Are Preoperative Corticosteroid Injections Associated with Increased Risk of Deep Infection after Unicompartmental Knee Arthroplasty?

Johnathon R McCormick[1], Elyse Jordan Berlinberg[2], Victoria Oladipo, Enrico Forlenza, Brian Forsythe[3], COL. (ret) Tad L Gerlinger

[1]Rush University Medical Center, [2]Midwest Orthopedics At Rush, [3]Midwest Orthopaedics At Rush

INTRODUCTION: Unicompartmental knee osteoarthritis (OA) may cause significant pain and disability. Prior to surgical intervention, pain may be managed via conservative modalities, including anti-inflammatory medications, physical therapy, and corticosteroid injections (CSI). However, many of these patients with isolated medial or lateral tibiofemoral degeneration may ultimately elect to undergo a unicompartmental knee arthroplasty (UKA). At the time of this study, it is unclear whether CSI prior to UKA impacts the likelihood of developing a postoperative infection. We sought to define the association between pre-operative CSI and infection within the 6 months after UKA, and whether it exhibits a time- or dose-dependent relationship.

METHODS: An administrative claims database was queried for all patients who underwent ipsilateral knee CSI within 6 months prior to undergoing UKA. Patients were excluded if laterality was not specified or if they did not have at least 6 months of pre-enrollment and 6 months of post-operative follow-up. Patients with a preoperative CSI were matched by age, sex, and Charlson Comorbidity Index (CCI) in a 1:1 ratio with controls who did not receive an intra-articular CSI in the 6 months prior to surgery. Rates of infection in the first 6 months after UKA were reported between CSI patients and controls. Time-dependent and dose-dependent relationships were modeled using multivariable logistic regression. Significance was set at P=0.05, and our sample size provided more than 80% power to detect a two-fold difference in rates of postoperative infection.

RESULTS: A total of 30,762 patients underwent UKA within the time queried, of which 25,342 (82.4%) had sufficient pre-enrollment, follow-up, and met the remainder of exclusion criteria. 10,562 patients within the UKA cohort had a CSI in the 6 months prior to surgery: 10,552 were matched to controls (n=10,552) who did not receive an intra-articular CSI (**Figure 1**). Baseline demographics were similar between groups after matching (**Table 1**). A total of 314 patients had a surgical site infection (SSI) after surgery (1.5%), 144 in patients with CSI (1.4%) and 170 controls (1.6%, OR=0.84, 95% CI 0.68-1.06, P=0.16). There was no significant difference in infection risk by timing of injection before surgery (**Table 2**). Although limited by low sample size (n=7 total infections), having 3 or more CSI in the 6 months prior to UKA was significantly associated with postoperative infection risk compared to having a single injection (OR 13.28, 95% CI 1.53-1115.58, P=0.019, **Table 3**). In univariable analysis, significant predictors of infection after UKA included younger age, male sex, increasing CCI, chronic obstructive pulmonary disease, chronic kidney disease, diabetes, obesity, and rheumatoid arthritis (**Table 4**). Multivariate analysis revealed that increasing CCI and younger age were independently associated with infection (**Table 5**).

DISCUSSION AND CONCLUSION: Administering ≤2 preoperative corticosteroid injections within 6 months prior to surgery is not associated with an increased risk of infection after UKA, although 3 or more CSI in this period may preclude an elevated risk. Significant medical comorbidity and younger age are also predictive of postoperative infection.

Figure 1. STROBE Diagram of a Matched Cohort Study of Patients with UKA +/- Preoperative CSI

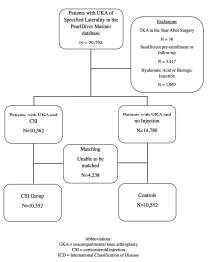

Table 2: Likelihood of Infection by Timing of Injection

	OR	2.50%	97.50%	P-Value
0-1 Months (N=7,400, I=106)	0.961	0.739	1.250	0.768
1-2 Months (N=2,200, I=30)	0.886	0.598	1.317	0.550
2-3 Months (N=1259, I=20)	1.414	0.919	2.154	0.109
3-4 Months (N=164, I=4)*	0.000	0.000	Inf	0.975
4-5 Months (N=48, I=1)	1.259	0.171	9.262	0.821
5-6 Months (N=47, I=0)*	0.000	0.000	Inf	0.981

N = number of injections administered, I = number of infections resulting from those injections
(NOTE: since a patient may have received >1 injection, the sum of I may not equal 144).
*Model did not converge for these variables because 0 infections occurred in patients receiving an injection during this timepoint.

Table 3: Likelihood of Infection by Number of CSI Injections within 6 Months

	OR	2.50%	97.50%	P-value
1 injection (N=9,860, I = 128)	Ref	-	-	-
2 injections (N=488, I = 11)	1.076	0.575	2.081	0.862
3 or more injections (N=4, I = 1)	13.281	1.526	115.579	0.019

Table 4: Univariable Predictors of Infection

	OR	95%CI		P-Value
Injection within 1 Month Before Surgery	0.971	0.756	1.248	0.820
Multiple CSI Before Surgery	1.641	0.984	2.738	0.058
1-Year *Decrease* in Age	**1.030**	1.017	1.042	**<0.001**
Male Gender	**1.294**	**1.011**	**1.657**	**0.041**
1-Point Increase in CCI	**1.108**	**1.042**	**1.168**	**<0.001**
Smoking	**1.517**	**1.185**	**1.942**	**<0.001**
Asthma	1.332	0.988	1.803	0.064
COPD	**1.364**	**1.034**	**1.744**	**0.027**
CKD	**1.676**	**1.230**	**2.285**	**0.001**
CHF	1.371	0.823	2.286	0.228
CAD	1.458	1.121	1.892	0.005
Diabetes	**1.374**	**1.072**	**1.760**	**0.012**
Hypertension	1.378	0.997	1.905	0.052
Hypothyroidism	0.927	0.700	1.230	0.601
Ischemic Heart Disease	1.068	0.775	1.467	0.692
Liver Disease	1.317	0.973	1.782	0.075
Obesity	**1.511**	**1.178**	**1.947**	**0.001**
Rheumatoid Arthritis	**2.484**	**1.595**	**3.878**	**<0.001**

Table 5: Multivariable Predictors of Infection

	OR	95%CI		P-Value
CSI within 1 Months Before Surgery	0.909	0.703	1.178	0.468
Multiple CSI in the Year Before Surgery	1.681	0.980	2.859	0.054
Male Gender	**1.324**	**1.034**	**1.687**	**0.026**
1-Point Increase in CCI	**1.123**	**1.065**	**1.184**	**<0.001**
1-Year Decrease in Age	**1.033**	**1.021**	**1.046**	**<0.001**