Patellofemoral Arthroplasty: Editorial

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Patellofemoral Arthroplasty: Editorial

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Whilst arthroplasty in its various forms including excision arthroplasty has been around for over a century, it was not until the 1960's that Sir John Charnley’s hip replacement made arthroplasty feasible on a large scale. He called the procedure low friction arthroplasty showing a clear understanding of the importance of the bearing surfaces and the consequences of wear particle debris. Whilst many others helped move total knee arthroplasty (TKA) forward based on Charnley’s pioneering work on bearing surfaces, it was John Insall who made the greatest inroads in the 1970’s and beyond with his total condylar knee and emphasis on alignment with avoidance of overloading either the medial or lateral compartments. This concept of mechanical alignment has only recently been challenged with other strategies, especially kinematic alignment where loads are not evenly distributed between the medial and lateral compartments. These recent changes in alignment strategy have not been associated with implant wear and early failure likely as a result of improvements in implants, particularly polyethylene which is now sterilised in an inert gas, cross linked with radiation and for some implants, infused with the antioxidant Vitamin E.

A further development which became more popular in the 1970’s was based on the concept that surgeons could replace only the parts of the knee that were worn leaving the remainder of the native knee to provide stability, more normal kinematics and some proprioception. Leonard Marmor was one of the early developers of a uni-compartmental knee arthroplasty (UKA) with a published 10-year survivorship of around 80% [1]. This didn’t compare favourably with Insall’s TKA 10-year survivorship of 90% resulting in a modest worldwide uptake of UKR. Many surgeons now aged in their 60’s would not have seen a UKA inserted during their training. It was the 1998 publication by Murray, Goodfellow and O’Connor describing a projected survivorship of 97% at 10 years with the mobile bearing Oxford replacement that made the orthopaedic world reconsider the idea of only replacing the worn parts [2]. The surgery was indicated for what was termed “anteromedial arthritis” and it was considered that the outcome of a well-done UKA was superior to that achieved with a well-done TKA.

Whilst great strides were being made with uni-compartmental replacement of predominantly the medial but sometimes the lateral compartment, others and particularly Blazina in California were reporting on an implant for isolated replacement of the patellofemoral joint. Just as patients with anteromedial arthritis were considered ideally suited to undergo medial UKA, so too were the less common group of patients with trochlear dysplasia. These patients often reported recurrent patellar instability in their youth with progressive patellofemoral arthritis in later life. Some had very disabling symptoms in their 40’s or earlier but no radiographic abnormality in the medial or lateral compartments and were considered too young for TKA. Whilst the concept of replacing only the worn part had appeal particularly as when performing TKA for isolated patellofemoral arthritis, it was difficult to re-create the external shape and kinematics of the un-worn tibiofemoral compartments and satisfy the patient. Whilst resurfacing a patella with some lateral bone-stock loss was a standard part of TKA, freehand preparing of the worn trochlea to accept an implant which could be positioned with six degrees of freedom was challenging for surgeons not used to this procedure.
Progress has been made in the past two decades initially with inlay and later onlay trochlear implants. Newman and Ackroyd from Bristol developed the Avon implant based on the trochlear design of a successful TKA femoral component and demonstrated good results [3]. However, positioning the component to minimise any step between the distal end of the trochlear component and the native femoral articular cartilage has proved challenging. It has been recent the development of instrumentation particularly milling systems that has made correct positioning the trochlear component reliable and reproducible. It is likely that image-based robotic-guided surgery for the trochlea will become more commonplace and give the surgeon more information to perhaps better position the trochlear component in relation to the native bone in the correct coronal, sagittal and axial alignment. Ongoing registry data will be key to determining whether the cost of robotic systems is justified with better outcomes and implant longevity.

Challenges remain for isolated patellofemoral arthroplasty including choosing the correct patient for the procedure and excluding those not suitable. Better imaging, particularly MRI, has allowed more accurate assessment of the medial and lateral compartments and aids in excluding those not suitable as does assessment of the patient’s body mass index (BMI) which is acknowledged to be a good predictor of the likelihood of tibiofemoral disease progression.

This edition contains a wealth of information on isolated patellofemoral arthritis, its management and the outcomes of surgery. Arias and Lustig succinctly outline the pathophysiology of the condition with a thorough explanation of normal and abnormal patellofemoral biomechanics as well as a guide to making the diagnosis with history, examination and investigations [4]. Batallier and colleagues discuss the indications for isolated patellofemoral arthroplasty and more importantly the contraindications [5]. They point out that patient selection is critical for success and that it is not a procedure to be performed by surgeons not generally familiar with arthroplasty. Shatrov and Coolican outline the improvements made in both implant design and instrumentation to allow a seamless transition of the trochlear implant to the native articular cartilage and discuss the key components of surgical exposure to identify landmarks and appropriately position the trochlear implant [6]. They describe their preferred technique for patellar preparation with inlay milling and provide advice on positioning the patellar implant in the coronal and sagittal planes depending on patellar height and wear. Finally, Cardenas and Wascher provide a great deal of information on outcomes particularly with the newer generation implants and point out that whilst revision rates for isolated patellofemoral arthroplasty remain higher than for TKA, patient outcomes and function levels are higher [7]. They call for improved outcome measures specific to the patellofemoral joint and along with all the authors in this special edition cautiously recommend the procedure in the correct patient.

References
