

Mentored Professional Enrichment Experience

Applicant:

Name of Project/Experience:

Risk of Early Revision of Primary TJA in Patients with Metabolic Syndrome.

Location where Project/Experience will take place:

Southern Illinois School of Medicine – Springfield, IL
Division of Orthopaedics

Mentor Name and Contact Information:

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RATIONALE

Total Joint Arthroplasty (TJA) has proven to be a cost effective surgery that improves quality of life and functionality for many patients [1,2]. Demand for these procedures is increasing at a remarkable rate. In 2005 there were 750,000 Total Hip Arthroplastys (THA) and Total Knee Arthroplastys (TKA) performed which represented a 70% increase over the previous five years [3]. The demand for these procedures represents a significant cost burden on the healthcare system. In 2006, Medicare spent more on TJA than any other inpatient procedure, with costs amounting to 5 billion dollars [4]. This cost is projected to increase to 50 billion dollars by 2030, with demand for THAs and TKAs increasing 174% and 673% respectively [3,4].

Currently, Revision procedures represent 18% of THA's and 8% of TKAs performed in the United States[5]. The projected increase in demand for Primary TJA is expected to result in a correlate increase in Revision procedures. Revision THAs and TKAs are expected to grow 137% and 601% respectively [4]. Revision TJAs are more costly than Primary TJAs, with longer operative times, higher complication rates, and longer hospitalization stays [6]. Patients undergoing revision TJA are also five to six times more likely to need subsequent revisions as compared to patients undergoing Primary TJA [7,8]. Currently, Revision TJAs are unavoidable due to the finite lifespan of the implants used in the procedures. However, 4% of TJA's necessitated revision within 5 years of implantation [9,10]. These "Early Revisions" represent an area of possible improvement.

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Multiple factors have been associated with an increased risk for early revision including patient age, insurance type, preoperative diagnosis, and hospital volume [10]. Various independent comorbid conditions have also been associated with increased risk for early revision [11]. However, the effect of Metabolic Syndrome on the risk for early revision has yet to be explored.

The Metabolic Syndrome (MetS) encompasses a group of modifiable risk factors that are associated with increased cardiovascular disease and all cause mortality [12]. These risk factors include Abdominal Obesity, Elevated fasting plasma Glucose, Dyslipidemia, and Hypertension. MetS represents a significant health problem in the United States with an estimated 23% of adults (>20 years of age) meeting the criteria for the condition [13]. In patients undergoing TJA, uncontrolled MetS has been identified as an independent predictor of perioperative complications and increased length of stay [14].

The purpose of the study is to examine the relationship between MetS and early revision of TJA. Patients with MetS have increased risk of perioperative complications following TJA. Revision TJAs have higher complication rates and increased risk of subsequent revision. Exploring the link between MetS and Early revisions will provide valuable information for surgeons and patients with MetS considering elective TJA.

GOALS

1. To determine if patients with MetS have an increased risk of early Revision TJA.
2. To prepare an abstract based on the findings to be submitted for publication.
3. To participate in research with the SIU School of Medicine Division of Orthopaedics.
4. To gain familiarity with the field of Orthopaedics.
5. To improve my research proposal and manuscript writing ability.
6. To improve my ability to statistically analyze data using the Kaplan-Meier survival analysis and the Cox Regression for Hazard ratio interpretation.

METHODS

This study will use the 5% national sample of Medicare claims data between the years of 1997 and 2011. Patients undergoing primary TKA and THA will be identified using International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) code 81.51 and ICD-9-CM code 81.54, respectively. For this study, the definition of MetS will be Obesity, Hypertension, Diabetes, and Dyslipidemia. This definition is consistent with those used by Ghandi et al and Zmistowski et al in similar studies [14,16]. Comorbidities will be defined using the ICD-9-CM diagnosis codes: Diabetes Mellitus [250.00-250.33, 250.40-250.93], Obesity [278.0, 278.00, 278.01], Dyslipidemia [272], and Hypertension [401.1, 401.9, 642.00-642.04, 401.0, 402.00, 402.10, 402.90, 403.00, 403.10, 403.90, 404.00, 404.10, 404.90, 405.01, 405.09, 405.11, 405.19, 405.91, 405.99, 642.10-642.24, 642.70-642.94] [15]. Patients with MetS will be placed into the MetS

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cohort. Patients without MetS will be placed into the Healthy cohort. In this study, Early Revision of TJA will be defined as a Revision occurring within 5 years of Primary TJA. Patients in both cohorts will be tracked longitudinally for 5 years following their Primary TJA using a unique, encrypted Medicare beneficiary identifier. THA revisions will be identified using ICD-9-CM codes 81.53 and 00.70-00.73. TKA revisions will be identified using ICD-9-CM codes 81.55 and 00.80-00.84. Patients who die before the 5 year period will be censored from the study.

ANALYSIS

Data collected will be analyzed to determine if the MetS cohort had an increased risk of Early Revision compared with the Healthy cohort. The Kaplan-Meier Survival analysis will be used to determine the overall Early Revision probability for each cohort. The Cox Regression Hazard Ratio analysis will be used to determine the relative risk of Early Revision for each cohort. After completion of data analysis, an abstract will be prepared for future presentation or publication. The remainder of my projected goals will be accomplished upon successful completion of this project.

SUPPORT

1. Do you request support funds? Yes
2. Would you be able to participate if a scholarship is not available? Yes

Please note that we do not need an exhaustive or extensive list of literature references.

References

1. Räsänen P, Paavolainen P, Sintonen H, et al. Effectiveness of hip and knee replacement surgery in terms of quality-adjusted life years and costs. *Acta Orthop.* 2007;78(1):108–15.
2. Lavernia CJ, Guzman JF, Gachupin-Garcia A. Cost effectiveness and quality of life in knee arthroplasty. *Clin Orthop Relat Res.* 1997;345:134–9.
3. Wilson NA, Schneller ES, Montgomery K, Bozic KJ. Hip and knee implants: current trends and policy considerations. *Health Aff (Millwood).* 2008;27:1587–98.
4. Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. *J Bone Joint Surg Am.* 2007;89: 780–5.
5. Kurtz S, Mowat F, Ong K, Chan N, Lau E, Halpern M. Prevalence of primary and revision total hip and knee arthroplasty in the United States from 1990 through 2002. *J Bone Joint Surg Am.* 2005;87:1487–1497. doi: 10.2106/JBJS.D.02441

Further references available upon request.