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EDITORIAL

The hip arthroplasty journey: where are we going and who is paying the bill?

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Osteoarthritis (OA) is a leading cause of chronic disability worldwide with a substantial impact on healthcare economies.[1] The hip is the most commonly affected joint after the knee, and hip arthroplasty provides a low-morbidity, cost-effective solution to the pain and functional impairment arising from the disease.[2] The long-term survivorship of these prostheses is also generally good.[3]

So, where is the problem? The answer lies, at least in part, on the cumulative cost of the disease and its treatment on the economy. The lifetime risk of hip arthroplasty in western countries in 2013 was approximately 10%, and this continues to increase.[4] In 2017, the number of hip arthroplasties reported to the National Joint Registry for England, Wales, and Northern Ireland was 105 306. The current standard NHS tariff payment for a non-complex hip arthroplasty is approximately £6000. This equates to a direct treatment cost in this territory alone of more than £530 million per annum. This does not, however, include the overall economic cost, which for OA as a whole is estimated at 1% of annual gross national product, costing the United Kingdom economy £3.2 billion in lost production.

What can be done to make hip arthroplasty surgery more cost-effective?. The range of prosthesis construct combinations available is large; in England and Wales alone, there are over 800.[5] Of these, in 2017 28.2% were of cemented fixation; 37.8% cementless; 30.3% hybrid (cemented stem); 3.1% reverse hybrid (cemented component); and 0.6% were hip resurfacing procedures. Of bearing interfaces, 57.6% were metal on polyethylene; 37.8% were ceramic on polyethylene; 9.0% were ceramic on ceramic; and less than 0.7% metal-on-metal. Given that these various combinations of prostheses have different pricing, and that their reoperation-free survival varies, there has been a strong move in the United Kingdom towards reducing the range of available prostheses by promoting those that are most cost-effective over the life of the patient. This 'getting it right first time' agenda is a logical solution for both patients at the population level and for the national economy. However, others argue that such a 'one size fits all' approach reduces healthcare to the economic consideration and stifles prosthesis innovation at a time when personalized care is also an important concern. Nonetheless, the NHS best practice tariff for hip arthroplasty from 1 April 2019 required that, at an institutional level, 80% of patients aged over 70 years receive either a fully cemented or hybrid prosthesis.

What about the younger patient with hip OA?. Increasing evidence shows us that hip OA is strongly heritable, with identified genetic variants accounting for 52% of that risk.[6] Many of these variants modulate structural bone or cartilage genes responsible for normal joint development,[6-9] raising the potential for novel therapeutic interventions. Synthetic biology approaches, gene editing, cellularised scaffolds, and other technologies are also bearing fruit in the preclinical setting,[10-12] as are novel investigational drugs targeting established OA pathways,[13] assisted by increased acceptance by regulatory authorities of structural endpoints for establishing their efficacy. However, these solutions will not form part of routine clinical care in the near future.

Recent data also suggest that the survivorship of hip arthroplasty in the younger patients is better than previously anticipated.[14] However, priorities and expectations vary between patients. Large diameter metal-on-metal bearings are still favoured by some. While in selected young and active men, the

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revision-free survival of these prostheses may be similar to conventional hip arthroplasty,[15] the performance of these bearings on the general population is poor,[16] making them an expensive lifetime choice. Debate continues around cemented *versus* cementless fixation, patient survival, and lifetime costs. However, much of the case against cementless stems using contemporaneous bearing materials lies in additional implant cost and an increased risk of early periprosthetic fracture. Competitive pricing and advances in cementless implant design may also modulate these arguments in the future.

Where next?. Although drugs to prevent the progression of early arthritis, non-arthroplasty surgery, and regenerative medicine solutions to established disease will be realistic prospects for the future, our current best solution for advanced OA that does not respond to lifestyle measures and analgesics remains hip arthroplasty. Although non-conventional choices will remain for some, the majority of patients will have fewer choices as they are being cared for in a healthcare economy that has to balance cost against long-term survival.

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