

Tranexamic Acid in Anterior Cruciate Ligament Reconstruction

Subjects: **Orthopedics**

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There are several papers that investigate the use of tranexamic acid (TXA) in anterior cruciate ligament reconstructions (ACLR) or other arthroscopic procedures, that show favorable results and little to no complications. In our systematic review we show that TXA use in arthroscopic ACLR decreases postoperative blood loss and pain. Some evidence of improvement in functional scores were observed, but we believe that needs to be addressed in specific long-term result studies.

tranexamic acid

anterior cruciate ligament reconstruction

postoperative pain

knee hemarthrosis

1. Introduction

One of the most often performed arthroscopic procedures in orthopedic surgery is the anterior cruciate ligament reconstruction (ACLR) while also remaining a low-risk surgical intervention ^[1]. The number of such procedures is constantly growing due to the predictability of its results and the short recovery period ^{[2][3]}. Postoperative pain is usually one of the most common complaints, leading to the delay in recovery and return to activity ^[4]. One of the pain sources can be excessive knee swelling caused by hemarthrosis. Besides affecting recovery rate, postoperative hemarthrosis can increase infection rates and cause cartilage toxicity ^[5].

Tranexamic acid (TXA- $C_8H_{15}NO_2$) is a widely used pharmacological agent that prevents needless blood loss in various pathologies ^{[6][7]}. TXA acts as an antifibrinolytic agent, stabilizing blood clots and preventing fibrin degradation ^{[8][9][10]}. These usually translate into an enhanced hemostasis, decreased intraoperative bleeding and related complications ^[11].

2. Tranexamic Acid in Anterior Cruciate Ligament Reconstruction

The common use of TXA in arthroscopies is beginning to gain traction, after it has already become widespread in arthroplasties and trauma.

When talking about the different TXA administration protocol, we can see two main ideas: IV and IA. Out of six studies, we saw three of them having an exclusively IV protocol, and a 4th one having two intervention groups—

One of the main concerns of the current literature is that statistically significant differences in VAS levels were not observed between the TXA and control groups (Table 1). The authors speculated that IA TXA can affect chondrocytes, as it was proven in an in-vitro study [12][13]. On the other hand, the authors showed that the cytotoxicity is related to the dosage of TXA, so further studies may be needed to determine a certain threshold that provides a sufficient benefit while not provoking toxicity. Furthermore, recent studies [14] have also shown that topical use of TXA also reduces surgical blood loss and need for blood transfusions during knee and hip arthroplasty while not increasing the risk for notable adverse events such as stroke or thromboembolism [15]. Our study failed to show a clear benefit for any one of the administration methods (IV vs. IA). Having differences in the pain management protocol may influence the significance of the VAS assessments. Postoperative morbidity brought down the VAS values and has been a secondary outcome in many studies. Pain management with TXA and NSAIDs will be worth that pain levels may be controlled either through analgesia or decreased intraarticular pressure that may be caused by postoperative hemarthrosis. Increased hemarthrosis can cause high levels of postoperative pain, infection rates, or cartilage damage [16]. There is a consistent association between TXA patients and decreased pain levels (VAS). Other reviews and meta-analyses have also found that the intraoperative and perioperative use of TXA in arthroscopic surgery decreases hemarthrosis volume [17][18][19]. A

3. Conclusions

Important point of discussion here can be developed regarding the clinical significance of the drains observed as negative pressure drains used to maintain bleeding. Some studies have shown that the hemarthrosis level remains to be significant considering that drainage would not be used. On the other hand, if moderate hemarthrosis occurs, the necessity for joint aspiration is paramount to reducing knee pain, joint effusion, intraarticular adhesion, and infection rates [20]. Another negative aspect of hemarthrosis is that it can cause decreased joint function and muscle strength due to a secondary deficit of rehabilitation caused by local pain.

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First Author, Year	VAS Score PD 1-5	VAS Score Week 1	VAS Score Week 2	VAS Score Week 3	VAS Score 1 Mo	VAS Score 2 Mo	VAS Score 3 Mo
	TXA Control	TXA Control	TXA Control	TXA Control	TXA Control	TXA Control	TXA Control
Karaaslan, 2015	1.4 * (1 to 5)	2.9 (2 to 5)	-	-	2 * (1 to 4)	4 (2 to 5)	3 (1 to 4)

First Author, Year	VAS Score PD 1-5		VAS Score Week 1		VAS Score Week 2		VAS Score Week 3		VAS Score 1 Mo		VAS Score 2 Mo		VAS Score 3 Mo		Ther.
	TXA	Control	TXA	Control	TXA	Control	TXA	Control	TXA	Control	TXA	Control	TXA	Control	
Felli, 2019	2 (1.1 to 2.9)	1.8 (1 to 2.6)	0.4 (-0.3 to 1.1)	1.1 (0.1 to 2.1)	-1.7 (-2.4 to 1)	-0.1 (-1.0 to 0.8)	-	-	-1.6 (-2.5 to -0.7)	-1.1 (-1.9 to -0.3)	-	-	-2.5 (-3.5 to -1.5)	-2.4 (-3.2 to -1.6)	d.
Chiang, 2019	3.2 *	6.7	-	-	-	-	-	-	1.7	2.0	-	-	-	-	
Lee, 2020	4.2	3.3													
	3.3	3.1													dic
	3.0	2.6	-	-	-	-	-	-	-	-	-	-	-	-	
	2.9	2.3													<. Anti-se
Banca, 2021	2.0	2.1													
	-	-	- *	-	-	-	-	-	-	-	-	-	-	-	c to
Ma, 2021	-	-	2.55 *	3.5	2.25 *	3.1	-	-	1.7	1.9	-	-	-	-	00-B,

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