The Efficacy of Cefazolin Vs Higher-generation Cephalosporins In Periprosthetic Joint Infection Prevention After Hip and Knee Arthroplasty

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ABSTRACT INTRODUCTION: Periprosthetic joint infection (PJI) remains a challenging complication of total hip and knee arthroplasty (THA and TKA, respectively). Current guidelines recommend using first-generation cephalosporins, particularly cefazolin, for prophylactic antibiotic coverage. However, meta-analyses examining the efficacy of higher-generation cephalosporins for preventing PJI are limited. This meta-analysis aims to compare PJI rates in patients who received cefazolin versus those who received higher-generation cephalosporins following THA and TKA.

METHODS: A comprehensive search across several databases was conducted to identify studies that compared clinical outcomes between patients receiving cefazolin prophylaxis versus those receiving higher-generation cephalosporin prophylaxis following THA and TKA. Patient characteristics and information regarding antibiotic regimens were recorded. The primary outcome was PJI rates. A random effects model was used to compare the relative risk of PJI in the two pooled cohorts.

RESULTS SECTION: Six studies with a total of 3,442 patients were included, with 2,121 (64%) treated with cefazolin and 1,251 (36%) treated with higher-generation cephalosporins. No significant difference was observed between the groups treated with cefazolin or higher-generation cephalosporins ($p > 0.05$) among all THA and TKA cases. The cefazolin group had a PJI rate of 2.19%, while the higher-generation cephalosporin group had a PJI rate of 2.15%. When comparing cefazolin to higher-generation cephalosporin use, there was no significant risk reduction of PJI. For all pooled outcomes, the I^2 and variance of true effects were 0.00% and 0.00, respectively, indicating perfect homogeneity and variance in the data set.

DISCUSSION: This meta-analysis revealed that cefazolin and higher-generation cephalosporins demonstrated comparable effectiveness in preventing PJI after total joint arthroplasty. However, this study is not without limitations, which include the small number of studies and potential patient variability, highlighting the need for further, large scale investigations to support these results.

SIGNIFICANCE/CLINICAL RELEVANCE: No significant difference in the rate of PJI occurrence was observed between cefazolin and higher-generation cephalosporins following total joint arthroplasty. This would suggest equal efficacy between the two treatment protocols with cefazolin being a safe, more cost-effective alternative. Further research is warranted to identify the ideal antibiotic for antibiotic prophylaxis following total joint arthroplasty.

Study or Subgroup	Cefazolin Events	Cefazolin Total	Other Cephalosporins Events	Other Cephalosporins Total	Weight	Risk ratio M-H, Random, 95% CI
Bryan 1982	0	48	2	49	2.6%	0.20 [0.01 , 4.14]
Davis 1987	0	52	0	54		Not estimable
DeBenedictis 1984	1	38	1	35	3.2%	0.92 [0.06 , 14.17]
Evrard 1988	2	477	3	488	7.5%	0.68 [0.11 , 4.06]
Mauerhan 1994	14	424	12	410	41.5%	1.13 [0.53 , 2.41]
Tang 2003	31	1152	9	215	45.2%	0.64 [0.31 , 1.33]
Total (95% CI)		**2191**		**1251**	**100.0%**	**0.80 [0.49 , 1.31]**
Total events:	48		27			

Heterogeneity: Tau² = 0.00; Chi² = 1.97, df = 4 (P = 0.74); I² = 0%
Test for overall effect: Z = 0.89 (P = 0.37)
Test for subgroup differences: Not applicable