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Review Article

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Past, Present and Future of Tha and Hip Surgery: An Expert Opinion

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Innovation in Orthopaedic Surgery is motivated by the desire to improve implant longevity, maximise patient function and reduce postoperative complications. In recent years, other goals of innovation include reduced Health Care costs and improved efficiency of Health Care delivery. In Orthopaedic Surgery, the outcome of an innovation may not become apparent until a considerable period of time has passed after the introduction of the new technology.

Total hip arthroplasty (THA) is considered to be single the most important innovation in hip surgery. In November 1962, just 60 years ago, the pioneer (Sir John Charnley) in hip reconstruction surgery made the break through. Thanks to basic scientists, engineers, the industry, and orthopaedic surgeons who have dedicated their scientific and professional lives to adult re-constructive surgery, we can now provide arthritic patients with painless joint movement and restoration of function. However, the road to success for arthroplasty has been neither easy nor without obstacles [1,2]. Problems of surgical technique arose, low quality implants were used, patterns of failure were recognised, and surgeons had to learn from devastating clinical failures with patients sometimes being "fashion victims".

Despite the advances made within Orthopaedic Surgery, occasional failures and disasters persist. Examples of this are in the recent overuse of minimally invasive surgical techniques, the problems which occur with metal-on-metal bearings of all types and, more alarmingly, with problems in the modular interfaces of the big femoral heads and modular necks [3]. Added to these problems is the matter of finance. Health providers question the cost-effectiveness of arthroplasty procedures and especially question the need for the introduction of the newer, more expensive, techniques and implants. Fortunately, we now have reliable educational and training programs, we critically review high quality literature published in peer review journals from evidence-based studies (Level I and II RCTs, meta-analysis and national registry data), and continental regulatory bodies inform and scrutinise industrial proposals. We also carefully record the complications that arise in our procedures and take preventive measures.

When evaluating innovations in hip reconstructive surgery over the last 30 years we should focus mainly on bearing surfaces. Highly cross-linked ultra-high-molecular-weight polyethylene (UHMWPE) and highly cross-linked polyethylene (HXLPE) was adapted for routine use in the early 2000s to reduce the revision rates related to wear, osteolysis, and aseptic loosening resulting from conventional UHMWPE wear. Since its introduction, consistent evidence showing reduced wear rates and osteolysis supports the use of HXLPE in THA. High quality studies demonstrating the advantage of HXLPE over conventional UHMWPE in terms of long-term survivorship are emerging [4]. On the other hand, recent registry data has shown that the old implant fixation controversy (cementless vs. cemented) of the '80s and '90s is irrelevant since equivalent long term outcomes have been recorded [5,6]. Despite the extensive scientific investigation of various surgical approaches in total hip arthroplasty it has been shown that the choice of approach may influence short-term outcomes only [7]. Moreover, modern navigation and robotic technology in total hip arthroplasty improve implant positioning and adjustments for leg length and offset measurements although this is not translated into improved long-term outcomes yet and the cost-effectiveness of their use is still unknown [8]. What we have really learnt in the last 30 years is that for the majority of patients, a standard conventional total hip arthroplasty with a surgical approach familiar to the surgeon using standard well established components and highly cross-linked polyethylene leads to satisfactory clinical outcomes [9].

DDH, LCPD, SCFE, and infections in the hip were the most significant areas of research and debate in pediatric orthopaedics during the last 20 years [10]. In DDH patients, research was oriented to the indications, success rates and complications for the Pavlik harness and brace treatments. A multi-centre prospective trial evaluating the use of the brace treatment found an overall success rate of 79% for dislocated hips [11,12]. LCPD

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research has focused traditionally, over the last 50-60 years, on containment. Mechanical protection should be optimised with modulation and stimulation of the healing process. The role and prognostic importance of perfusion MRI for early-stage disease has received a lot of attention. Intraoperative monitoring of femoral head perfusion has been an important area of research in slipped capital femoral epiphysis (SCFE) as well as its implications for surgical treatment [13,14]. Obesity and high leptin levels are correlated with physeal plate pathology in patients with SCFE [15].

Our knowledge of pre-arthritic hip joint conditions has recently improved greatly. A thorough understanding of femoroacetabular impingement (FAI), congenital hip disease, sequalae of paediatric hip disorders and torsional hip deformities, the introduction of hip arthroscopy, new surgical approaches and procedures such as periacetabular osteotomy have opened up the field of hip joint preservation surgery [16,17]. Hip arthroscopy has become a standard procedure with wide indications but revision rates are still high due to labral tears and residual FAI (failure to distinguish impingement from instability) [18]. Surgical techniques for performing a peri-acetabular osteotomy have improved, and the indications and long-term outcomes have been confirmed [19,20].

Due to recent research, the definition and diagnosis of peri-prosthetic hip infection have seriously improved using validated criteria [21]. Debridement, antibiotics and implant retention (DAIR), 1-stage and 2-stage revision surgery are the most common management strategies for infected total hip arthroplasty. However, our knowledge concerning their efficacy is based on short- to mid-term low-quality studies. The above strategies, are not unique surgical techniques presenting several variables. Infection control rates above 85% have been reported for each but comparisons are difficult because different indications and patient selection criteria are used in each strategy [22]. Recent outcome data show that DAIR and 1-stage revision present superior functional and quality of life outcomes and reduced costs for Health Systems.

For several decades orthopaedic surgeons have tried hard to improve surgical techniques for hip fracture fixation surgery. However, it has been shown that, apart from the surgical technique, it is mainly the patient related parameters which influence outcomes [23-25]. Patient optimisation and time to surgery also affect outcomes and mortality rates [26].

Pelvic tumour surgery has improved in recent years. Modern diagnostic modalities, contemporary chemotherapy and radiotherapy techniques in combination with newer reconstructive techniques such as endoprosthetic reconstruction, allograft or autograft reconstruction, arthrodesis and hip transposition have all improved functional and survival outcomes.27 However, complication rates are still high [27].

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