MEDICAL SCHOOL
UNIVERSITY OF MICHIGAN

Capstone for Impact Submission | GY2020

Project Title: Relationship between Anatomical Risk Factors, Articular Cartilage Lesions, and Patient Outcomes Following Medial Patellofemoral Ligament Reconstruction

Student Name(s): Charles Holliday

Advisor Names(s): John Grant, MD

Branch: Procedure Based Care

Path of Excellence: N/A

If this project can be continued by another UMMS student, please include your contact information or any other details you would like to share here:

N/A

Summary:

As a student interested in pursuing a career in orthopaedic surgery, I chose to pursue a project which focused on improving our clinical understanding regarding condition that afflicts a specific patient population. For my Capstone Project, I focused on patients with recurrent patellar instability (PI), a condition that commonly affects young, active females. Dr. John Grant served as my advisor for this project, connecting me with colleagues who frequently treat patients with PI and had collected data on patient characteristics and outcomes. This allowed me the opportunity to perform data analysis and to synthesize a discussion of our results within the context of existing literature. The project took place between 2017-2019 and culminated in a first-author publication in the peer-reviewed journal, "Cartilage".

Introduction:

Patients with recurrent PI frequently develop Patellofemoral (PF) cartilage lesions. The risk factors for developing PF cartilage lesions, and the impact of these lesions on quality of life, have yet to be described. It is important that clinicians understand these risk factors, and the natural course of PF cartilage lesions when treating these patients.

Methodology:

Preoperative, intraoperative, and postoperative demographic, anthropometric (body mass index, Beighton score, hip rotation), radiographic (crossover sign, trochlear bump), cartilage lesion morphology (presence, size, location, grade), and outcomes data (Banff Patella Instability Instrument 2.0 [BPII 2.0]) were prospectively collected from patients undergoing isolated medial patellofemoral ligament reconstruction. For all knees (n = 264), single and multivariable logistic regression was used to determine if any patellar instability risk factors affected the odds of having a cartilage lesion. In patients with unilateral symptoms (n = 121), single variable linear regression was used to determine if the presence, size, or ICRS (International Cartilage Regeneration & Joint Preservation Society) grade of cartilage lesions could predict the 12 or 24+ month postoperative BPII 2.0 score.

Results:

A total of 84.5% of knees had patellofemoral cartilage lesions (88.3% involved the distal-medial patella). Trochlear dysplasia (high grade: odds ratio = 15.7, $P < 0.001$; low grade: odds ratio = 2.9, $P = 0.015$) was associated with the presence of a cartilage lesion. The presence, size, and grade of cartilage lesions were not associated with 12 or 24+ month postoperative BPII 2.0 scores.

Conclusion:

Trochlear dysplasia was a risk factor for the development of patellofemoral cartilage lesions in this patient population. Cartilage lesions most commonly involve the distal-medial patella. There was no significant relationship between patellofemoral cartilage lesion presence, size, or grade and postoperative BPII 2.0 scores in short-term follow-up.

Reflection/Impact Statement:

This project has served as a platform from which I developed a deeper understanding of the scientific research process. I was able to gain experience in statistical analysis, manuscript drafting and revision, as well as podium and poster presentation.

This project serves to enhance the clinical impact we are able to make in the lives of patients who suffer from recurrent patellar instability. This condition presents with a high degree of cartilage damage in an incredibly young patient population (25 years on average at the time of surgery). While our project did not see an association between cartilage lesions and short-term quality of life outcomes, it is likely that the large cartilage defects in these young patients will go on to lead to worsened clinical outcomes. With this project identifying trochlear dysplasia, as a predictor of cartilage lesions, clinicians will be able to counsel patients with this risk factor on their likelihood of cartilage damage. Additionally, future studies will be able to focus on how we can individualize treatment for these patients who are at higher risk of developing cartilage defects and the subsequent clinical consequences.