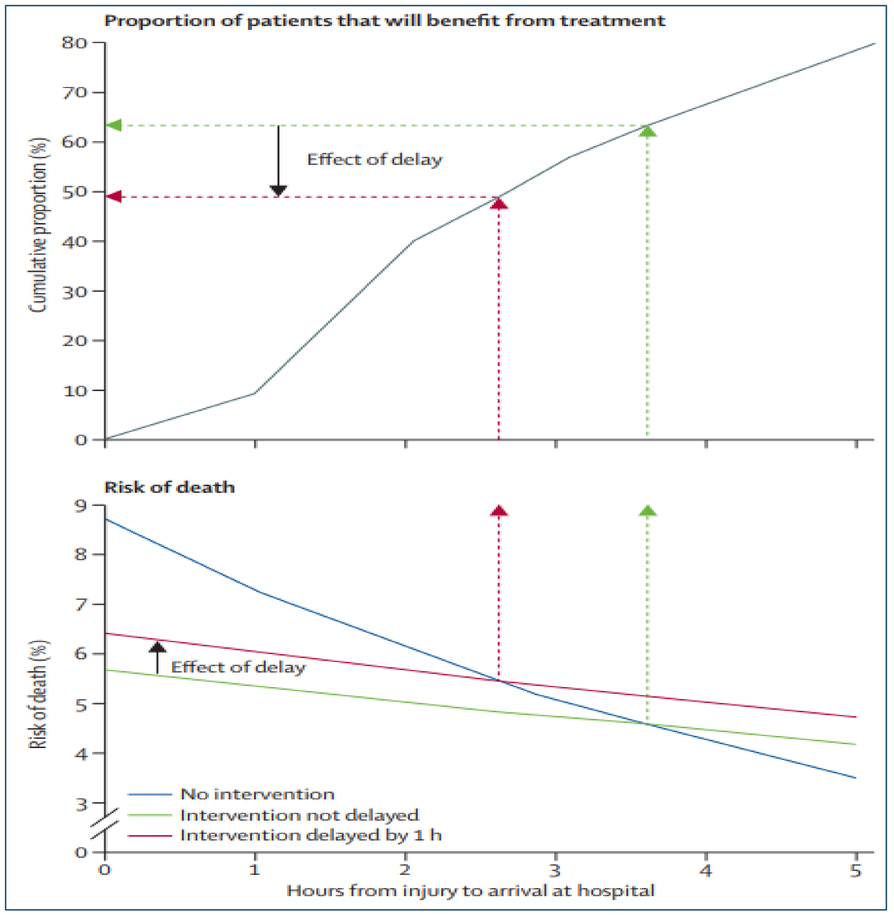

Figure 1. Linear regression models demonstrating 63% versus 49% of patients benefitting from non-delayed versus 1 hour delayed TXA treatment and risk of death in treated versus untreated patients, respectively.[3]

References

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Hospital Setting

Vascular occlusive events are a major concern in hemorrhagic trauma management. TXA aids in vascular occlusive event prevention, showing greater preventative benefit the earlier TXA is administered.[4] Degree of fibrinolysis in hemorrhagic trauma patients may be considered, however the decision to administer TXA should not be confined to this single parameter. While patients with no fibrinolytic activity may not gain clinical benefit from TXA, administration in patients with varying degrees of fibrinolytic activity still provides reduced fibrinolysis without serious side effects.[5] TXA has been shown to carry no independent association with an increased risk of post-injury infection as a result of its mechanism of action.[6] Patients with impaired renal function should be closely monitored as TXA is renally excreted.[1] The only absolute contraindication of TXA use in an acute hemorrhagic trauma setting is in patients with a thrombotic disseminated intravascular coagulation.[3]

Conclusion

TXA is a reliable and cost-effective option that reduces the risk of death due to exsanguination and hypovolemic shock in trauma patients with no serious side effects reported.[7] TXA shows no evidence of increasing vascular occlusive event risk and is safe as an acute hemostatic agent in hemorrhagic trauma patients.[4] Administration within a 3-hour window is crucial for maximizing proportion of patients benefitting from TXA and minimizing risk of death from massive hemorrhage.[3]