Early Complications of Hip Resurfacing

Lawrence Kohan, FRACS, FAOrth, PhD, Clarice J. Field, BE(Hons), PhD, and Dennis R. Kerr, MB, BS, FANZCA

Abstract: There has been a rapid increase in the number of hip resurfacing procedures for the treatment of symptomatic osteoarthritis over the last decade. We examine our early complications associated with this procedure. Eight hundred forty consecutive hip resurfacing procedures by 1 surgeon using 1 prosthesis were assessed. The complications seen within the first 12-month postoperative period were analyzed. Specific patient selection criteria were used. Complications such as loosening, femoral neck notching, femoral neck fracture, deep vein thrombosis, stress fracture, nerve palsy, and infection were noted. Complications linked with loosening were categorized to either the femoral or acetabular component. A total of 86 early complications were observed in the 840 resurfacings. Twenty-three (2.7%) required operative intervention, and 10 (1.2%) were converted to stemmed hip arthroplasties. Of these 86 complications, the most common complication was deep vein thrombosis, 19 instances (2.26% occurrence in 840), followed by femoral neck fracture, 11 (1.31%); infection, 10 (1.19%); femoral notching, 10 (1.19%); transient nerve palsy, 8 (0.95%); acetabular loosening, 6 (0.71%); hematoma, 5 (0.60%); and stress fracture, 4 (0.48%). The fractures occurred mostly in patients older than 60 years.
Keywords: Birmingham hip resurfacing, complications, body mass index, femoral fracture.

The Birmingham Hip Replacement (BHR) (Smith & Nephew, Memphis, Tenn) is the most widely used device for hip resurfacing arthroplasty. According to the Australian Orthopaedic Association National Joint Replacement Registry (ANJRR), there was a 15% increase in these procedures between 2004 and 2008 [1]. However, the frequency is now decreasing, and a possible reason for this may be an appreciation of the complications associated with this procedure. The ANJRR also shows that the failure rate varies greatly between implant manufacturers.

Hip resurfacing is an option for the treatment of the younger, more active patient with osteoarthritis. Advantages of the technique include bone preservation and the ability to maintain a high-activity lifestyle. We feel that it is important to examine early complications in hip resurfacing with the aim of improving the management and prevention or at least the minimization of these complications.

From the Joint Orthopaedic Centre, Bondi Junction NSW, Australia.
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Reprint requests: Lawrence Kohan, MB, BS(Hons), PhD, FRACS, FAOrthA, Orthopaedic Surgeon, Joint Orthopaedic Centre, 99 Spring St, Bondi Junction, NSW 2022 Building J07, Australia.

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Previous hip resurfacing designs comprised metal-on-polyethylene bearings [2,3], where early complications such as high volumetric wear, polyethylene particulate debris, osteolysis, and loosening were reported. Metal-on-metal bearings have now resolved the complication of polyethylene wear but have replaced it with the problem of metallic debris and increased metal ion concentration in tissue fluids. The use of a metal-on-metal bearing for hip resurfacing has, generally, provided consistent outcomes with fewer complications compared with the polyethylene bearing surface [4,5]. Other reported problems associated with hip resurfacing are thinning of the femoral neck, femoral neck fractures, avascular necrosis, and hypersensitivity to metal ions [6-8].

Complications such as hematoma, acetabular loosening, femoral notching, excessive reaming, stress fracture, femoral fracture, deep vein thrombosis (DVT), dislocation, infection, and transient femoral nerve palsy have been reported [6]. This study aims to examine our experience of early complications associated with hip resurfacing surgery.

Materials and Methods

One implant only was used in this series, the BHR. Antibiotic Simplex P cement with tobramycin was used for the femoral component (Stryker, Newbury, UK). One surgeon performed all the operations (LK), and this

patient population represents all the patients seen, including the "learning curve." There are no omissions.

We analyzed early complications related to BHR surgery between April 15, 1999, and June 30, 2009. Early complications related to resurfacing were deemed to have occurred within the first 12-month postoperative period.

A specific set of patient selection criteria was used. The patients had end-stage osteoarthritis, which had failed nonoperative treatment for at least 6 months. Some had avascular necrosis. Some had undergone proximal femoral trochanteric osteotomy previously for osteoarthritis. All of the patients had to be independently mobile, living at home and not in an institution or care facility. They had to undertake some physical activity outside their home at least twice per week. They had to be in good general health and have no inflammatory joint disease, no history of neurologic disorder, metabolic bone disease, pelvic irradiation, not taking any steroid medications and no alcohol abuse.

On the imaging studies, less than one third of the femoral head could be necrotic or absent. Bone density studies using Dual Energy X-ray Absorbtiometry (DEXA) [9] were started when, during the first 50 patients in this series, we experienced femoral neck fractures. We required a T score measured at the level of the femoral neck higher than -2.0 g/cm^2 in both hips for femoral resurfacing. The World Health Organization criterion for the diagnosis of osteoporosis is a T score of -2.5 g/cm^2 [10]. We decided to add a margin of 0.5 standard deviations to our cutoff T score as a buffer between our cutoff level for hip resurfacing surgery and the definition of osteoporosis. The patients had to be able to understand the preoperative instructions and be able to comply with the postoperative treatment program.

Complications were classified using the method described by Dindo et al [11]. Although designed for general surgical use, we feel that the classification is useful in the assessment and interpretation of our data.

Grade I is defined as any deviation from the normal postoperative course but not requiring treatment, pharmacologic, surgical, endoscopic, or radiologic. However, analgesics, antipyretics, antiemetics, physiotherapy, and others are permitted. *Grade II* is defined as a complication requiring pharmacologic treatment with medications other than allowed for grade I complications such as anticoagulants (other than thrombo prophylaxis) and antibiotics. Grade III complications require surgical, endoscopic, or radiologic intervention, such as femoral neck fracture and component loosening. This group is further subdivided into IIIa, intervention not under general anesthesia, and IIIb, intervention under general anesthesia. Grade IV addresses life-threatening complications requiring intensive care unit management and is further subdivided into grade IVa, single-organ dysfunction and a grade IVb, multiorgan dysfunction. Grade V relates to the death of a patient. For the purpose of evaluating complications in relation to arthroplasty surgery, grade III, as it is described by Dindo et al [11], appears to be encompassing too large a spectrum of problems and not specifically discriminating between the magnitude of problems encountered in this group of patients. The span between grade II, pharmacologic treatment of complications, and grade IV, life-threatening complications requiring intensive care unit management, is very large. In an effort to address this, we have added 2 further subgroups. Grade IIIa remains intervention not under general anesthesia; grade IIIb is an intervention under general anesthesia but not requiring an open procedure, such as a closed reduction of a dislocation. Grade IIIc becomes an intervention under general anesthesia, requiring an open procedure but not removal of a prosthesis, such as a periprosthetic fracture; drainage of hematoma; and open reduction of a dislocation, and grade IIId becomes an open procedure under general anesthesia requiring the removal or replacement of a prosthesis. We have classified the complications that we encountered along these guidelines.

A total of 734 patients underwent 840 BHR procedures. 565 were male (80%) and 169 were female (20%). The mean age at operation was 54.5 years (range, 24-87). The age distributions are shown in Fig. 1. The oldest patient in the group, at 87 years of age, underwent resurfacing surgery, in accordance with our selection criteria. As a marathon runner, in excellent health, with adequate bone mineral density, we did not exclude him on the basis of his age. However, he is an extreme example and 87 year olds would not under usual circumstances, be suitable candidates for hip resurfacing surgery.

Complications are recorded and classified in Table 1. Deep vein thromboses were diagnosed using Duplex ultrasound carried out by an experienced ultrasonographer. Both lower limbs were examined. This was carried out routinely 12 to 14 days postoperatively when the skin clips were removed and at any other time when

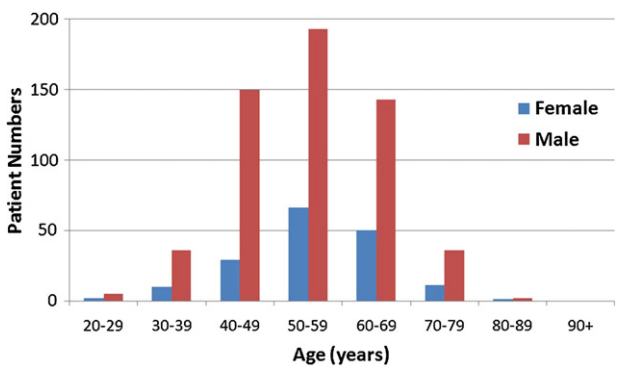

Fig. 1. Patient age distributions.