■ EDITORIAL

40 years of the Oxford Knee

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The Oxford Partial Knee (Zimmer Biomet, Bridgend, United Kingdom) has been used for the last four decades. Very few products make it to this milestone, not least in the world of medicine with the constant drive for innovation and improvement. The original design concept of John Goodfellow and John O'Connor, a fully congruent mobile meniscal bearing articulating with spherical femoral and flat tibial components, has remained unchanged.[1] That does not mean the 'Oxford' has not evolved. Over the course of 40 years, much work has been done in better understanding indications for its use,[2,3] improving instrumentation to allow accurate and more reproducible implantation through smaller incisions,[4] and design changes to improve fixation and durability of the components.[5]

In 1976, knee arthroplasty was still in its infancy. Engineers and surgeons were concerned with polyethylene wear with unconstrained designs, but as they increased congruity of the articulating surfaces, necessarily increased force was transmitted to the implant bone interface and high rates of loosening were observed.

Fairbank[6] had previously recognised the importance of the meniscus and noted its load-bearing properties. By conforming to the joint surfaces and moving with the knee, it could significantly increase the surface area over which load was transmitted, thereby reducing the pressure on the articular surfaces. Loss of this structure clearly led to abnormal forces in the knee and the development of medial compartment osteoarthritis.

Surgeon (Goodfellow) and engineer (O'Connor) met and set out to design a knee prosthesis that would minimise wear and reduce stresses through the implant bone interfaces. The Oxford Knee was introduced initially as a bicompartmental procedure. Fairly soon thereafter, anteromedial osteoarthritis was recognised as a path anatomical pattern,[7] and this has been increasingly recognised as the predominant pattern of osteoarthritis we treat.[8] Partial knee arthroplasty surgery was introduced.

The design philosophy of the Oxford has stood the test of time. Multiple studies have shown very low levels of polyethylene wear (0.01 mm/year) if no impingement is observed.[9] The implant has well-documented long-term survival rates, even into the second decade, showing the durability of the bone implant interfaces.[10] The technique allows the implant to be positioned balancing the ligaments and restoring their natural tensions. This restores the knee kinematics to pre-disease levels,[11] and leads to high function and better satisfaction than with conventional TKA designs.

There are, however, still concerns about partial knee arthroplasties in the orthopaedic community. Joint registries have shown higher rates of revision compared with conventional TKAs, and many suggest that their use should be limited.[12] This is despite the same registries showing better clinical results from partial knee arthroplasties than TKA.[13]

It has been well demonstrated from registry data that the thresholds for revision are different for partial knee arthroplasties and this goes partly to explain the increased revision rate.[14] It has also been well documented that surgical experience is important and much has been and continues to be done to educate surgeons in appropriate indications and optimum surgical technique.[15] There is good evidence that as surgeons undertake more partial arthroplasties as a percentage of their knee arthroplasty practice (up to 50%), their results improve.[16]

Data from joint registries not only show excellent clinical outcomes with more satisfied patients, they also show significantly lower complication rates with partial knee arthroplasty compared with TKA;[1,17] which should appeal to patients, surgeons and those who contribute towards the cost of health care.

The unique design of the Oxford knee continues to generate much interest. In this

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supplement we can see the Oxford being successfully implanted all over the globe with excellent ten-year data from the United States[18] and other European centres.[19]

As long-term survival of arthroplasty procedures have become more reliable, interest has been directed towards optimising knee function. The Oxford Knee has demonstrated excellent functional results,[13] but current patient-reported outcome measures may not be sensitive enough to appreciate these differences fully. The paper by Professor Cobb's group[20] from Imperial College, London shows that gait patterns can be returned to near normal levels. The Oxford technique of implanting the prosthesis with reference to the ligaments allows almost normal knee kinematics and is likely to contribute to the high function and satisfaction levels that are often reported.

There is still much to learn and things to be improved, and as a result, the Oxford Partial Knee will continue to be developed to benefit the patients we see.

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