

Effect of Ketorolac Administration on Operatively Treated Clavicle Fractures: A Matched Cohort Analysis

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INTRODUCTION:

Nonsteroidal anti-inflammatory drugs (NSAIDs), including ketorolac, are commonly used for postoperative pain management. However, concerns have been raised regarding their potential impact on bone healing and surgical outcomes, particularly in orthopedic procedures. Clavicle fractures are frequently managed surgically, making postoperative optimization critical for improved patient outcomes. This study investigates the relationship between ketorolac use and postoperative complications following clavicle surgery, including nonunion rates, revision surgery, wound healing, and opioid consumption.

METHODS:

The TriNetX Research Database was queried to identify patients undergoing surgery for clavicle fractures between 2002 and 2022. Patients were divided into two cohorts: those who received ketorolac post operatively and those who did not. Propensity score matching was utilized to balance comorbidities. Postoperative outcomes, including diagnosis of nonunion, revision surgery, opioid prescriptions, surgical site infection, wound disruption, and infected hardware were analyzed at 30 days, 90 days, 1 year, and 2 year postoperatively.

RESULTS:

We included 5,264 patients in each cohort after matching (Table 1). The number of patients diagnosed with a nonunion was similar between the ketorolac and no-ketorolac groups at 30 days (16 vs. 18, P=0.731), 90 days (31 vs. 40, P=0.284), 1 year (93 vs. 88, P=0.708) and 2 years (104 vs. 100, P=0.777). Similarly, revision surgery for nonunion was also comparable between ketorolac and no-ketorolac groups at all time points, 30 days (<10 vs <10, P=1), 90 days (<10 vs <10, P=1), 1 year (24 vs. 20, P=0.546), and 2 years (27 vs 26, P=0.890). Opioid prescription rates were comparable across all time points but trended lower in the ketorolac group: 30 days (1,827 vs. 1,906, P=0.108), 90 days (1,967 vs. 2,051, P=0.092), 1 year (2,340 vs. 2,428, P=0.085), and 2 year (2,574 vs 2,642, P=0.185). Wound disruption occurred significantly more frequently in the ketorolac group at 30 days (25 vs. 12, P=0.032) but not at later time points. Surgical site infections were similar between groups at 30 days (<10 vs. <10, P=1), 90 days (12 vs. 10, P=0.669), 1 year (17 vs. 13, P=0.465) and 2 years (50 vs. 50, P=1). Infected hardware rates did not differ significantly between groups at any time point. Full comparison between cohorts is shown in Table 2.

DISCUSSION AND CONCLUSION:

Ketorolac use following clavicle surgery was not associated with increased nonunion or revision surgery rates. Although opioid prescription rates trended lower in the ketorolac group, the difference was not statistically significant. A small but significant increase in wound disruption was observed at 30 days in the ketorolac group; however, no differences were found in other infection-related complications. These findings suggest that ketorolac may be a safe and effective option for postoperative pain management in clavicle surgery without negatively impacting long-term healing or increasing major complications.

Characteristic	Mean ± SD	Patients	% of Cohort	P Value	Std. Err
Age	54.7	10,536	100%	<0.001	0.028
Age at Index	54.8	10,536	100%	<0.001	0.028
Male	1,485	14,812	55.1%	0.813	0.013
Female	899	8,976	34.9%		
Race	1,031	10,302	39.4%	0.814	0.014
White	2,822	28,194	66.1%		
Black or African American	282	2,816	6.5%	0.007	0.007
Hispanic or Latino	80	792	3.3%	0.002	0.004
Other	417	4,162	15.1%		
Insurance	8,413	83,916	78.3%	0.001	0.001
Medicaid	21	204	0.8%	0.006	0.006
Medicare	44	436	1.7%		
Other	112	1,104	4.5%		

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Table II 30 day, 90 day, 1 year, and 2 year complication rates for matched Ketorolac and No-Ketorolac cohorts

	Ketorolac (n=5,264)	No-Ketorolac (n=5,264)	OR (95% CI)	P Value
Nonunion Diagnosis				
30 d	16	18	0.889 (0.453 - 1.744)	0.731
90 d	31	40	0.774 (0.483 - 1.239)	0.284
1 y	93	88	1.058 (0.788 - 1.419)	0.708
2 y	104	100	1.041 (0.789 - 1.373)	0.777
Nonunion Surgery				
30 d	10	10	-	-
90 d	10	10	-	-
1 y	24	20	1.201 (0.663 - 2.177)	0.546
2 y	27	26	1.039 (0.605 - 1.782)	0.890
Opioid Consumption				
30 d	1827	1906	0.937 (0.865 - 1.014)	0.108
90 d	1967	2051	0.935 (0.864 - 1.011)	0.092
1 y	2340	2428	0.935 (0.866 - 1.009)	0.085
2 y	2574	2642	0.950 (0.880 - 1.025)	0.185
Surgical Site Infection				
30 d	10	10	-	-
90 d	12	10	1.200 (0.518 - 2.781)	0.669
1 y	17	13	1.309 (0.635 - 2.697)	0.465
2 y	20	13	1.541 (0.766 - 3.100)	0.222
Wound Disruption				
30 d	25	12	2.089 (1.048 - 4.161)	0.032
90 d	39	28	1.396 (0.858 - 2.272)	0.178
1 y	47	44	1.069 (0.707 - 1.615)	0.752
2 y	50	50	1.000 (0.674 - 1.483)	1.000
Infected Hardware				
30 d	10	10	-	-
90 d	13	19	0.683 (0.337 - 1.385)	0.288
1 y	23	29	0.792 (0.458 - 1.371)	0.404
2 y	26	34	0.764 (0.458 - 1.274)	0.300