

EDITORIAL

Intraarticular Tranexamic Acid in Arthroscopic Knee Procedures: Has There Been Any Progress in the Last 5 Years (2021-2025)?

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Tranexamic acid (TXA) has been steadily more employed for decreasing blood loss in total knee arthroplasty (TKA). In 2020 Mortazavi et al found that during TKA, intraarticular (IA) TXA was to the same degree safe and efficacious as its intravenous (IV) infusion with regard to diminished blood loss and adverse effects.¹

In 2025 Dragosloveanu et al published that TXA effectively diminished blood loss in TKA without increasing thromboembolism risk. The mixed use of TXA (IV and IA) in individuals experiencing TKA was more efficacious than IV-only employment.²

In September 2020 it was stated that some publications seemed to prompt the employment of IV-TXA in individuals experiencing arthroscopic anterior cruciate ligament reconstruction (ACLR) and arthroscopic partial meniscectomy to reduce articular bleeding after surgery and its complications [pain, inflammation, loss of range of motion (ROM), necessity for joint aspiration].³⁻⁶

Besides, it was also stated that with regard to the employment of IA-TXA, one *in vitro* study had encountered that high concentrations of IA-TXA was cytotoxic to chondrocytes. Additionally, such cytotoxicity was dose-dependent (a 10 mg/mL to 20 mg/mL concentration might be harmless). However, when the concentration of IA-TXA was above 20 mg/mL, chondrocytes can be damaged.^{3,7}

Therefore, in September 2020 my viewpoint was that until well-designed studies could validate that IA-TXA was not cytotoxic to chondrocytes, its employment should not be advised. In other words, in individuals undergoing arthroscopic ACLR and arthroscopic partial meniscectomy, it seemed safer to employ IV-TXA.³

The purpose of this Editorial has been to analyze the literature on the role of IA-TXA in arthroscopic knee surgery and its possible complications, particularly with regard to the potential damage that TXA can cause to chondrocytes. To this end, on 19 December 2025, a literature search was conducted in PubMed using the keywords 'knee arthroscopy intraarticular tranexamic

acid'. Seven articles were found, of which only four were analyzed as they were directly related to the title of this Editorial.

Studies of Interest Published Between 2021 and 2025

In July 2019 Chiang et al evaluated the impact of IA-TXA in individuals undergoing ACLR (single-bundle reconstructions utilizing autologous hamstring tendon grafts). In a prospective comparative study (level II of evidence) a total of 304 individuals were included. Individuals were randomized into 2 cohorts: Cohort 1 individuals (TXA cohort) experienced ACLR with a 10-mL IA injection of TXA (100 mg/mL). Cohort 2 individuals (control cohort) underwent ACLR without TXA injections. An IA suction drain was put in the knee and clamped for 2 hours following surgery. One day after surgery, a considerable decrease in the amount of drainage was encountered in individuals receiving IA-TXA (TXA cohort, 56 mL; control cohort, 80 mL). On day 3 and at week 4, the intensity of pain significantly diminished in the TXA cohort. However, at week 4, no differences were encountered between the 2 cohorts in the IKDC scores. The conclusion was that IA-TXA could significantly diminish IA bleeding and alleviate pain in the first 24 hours after surgery in individuals experiencing arthroscopic ACLR. Besides, no systemic complications or need for arthrocentesis was found. Consequently, IA-TXA could be contemplated an efficacious and relatively safe option to diminish postoperative bleeding and pain in ACLR individuals.⁸

In June 2021 Bolam et al reviewed the literature about the potential toxicity of TXA on the IA cells. Experimental studies showed that TXA concentrations beyond 20 mg/mL were cytotoxic to chondrocytes, tenocytes, synoviocytes and periosteum-derived cells. However, no clinical studies were encountered.⁹

In February 2022 Alkhatib et al conducted a systematic review of available randomized controlled trials (RCTs) in the literature that analyzed results after TXA employment in ACLR to define its efficacy (a level II, systematic review of

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therapeutic level I-II studies). A total of 807 individuals from 7 RCTs were included. The age of patients was 28 years on average. Need for arthrocentesis was less with TXA employment.¹⁰

In May 2023 analyzed the potential efficacy of IA-TXA in 80 individuals with pigmented villonodular synovitis (PVNS) who experienced arthroscopic synovectomy of the knee. Individuals were divided into two cohorts: cohort A was the control group, whereas individuals in cohort B received an intraarticular injection of 50 mL of TXA (1 g:100 mL) immediately after the synovectomy. A lower volume of drainage was encountered in cohort B than in cohort A at 24 hours, 48 hours, and in total. A lower VAS pain score in cohort B was noticed at 24 hours and 48 hours. ROM and Lysholm score were significantly superior in cohort B compared with cohort A two weeks after surgery. Regarding adverse events, 3 individuals in cohort A and 1 individual in cohort B developed deep venous thrombosis after surgery. Articular bleeding occurred in 5 individuals in cohort A during follow-up. IA-TXA seemed to be efficacious in diminishing postoperative bleeding and early postoperative pain for individuals who experienced arthroscopic synovectomy of PVNS.¹¹

Conclusion

Two of the four articles published after September 2020 were systematic reviews. The first systematic review found that concentrations of TXA beyond 20 mg/mL were cytotoxic to chondrocytes, tenocytes, synoviocytes and periosteum-derived cells. The other systematic review suggested that the utilization of TXA in ACLR diminished the need for joint aspiration, articular bleeding, drain output, and knee inflammation in the postoperative period. The other two articles were clinical studies. One of them contemplated IA-TXA as a potentially efficacious and relatively safe option to diminish postoperative bleeding and pain in ACLR individuals. The other clinical study found that IA-TXA was efficacious in diminishing postoperative bleeding and early postoperative pain in individuals who underwent arthroscopic synovectomy of

PVNS. Given the scarcity of well-designed studies on the long-term impact of IA-TXA on chondrocytes, we cannot know whether IA-TXA is harmful in the long-term, although it certainly appears to be beneficial in the short-term following some arthroscopic knee procedures (diminish postoperative bleeding and pain in ACLR and PVNS individuals). It is clear that very little progress has been made in the last five years and that well-designed, long-term studies will be needed to determine whether IA-TXA is harmful to chondrocytes in arthroscopic knee surgery.

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