Substantial Differences in Procedures and Interventions between Medical and Orthopaedic Readmissions after Total Hip Arthroplasty

Joshua Tidd, Pedro Javier Rullan, Lakshmi Spandana Gudapati, Ignacio Pasqualini, Alison K Klika[1], Viktor Erik Krebs, Trevor G Murray, Matthew Edward Deren[1], Nicolas Santiago Piuzzi
[1]Cleveland Clinic

INTRODUCTION: Stratification of readmissions by primary cause (medical vs. orthopaedic) has been shown to be a major factor impacting the cost of 90-day readmissions. As institutions aim to control postoperative expenditures, there must be a thorough evaluation of readmission episodes of care. Prior studies have determined the primary causes of medical and orthopaedic-related readmissions, but no investigation has assessed what happens to these patients once they are readmitted [e.g., surgical interventions, Intensive Care Unit (ICU) admissions, and the specialties involved in their care]. Therefore, this study aimed to stratify readmissions by primary cause (medical vs. orthopaedic) and characterize the readmission episode of care by 1) surgical or minimally invasive interventions, 2) ICU admissions, 3) blood transfusions, 4) initial readmission ward, and 5) consulted services.

METHODS: A consecutive cohort of all primary unilateral elective THAs performed from 2016-2020 at a large tertiary academic center were followed using a validated, institutional prospective data collection system **(**n=8,893 patients). In total, 502 patients (5.6%) were readmitted within 90-days. Patient electronic health records were manually reviewed to determine primary cause of readmission (medical or orthopaedic), and if they required a surgical intervention, minimally-invasive intervention, ICU admission, blood transfusion, the service they were readmitted to, and any consulted services. Orthopaedic-related readmissions were specific complications affecting the prosthesis or the surgical wound. Medical readmissions were due to medical diagnoses requiring medical treatment or management only. Surgical interventions were considered procedures that take place in the operating room and require anesthesia. Minimally invasive procedures included procedures that can take place outside of the operating room (e.g., arthrocentesis, closed joint reduction, esophagogastroduodenoscopy, colonoscopy, etc.).

RESULTS: The majority of readmissions were medically-related (75%, n=377 patients vs. 25% orthopaedic-related, n= 125 patients. A total of 126 (23.7%) patients had a surgical intervention during the readmission (medical-cohort: n=27, 7.2% vs. orthopaedic-cohort: n=99, 79.2%; p<0.001) (**Table 1**). Patients underwent minimally-invasive occurred in 22.7% (n=114) of the readmissions (medical-cohort: n=71, 18.9% vs. orthopaedic-cohort: n=43, 34.4%; p<0.001). Overall, 51 (10.2%) patients were admitted to the ICU at any time during readmission (medical-cohort: n=45, 12.0% vs. orthopaedic-cohort: n=6, 4.9%; p= 0.02) and 90 (17.9%) patients had a transfusion of blood products (medical-cohort: n=45, 12.0% vs. orthopaedic-cohort: n=45, 36.3%; p <0.001). Most medical readmissions were initially admitted to Internal Medicine (n=304, 80.6%), followed by the ICU (n=21, 5.6%), Cardiology (n=10, 2.7%), General Surgery (n=7, 1.9%), and Orthopaedic Surgery (n=7, 1.9%) (**Table 2)**. Most orthopaedic readmissions were initially admitted to the Orthopaedic Surgery service (n= 94, 75.2%), followed by Internal Medicine (n=30, 24%), and Trauma Surgery (n=1, 0.8%). There was a significant difference in the number of patients admitted to internal medicine (p<0.001), orthopaedic surgery (p<0.001), and ICU services (p=0.007) with regard to readmission type. Among medical-readmissions, 19% were consulted to Orthopaedic Surgery (n=79), 19% to Cardiology (n=70), 14% to Gastroenterology (n=54), and 11% to Infectious Disease (n=41). Among orthopaedic-readmissions, 64% were consulted to Internal Medicine (n=80), 44% to Infectious Disease (n=55), 5.6% to Wound Care (n=7), and 4% to Cardiology, Nephrology, and Pain Management, respectively (n=5 for each) (**Table 3**).

DISCUSSION AND CONCLUSION: The vast majority of orthopaedic-related readmissions following THA necessitate surgical intervention. Furthermore, orthopaedic readmissions also require minimally invasive procedures at greater frequency. However, medical readmissions result in a higher incidence of ICU admission. These results have implications in the era of bundled-payments, as they demonstrate differences in resource-intensive characteristics between patients who experience primarily orthopaedic vs. medical readmissions. Additionally, patients who experience an unplanned readmission are cared for by over thirty different medical and surgical specialties. This highlights the multidisciplinary nature of unplanned readmissions. As a result, there must be an interdisciplinary approach to creating and implementing measures aimed at reducing readmissions.

Table 1 – Readmission Episode of Care Outcomes

Variable	Medical (N=377)	Orthopaedic (N=125)	p-value
Surgical Intervention			**< 0.001**
Yes	27 (7.2%)	99 (79.2%)	
No	350 (92.8%)	26 (20.8%)	
Minimally invasive procedure			**< 0.001**
Yes	71 (18.9%)	43 (34.4%)	
No	305 (81.1%)	82 (65.6%)	
ICU admission			**0.02**
Yes	45 (12.0%)	6 (4.9%)	
No	330 (88.0%)	117 (95.1%)	
Transfusion of blood products			**< 0.001**
Yes	45 (12.0%)	45 (36.3%)	
No	331 (88.0%)	79 (63.7%)	

Table 2 – Initial Readmission Service for THA Patients with Medical or Orthopaedic Complications

Readmission Service	Medical (N=377)	Orthopaedic (N=125)	p-value
Internal Medicine	304 (80.6%)	30 (24%)	**< 0.001**
Orthopaedic Surgery	7 (1.9%)	94 (75.2%)	**< 0.001**
Intensive Care Unit	21 (5.6%)	0	**0.007**
Cardiology	10 (2.7%)	0	0.07
General Surgery	7 (1.9%)	0	0.13
Neurology	5 (1.3%)	0	0.20
Hematology-Oncology	3 (0.8%)	0	0.32
Vascular Surgery	3 (0.8%)	0	0.32
Trauma Surgery	2 (0.5%)	1 (0.8%)	0.74
Behavioral Health	2 (0.5%)	0	0.42
Colorectal Surgery	2 (0.5%)	0	0.42
Urology	2 (0.5%)	0	0.42
Gastroenterology	1 (0.3%)	0	0.57
Physical Medicine &Rehabilitation	1 (0.3%)	0	0.57
Nephrology	1 (0.3%)	0	0.57
Pain Management	1 (0.3%)	0	0.57
Pulmonology	1 (0.3%)	0	0.57

Table 3 - Services Consulted During the Readmission Episode of Care

Readmission Consults	Medical (N=377)	Orthopaedic (N=125)	p-value
Internal Medicine	312 (82.8%)	80 (64%)	**< 0.001**
Orthopaedic Surgery	72 (19.1%)	114 (91.2%)	**< 0.001**
Infectious Disease	41 (10.9%)	55 (44%)	**< 0.001**
Cardiology	70 (18.6%)	5 (4%)	**< 0.001**
Gastroenterology	54 (14.3%)	1 (0.8%)	**< 0.001**
Neurology	35 (9.3%)	1 (0.8%)	**0.001**
General Surgery	34 (9%)	1 (0.8%)	**0.002**
Nephrology	27 (7.2%)	5 (4%)	0.21
Psychiatry	26 (6.9%)	1 (0.8%)	**0.009**
Urology	25 (6.6%)	1 (0.8%)	**0.01**
Vascular Surgery	20(5.3%)	1 (0.8%)	**0.03**
Hematology-Oncology	19(5%)	1 (0.8%)	**0.04**
Wound Care/Ostomy	13(3.4%)	7 (5.6%)	0.29
Pain Management	11(2.9%)	5 (4%)	0.55
Interventional Radiology	6(1.6%)	3 (2.4%)	0.56
Physical Medicine & Rehabilitation	9(2.4%)	0 (0%)	0.08
Pharmacy	4(1.1%)	3 (2.4%)	0.27
Otolaryngology	5(1.3%)	1 (0.8%)	0.64
Cardiothoracic Surgery	5(1.3%)	0 (0%)	0.20
Vascular Medicine	3(0.8%)	2 (1.6%)	0.43
Colorectal Surgery	3(0.8%)	1 (0.8%)	0.99
Neurosurgery	4(1.1%)	0 (0%)	0.25
Trauma Surgery	3(0.8%)	1 (0.8%)	0.99
Rheumatology	4(1.1%)	0 (0%)	0.25
Podiatry	3(0.8%)	1 (0.8%)	0.99
Dermatology	3(0.8%)	0 (0%)	0.32
Hospice & Palliative care	2(0.5%)	0 (0%)	0.42
Allergy & Immunology	1(0.3%)	1 (0.8%)	0.41
Obstetrics & Gynecology	2(0.5%)	0 (0%)	0.42
Endocrinology	2(0.5%)	0 (0%)	0.42
Geriatrics	1(0.3%)	1 (0.8%)	0.41
Hepatology	2(0.5%)	0 (0%)	0.42
Dentistry	2(0.5%)	0 (0%)	0.42
Other	1(0.3%)	0 (0%)	0.57
Plastic Surgery	0(0%)	1 (0.8%)	0.08
Ophthalmology	1(0.3%)	0 (0%)	0.57
Radiation Oncology	0(0%)	1 (0.8%)	0.08