

Repeat Exposure to 2-octyl Cyanoacrylate Adhesive in Consecutive Total Joint Arthroplasties Increases Risk for Allergic Contact Dermatitis

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INTRODUCTION: Allergic contact dermatitis (ACD) has been increasingly reported following wound closure with 2-octyl cyanoacrylate-based skin adhesives in total joint arthroplasty (TJA). While ACD is thought to follow a sensitization-based immune response, the risk associated with repeat exposures to 2-octyl cyanoacrylate remains poorly understood in large cohorts. We aimed to investigate the risk of ACD after multiple exposures to skin adhesives during primary total joint arthroplasty.

METHODS: We conducted a retrospective longitudinal cohort study of 6,909 patients undergoing 14,353 arthroplasties from February 2016 to December 2024 at a single academic institution. Patients were included if they underwent multiple surgeries with application of wound adhesives. The primary outcome was ACD within 90 days postoperatively, identified via clinical documentation. Multivariable mixed-effects logistic regression adjusted for patient demographics and assessed the association between repeat adhesive exposure and risk of ACD. Patient identifiers were included as a random effect for repeated measures. Adjusted odds ratios (aORs) with 95% confidence intervals (CI) were reported.

RESULTS: ACD occurred in 168 of 14,353 arthroplasties (1.17%). Repeat exposure to 2-octyl cyanoacrylate was independently associated with significantly increased odds of ACD. For each additional adhesive exposure, the odds of developing ACD increased by a factor of 2.5 (aOR 2.52; 95% CI 1.98–3.20; $p = 0.003$). Additional independent risk factors included female sex (aOR 2.53; 95% CI 1.68–3.81), knee arthroplasty (aOR 1.81; 95% CI 1.26–2.60), and pre-existing adhesive allergy (OR 3.28; 95% CI 1.70–6.29).

DISCUSSION AND CONCLUSION: Repeat exposure to 2-octyl cyanoacrylate is associated with a dose-dependent increase in ACD risk after TJA. These findings support a sensitization mechanism and may inform adhesive use decisions for bilateral, staged, or revision procedures. Longitudinal tracking of adhesive exposures and screening for adhesive allergy may help mitigate risk.

Demographics	n	Unadjusted Model			
		OR	95% CI	p-value	
Age, mean (SD)	64 (427) (9.61885)	Exposure	2.48*	0.34 (2.06, 3.00)	
Sex		Adjusted			
Female	4238 (61.3%)	Odds Ratio	OR	95% CI	p-value
Male	2671 (38.7%)	Exposure	2.52	0.33 (1.98, 3.20)	*
Race		Age	0.97	0.01 (0.96, 0.99)	*
American Indian or Alaska Native	16 (0.2%)	Sex			
Asian	217 (3.1%)	Female	2.53	0.33 (1.68, 3.81)	*
Black or African American	589 (8.5%)	Male	0.99	0.01 (0.96, 1.01)	
Native Hawaiian or Other Pacific Islands	4 (0.1%)	Joint			
Other	308 (4.5%)	Knee	1.81	0.33 (1.26, 2.60)	*
Prevalent Declined	90 (1.3%)	Adhesive Allergy			
White or Caucasian	5653 (82.2%)	Yes	3.28	1.09 (1.70, 6.29)	*
Ethnicity		Cohort definition:			
Hispanic or Latino	361 (5.2%)	Mixed Effects Logistic Regression			
Not Hispanic or Latino	6438 (93.2%)	Outcome: Allergic Contact Dermatitis			
Prevalent Refused	86 (1.2%)	Number of Observations (surgeries): 14,353			
Unknown	24 (0.3%)	Number of groups (patients): 6,909			
Smoking Status					
Current	271 (3.9%)				
Former	2375 (34.3%)				
Never	4003 (58.8%)				
Insurance					
Commercial	2708 (39.2%)				
Medicaid	128 (1.9%)				
Medicare	2027 (29.4%)				
Not Insured	1 (0.0%)				
Other	7 (0.1%)				
Self-Pay	27 (0.4%)				
Worker's Comp.	57 (0.8%)				
Joint					
Hip	3354 (48.2%)				
Knee	1047 (15.1%)				
Missing	6 (0.1%)				
Prior Skin Reaction					
No	6855 (99.1%)				
Yes	99 (0.9%)				
OR, mean (SD)	30 (609) (6.48966)				
95% CI, mean (SD)	2 (72) (4.67223)				
Number of Allergies, mean (SD)	17 (65) (1.72117)				