



RCSI

ROYAL COLLEGE OF SURGEONS IN IRELAND

COLÁISTE RÍOGA NA MÁINLEÁ IN ÉIRINN

Ethicon Grant/Fellowship Report Form

Grant Holder Name	Brian Devitt
Brief biography, including qualification and year of graduation (no more than 100 words)	I qualified from UCD in 2001 and carried out my internship at the Mater Misericordiae University Hospital. I decided to pursue a career in orthopaedic surgery and carried out my basic surgical training at Cork University Hospital, achieving my MRSCI in 2004. Following this, I performed research at the Genomics Research Unit, exploring the molecular effects of metal ions on human osteolasts, and was awarded with a medical doctorate in 2007. Appointed to the higher surgical training scheme in 2007, I attained the FRCS (Trauma & Orthopaedics) in 2011 and completed my training in 2012.
Title of Project/Fellowship	Exploring new surgical reconstruction methods for complex knee ligament injury: a biomechanical study.
Year of Award: Commencement Date: Conclusion Date:	2012 July 2012 June 2013

Summary (no more than 250 words)

Background: A more thorough understanding of the posterior cruciate ligament (PCL) has led to an increase in awareness and treatment of these complex injuries. A great deal of controversy still exist, however, as to which is the most effective reconstruction technique, anatomic single bundle (SB) or double bundle (DB).

Hypothesis: It was hypothesized that anatomic DB PCL reconstruction techniques would produce superior anterior-posterior and rotatory knee stability compared to anatomic SB PCL reconstruction, and would more closely recreate the normal knee kinematics.

Materials and Methods: Nine matched-pair cadaveric knees were used to evaluate the kinematics of an intact knee, a SB and a DB PCL reconstruction. Using a 6 degree-of-freedom robotic system, knee stability was assessed.

Conclusions: We found that an anatomical DB PCL reconstruction confers superior knee stability under testing conditions compared to an anatomical SB PCL reconstruction through

a full range of knee motion. Specifically, we demonstrated that a DB PCL reconstruction provides significantly more restraint to both posterior translation, and offers better rotational stability. In so doing, an anatomical DB PCL reconstruction closely approximates normal knee kinematics.

Clinical relevance: Comparison of the two reconstructive techniques illustrates the clinical advantage imparted by the addition of the posteromedial bundle (PMB). Consequently, a DB PCL reconstruction confers a greater degree of knee stability in comparison to a SB PCL reconstruction throughout a full range of knee motion, in particular beyond 90° of knee flexion.

Grant Report (in the region of but no more than 500 words)

Objectives of Project/Fellowship:

The objective of this fellowship was to carry out biomechanical research exploring the surgical reconstruction for complex ligamentous knee injuries. To this end, I worked on a project exploring the role each bundle of the Posterior Cruciate Ligament (PCL) has on the kinematics of the knee. This study formed the foundation for the main focus of the research, which investigated to kinematics of PCL reconstruction and compared anatomical single-bundle versus double-bundle reconstruction.

The reconstructions were performed on fresh frozen cadaveric knees and were tested in a KUKA robot, which allowed analysis of the laxity of the knee and its ability to withstand physiological forces following reconstruction.

Did you achieve these objectives?

Yes, the objectives of my research fellowship were achieved. The study was completed over a three month period with intensive testing. On a personal level, I performed all the surgical reconstructions, contributed to analysis of the data, and wrote the manuscript.

In your opinion, what is the value of your award to:

(a) Yourself

This award was extremely valuable to me. It allowed me to travel to a centre of excellence internationally and carry out research with experts in the field. In addition to the research experience gained, I also benefitted from exposure to vast expertise in the field of complex knee surgery.

(b) The institution in which you worked

The institution benefitted from having an experienced orthopaedic surgeon to perform the surgical reconstruction procedures. In terms of translational research, having a surgeon working along with engineers in biomechanical research is essential to maintain the clinical relevance of the investigation. In addition, I believe I made a significant intellectual contributions to the analysis of the data and the writing of the manuscript.

(c) In the future for Irish patients

The experience I gained working at the Steadman Philippon Research Institute has not only enhanced my knowledge and understanding of the treatment of multiligamentous injuries but has also introduced me to a vast number of experts in the field. This experience will benefit Irish patients by providing state of the art care in the future and facilitate the establishment of a musculoskeletal research institute where further research can be carried out in Ireland in this evolving field.