Fellowship Training in Adult Reconstruction is Associated with Decreased Complications Following Total Knee Arthroplasty

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INTRODUCTION: Fellowship training has become increasingly popular among orthopaedic residents, though its impact on arthroplasty outcomes has been underexplored. This study aimed to compare the incidences of complications, including periprosthetic joint infection (PJI), manipulation under anesthesia (MUA), aseptic revision, and aseptic loosening, between patients who underwent primary TKA by an arthroplasty-trained surgeon versus a non-arthroplasty-trained surgeon at 90 days, one year, and two years postoperatively.

METHODS: A national insurance database was used to identify patients who underwent elective TKA from 2010 to 2021. A physician report was obtained for this cohort of patients, which included the name and National Provider Identifier (NPI) of the operative surgeon, allowing for a web search to identify whether each physician had undergone adult reconstruction fellowship training. Patients were then split into two cohorts: those operated on by arthroplasty-trained surgeons and non-arthroplasty-trained surgeons. We employed a propensity-score match to account for demographic differences, resulting in two cohorts with 361,362 patients each.

RESULTS: At 90 days, patients who were operated on by non-arthroplasty-trained surgeons experienced increased rates of surgical site infection (odds ratio (OR) 1.39, 95% confidence interval (CI) 1.26 to 1.54), venous thromboembolism (OR 1.14, 95% CI 1.02 to 1.26), periprosthetic joint infection (PJI) (OR 1.40, 95% CI 1.24 to 1.58), aseptic loosening (OR 1.62, 95% CI 1.15 to 2.29), and manipulation under anesthesia (MUA) (OR 1.23, 95% CI 1.16 to 1.30). At one and two years, higher incidences of PJI, aseptic loosening, and MUA persisted in the non-arthroplasty cohort. Additionally, the non-arthroplasty cohort demonstrated higher odds of aseptic revision at one year (OR 1.16, 95% CI 1.04 to 1.28) and two years (OR 1.28, 95% CI 1.18 to 1.39).

DISCUSSION AND CONCLUSION: Patients who underwent TKA with arthroplasty-trained surgeons experienced fewer complications at ninety days, one year, and two years postoperatively. Our findings illustrate the immense value of an adult reconstruction fellowship in achieving favorable patient outcomes.

Table 1. Baseline demographics and comorbidities

	Demographics		
	Adult Reconstruction Fellowship Trained (n=513,798)	Non-Adult Reconstruction Fellowship Trained (n=711,592)	*P-value*
	n (%)	*n (%)*	
Age (SD)	65.25(8.90)	64.91(8.90)	<0.001
CCI (SD)	1.15(1.62)	1.14(1.63)	<0.001
Sex			0.897
Female	318,117 (61.91)	440,462 (61.90)	
Male	195,679 (38.08)	271,126 (38.10)	
AA	26,787 (5.21)	36,440 (5.12)	0.022
COPD	152,695 (29.72)	223,750 (31.44)	<0.001
CKD	100,912 (19.64)	149,367 (20.99)	<0.001
CHF	37,471 (7.29)	57,087 (8.02)	<0.001
CAD	162,638 (31.65)	233,128 (32.76)	<0.001
DM	226,221 (44.03)	322,711 (45.35)	<0.001
HIV	1,640 (0.32)	1,706 (0.23)	<0.001
HTN	433,155 (84.30)	609,050 (85.59)	<0.001
Hypothyroidism	159,560 (31.06)	219,625 (30.86)	0.024
Liver Disease	86,135 (16.76)	119,357 (16.77)	0.899
Obesity	291,825 (56.80)	402,834 (56.61)	0.039
TU	187,563 (36.51)	266,757 (37.49)	<0.001
BMI 20-24.9	21,607 (4.21)	30,399 (4.27)	0.072
BMI 25-29.9	68,895 (13.41)	94,817 (13.32)	0.177
BMI 30-34.9	110,014 (21.41)	151,677 (21.32)	0.198
BMI 35-39.9	95,203 (18.53)	134,789 (18.94)	<0.001
BMI 40+	88,658 (17.26)	130,025 (18.27)	<0.001

*CCI: Charlesm Comorbidity Index; AA: Alcohol Abuse; COPD: Chronic Obstructive Pulmonary Disease; CKD: Chronic Kidney Disease: CHF: Congestive Heart Failure; CAD: Coronary Artery Disease: DM: Diabetes Mellitus; HIV: Human Immunodeficiency Virus; HTN: Hypertension; TU: Tobacco Use; BMI: Body Mass Index

Table 2. Baseline surgeon case volume

	Surgeon Case Volume		
	Adult Reconstruction Fellowship Trained (n=513,798)	Non-Adult Reconstruction Fellowship Trained (n=711,592)	*P-value*
	n (%)	*n (%)*	
Case Volume <500	158,416 (30.83)	281,946 (39.62)	<0.001
Case Volume 500-1,000	51,645 (10.05)	103,086 (14.49)	<0.001
Case Volume >1,000	260,383 (50.68)	270,523 (38.02)	<0.001

Table 3. Incidences of postoperative complications at 90 days, one year, and two years

	Incidences of Complications after Propensity Score Match		
	Adult Reconstruction Fellowship Trained (n=361,362)	Non-Adult Reconstruction Fellowship Trained (n=361,362)	*P-value*
	n (%)	*n (%)*	
90-Day Complications			
SSI	676 (0.19)	940 (0.26)	<0.001
VTE	685 (0.19)	781 (0.22)	0.013
PJI	469 (0.13)	656 (0.18)	<0.001
Aseptic Revision	216 (0.06)	249 (0.07)	0.138
Aseptic Loosening	53 (0.01)	86 (0.02)	0.007
MUA	1,994 (0.55)	2,401 (0.68)	<0.001
1-year Complications			
PJI	775 (0.21)	1,045 (0.29)	<0.001
Aseptic Revision	681 (0.19)	787 (0.22)	0.006
Aseptic Loosening	116 (0.03)	181 (0.05)	<0.001
MUA	2,433 (0.67)	3,132 (0.87)	<0.001
2-year Complications			
PJI	903 (0.25)	1,226 (0.34)	<0.001
Aseptic Revision	1,074 (0.30)	1,377 (0.38)	<0.001
Aseptic Loosening	176 (0.05)	311 (0.09)	<0.001
MUA	2,499 (0.69)	3,211 (0.89)	<0.001

*SSI: Surgical Site Infection; VTE: Venous Thromboembolism; PPFX: Periprosthetic Fracture; PJI: Prosthetic Joint Infection.

Table 4. Odds Ratios of postoperative complications

	Odds Ratio of Complications after Propensity Score Match	
	Non-Adult Reconstruction Fellowship Trained	
	OR	95% CI
90-Day Complications		
SSI	1.39	1.26-1.54
VTE	1.14	1.03-1.26
PJI	1.40	1.24-1.58
Aseptic Revision	1.15	0.96-1.38
Aseptic Loosening	1.62	1.15-2.29
MUA	1.23	1.16-1.30
1-year Complications		
PJI	1.35	1.23-1.48
Aseptic Revision	1.16	1.04-1.28
Aseptic Loosening	1.56	1.24-1.97
MUA	1.29	1.22-1.36
2-year Complications		
PJI	1.36	1.25-1.48
Aseptic Revision	1.28	1.18-1.39
Aseptic Loosening	1.77	1.47-2.13
MUA	1.29	1.22-1.36

*OR: Odds Ratio; CI: Confidence Interval; SSI: Surgical Site Infection; VTE: Venous Thromboembolism; PPFX: Periprosthetic Fracture; PJI: Prosthetic Joint Infection.