Does Use of Technology Affect Manipulation Under Anesthesia Rates in Total Knee Arthroplasty?

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INTRODUCTION:

Limitations in range of motion can be a major source of dissatisfaction for patients undergoing total knee arthroplasty (TKA). Manipulation under anesthesia (MUA) within three months may improve motion. As using technology may eliminate alignment outliers and limit soft tissue releases, we sought to investigate if robotic and navigation technology impact rates of manipulation.

MÉTHODS:

A retrospective review was conducted on 18,815 patients who underwent primary elective unilateral TKA over a thirteenyear period. Patients were stratified into conventional (n=12,659), computer navigated (C-TKA) (n=4,071), or roboticassisted (R-TKA) (n=2,085) cohorts using ICD-10 coding. Patient demographics, implant data including fixation and cruciate-retaining (CR) vs. posterior-stabilized (PS) status were analyzed. The primary outcome was MUA. Data was analyzed using multivariate logistic regression.

RESULTS:

The conventional, C-TKA and R-TKA groups differed significantly across demographics, fixation and CR vs. PS status (P<0.001, for all). On multivariate analysis, the C-TKA and R-TKA groups demonstrated comparable odds of MUA when compared to conventional (P=0.156, P=0.434, respectively). Fully cementless (OR: 1.80 [95% CI: 1.16-2.78], P=0.008) and hybrid TKAs (OR: 2.92 [95% CI: 1.77-4.81], P<0.001) demonstrated higher odds of MUA when compared to fully cemented implants. CR (OR: 1.51 [95% CI: 1.16-1.96], P=0.002) TKAs demonstrated higher odds of MUA when compared to PS. Multivariate testing revealed associations between younger age (P<0.001), female sex (P=0.002), non-smoking status (P=0.006), lower BMI (P<0.001), African American race (P<0.001) and ASA >2 (P=0.008) and higher odds of MUA.

DISCUSSION AND CONCLUSION:

Loft 6,115 (40.5) 1,555 (40.0) 594 (47.7) C-TKA, Computer Nervigated Total Knee Arthroplasty, B-TKA; Boberic-Asolated Total Knee Arthroplasty, BMI; Body Mass Index, ASA; American Society of Americanitogian, CC1;

C-TKA and R-TKA demonstrated comparable odds of MUA to conventional TKA on multivariate analysis. Cementless and hybrid TKAs were associated with increased odds of MUA compared to fully cemented. CR demonstrated higher odds of MUA when compared to PS. These operative factors along with patient factors such as age, sex, race, smoking status and comorbidities should be considered when risk-stratifying and counseling patients on MUA.

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Figure II: Kapitan Meler Survivonhip Analysis for MUA		Table 1. Baseline Char	selectation				Table 2. Perioperative and Clinical Outcomes				Table 3. Implant Dat					Table 4: Multivariate Logistic				Table 5: Multivariate Legistic Regression for Odds of NUA with Surgeons performing +20 responsibilities and exhedite TKAs		
	Kaplan Meler Survival From MJA	Donographic	Currentional (#=12,65%	C-TKA (RP4.87D)	R-TKA (m=2.895)	AValue	Demographic	Convertional	C-TKA	B-TKA	P-Value	Demographic	Conventional (#=12.899	C-TKA 0F-4.07D	8-TKA (n=2.885)	P-Value	Variable	OR [95 % CI]	P-Value	Variable	OR 195 % CIL	P-Yaho
10	Technology	Mann Ann (Yaani)	96.8	415	66.8	10.0012		(9=12,699)	(#=4,670)	01-2,0851		Finalise In No.	(1-12)099	0-0-0	00-126603	-0.001*	Computer Naviantion	6.80 30.59 1.090	0.156			0.822*
	Constant Salphan Challen	(roman)	(21,94)	(26/90)	(22.90)		Sergical Time (Mine) (SD)	\$5.1 (27.7)	106.7 (21.7)	127.9 (58.1)	-0.861*	Fully Commind	12,435 (98.2)	1 KET AND TO	1.258 (60.3)	10.000	Robertic Assistance	12/080-1201	0.434	Computer Nevigation	0.82 (0.42-8.99)	
		Sec. e (70)				-0.0011	(Mara) (SD) LOS (Hours) (SD)	653(28.5)	43.067	366(059)	10.0011	Fully Cementers	56 (8.4)	129 (2.5)	107(15.0)		Incrueing Age	6.95 (0.54-0.57)	-0.0011	Rebutic Amintance	0.88 (0.57-1.55)	0.94
	Concernant of Concern	Man	4,825(31.8)	1,207 (29.6)			Discharge Disposition		46.3 (36.7)	See travi	-0.811	Ebbed	177 (1.4)	99(23)	80.8				0.802*	Increasing Age	0.97 (0.95-8.99)	-0.000*
	P<0.00	Wattern	8,654 (98.2)	2,864(78.4)	1,270 (96.9)		0.59					Dotat (s. %)				-0.801*	Male Sex	8.65 [0.50-0.85]		Male Sex	0.74 (0.53-1.05)	0.888
	3-006	Faor, n (%)					Home	10,218 (88,T)	3,741 (51.5)	2,814 (96.6)		78	13,899 (79.7)	2,455 (53.3)	361((7.3)		Former Smellur	0.69 [0.53-0.90]	0.806*	Former Smiler	0.59(0.4) 4.85	0.001
		White	9,365 (74.0)	2,844 (58.9)	1,595 (76.1)	-6.001*	SNE	1,913 (15.1)	295 (7.2)	66 (3.2)		CR.	2,509 (28.3)		1,725 (92.7)		African American Baca	1.61 [1.26-2.09]	-0.001*	Alfram American Race	1.60 [1.11-2.50]	0.011*
		African American	2,471 (19.5) 652 (5.2)	899 (21.9) 223 (3.5)	303 (14.5) 118 (5.7)		A87	538 (4.2)	35 (0.8)	5 (9.2)		C-TKA; Computer N	vigsted Tatal Knee -			inted Total Knop	Incrusing BMI	8:94 00.92-0.952	-1.011			-0.002
		Asian Hispanic Latino	196-(1.2)	20(0.5)	66(3,2)		90-Day Randmissions	461.0.0	119 (2.5)	46 (2.2)	-0.861*	Arthrophety, PS; Ped	rice-Stabilized, CR;	Cruciate Rataining					0.008*	Increasing BME	0.93 [0.91-8.96]	
		Ober	1400.0	15(8.4)	12(0.6)		Revisions (x, %)	201 (6.0)	88 (2.2)	23 (1.1)	-0.861*						A8A >2	1.40 [1.89-1.79]		ASA >2	1.25 (0.89-1.74)	0.200
		Mean BME (logies')	32.4	32.8	31.4	10.0012	MUA 06.19	198 (1.4)	60(15)	66 (3.2)	-0.861*						Incrusing CCI	1.01 [0.85-1.07]	0.813	Increasing CCI	1.01 (0.94-1.10)	0.713
		ional	(14.67)	(17-67)	(15.47)		Median Days to MUA	98.0	75.0	77.5	0.989						Centendeus vs. Comented	1.80 [1.16-2.78]	0.808*	Consentions vs. Consented	1.83 [1.09-3.08]	0.823*
							SD, Standard Deviation Rehabilitation Facility,	LOS; Leigth of S	up, SNF; Skilled S	iuning Facility, 1	URF; Auto						Hybrid vs. Consuted	2.92 [1.77-6.81]	-8.081*	Rubrid vs. Committed	3.74 (2.16-6.48)	-0.000*
		Stacking Status, a (NJ)				-6.0011	Result Mattern Faculty,	erce stanpunto	s Under Anertheit								08 m 25	1.51 [1.16-1.96]	0.002*	Cl vs PS	1.20.00.86-1.680	0.281
		Namar	7,604 (96.0)	2,495 (\$1.5)																		
	Time From TKA (Days)	Fermer	4301(341)	1,373 (33.7)	645 (20.3)												MUA; Manipulation Under Am	sthosis, OR; Odds Fatis, CI; Confid	ence Interval, BMI; Body	MUA; Manipulation Under Anorthesis Confidence Interval, BMI: Dark Mani		
		Current	737 (5.8)	302 (1.0)	66.0.5												Mass Index, ASA; American So CR: Craciate-Retaining, PS: Pa	cisty of Anothesiologists, OCI; Ch	efaon Comorbidity Index,	Confidence Interval, BMI; Body Mass Charlass Consolidity Index, CR; Ora		
		ASA Class, # (%)	24271.95	20.0	64.0.0	40.0011											CC; Cracate-Kataning, PS; PS	Action-Office and		Charlies Consonany Inter, Cr. Cra	care-neuring, ro, resence-	6818300
		1	102 (19) 6841 (941)	2381(855)	64 (0.1) 1251 (00.1)																	
		1	5557(42.4)	128 (84)	151,0006																	
		1	211 (1.7)	410.0	12(0.6)																	
		More CCL (SD)	3112.0	3.6(2.4)	33(23)	-6.0011																
		Precedure Laterality,	(+-1)			0.807																
		a (%).																				
		Right	6583 (51.7)	2,115 (52.0)	1.891 (\$2.5)																	