The Journal of Arthroplasty 29 (2014) 2262–2266

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

The Fate of Osteophytes in the Superolateral Region of the Acetabulum After Total Hip Arthroplasty

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ARTICLE INFO

Article history:
Received 15 February 2014
Accepted 16 April 2014

Keywords:
osteophyte
acetabulum
total hip arthroplasty
radiograph
fate

ABSTRACT

Acetabular osteophytes are common during total hip arthroplasty (THA). However, the fate and role of superolateral osteophytes of the acetabulum after THA remain unclear. The present study reviewed a series of radiographic changes in the osteophytes on the superolateral region of the acetabulum in 35 hips. The mean follow-up period was 42.2 months. The results revealed that the osteophytes that were not in contact with the superolateral edge of acetabular cup were gradually absorbed after THA. In contrast, the osteophytes that were in contact with the superolateral edge of the acetabular cup underwent remodeling, formed regular trabecula, were stress bearing, and eventually integrated with the acetabular cup and the original acetabular bone, and should play a role in stabilizing the acetabular cup.

Osteophyte formation is an integral pathologic feature of osteoarthritis (OA) and an important criterion of the disease [1]. Osteophytes are the metaplastic osseous and cartilaginous tissues at the margin of osteoarthritic articular surfaces. Osteophytes can be considered to be adaptive reactions to instability within a joint [2]. Osteophytes may play a compensatory role in the redistribution of stress to provide protection for the articular cartilage [3]. The severity of osteophyte formation is positively correlated with the intensity of the stress borne by the joint, and osteophytes can even be used as markers of joint stress [4].

Total hip arthroplasty (THA) is currently the preferred method for treating serious hip OA [5]. Osteophytes around the acetabulum are common during THA. It has been suggested that the osteophytes should be treated intraoperatively to avoid potential impingement between the osteophytes and femoral prostheses [6] and that the true acetabulum should be adequately exposed such that the acetabular cup can be implanted in an appropriate position [7]. However, to our knowledge, there are no criteria for dealing with osteophytes.

After THA, the superolateral region of the bony acetabulum and the acetabular cup bear the most stress [8,9]. The bone stock on the superolateral region of the acetabulum determines the size and initial stability of the acetabular prosthesis particularly in patients with OA secondary to developmental dysplasia of the hip (DDH) [10]. Moreover, the superolateral region of the acetabulum exhibits the most severe osteophyte formation; therefore, special attention should be given to the management of osteophytes at this site in THA.

After THA, the articular cartilages are replaced by new friction pairs, and the hip joint is in a new mechanical environment and achieves a new stable state. Given this new environment, should osteophytes be removed intraoperatively? What happens to the reserved osteophytes on the superolateral region of the acetabulum? Could these osteophytes continue to play a role? The present study observed a series of radiographic changes in the osteophytes on the superolateral regions of the acetabulums of patients who underwent THA, with the goals of analyzing the fate of these osteophytes and discussing the role of these osteophytes after THA.

Materials and Methods

This study was approved by the institutional review board of the Ninth People's Hospital, Shanghai, Jiao Tong University School of Medicine. All patients provided written informed consent prior to the initiation of the study. Thirty-four patients who had osteophytes on the superolateral aspects of the acetabulum after receiving THA were identified in our department from February 2006 to February 2010. One patient was lost to follow-up 6 months after the operation, and one patient died due to diseases unrelated to THA 15 months after the operation. Therefore, a total of 32 patients (35 hips) were available for our study. The demographic data of the patients are shown in Table 1.

The Conflict of Interest Statement associated with this article can be found at http://dx.doi.org/10.1016/j.arth.2014.04.017.

Competing interests: The authors declare that they have no competing interests.

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http://dx.doi.org/10.1016/j.arth.2014.04.017
0883-5403/

Table 1
Demographic Data.

Variable	Value (Range)
Sex	
Female	26
Male	6
Age (years)[a]	56.6 (37–73)
Primary diagnoses	
DDH	27
OA	5
Type of osteophyte	
I	10 (11 hips)
IIA	13 (15 hips)
IIB	9 (9 hips)
Follow-up time (months)	42.2 (25–82)

[a] Values expressed as means with ranges in parentheses.

Types of Osteophytes

The osteophytes on the superolateral aspects of the acetabular cup after THA were divided into two types according to their relationships with the acetabular cup on anteroposterior pelvic radiographs (Fig. 1).

In the type I osteophytes (i.e., the non-contact type), the lateral upper edge of the acetabular cup was level with the superolateral edge of the true acetabulum, and the osteophytes were beyond the acetabular cup and did not directly contact the acetabular cup.

In the type II osteophytes (i.e., the contact type), the lateral upper edge of the acetabular cup extended beyond the superolateral edge of the true acetabulum, and the portion exceeding the acetabulum was covered by osteophytes. Moreover, based on the relationship between the osteophyte and the acetabular cup, type II was further divided into type IIA, in which the outer edge of the osteophyte did not exceed the lateral upper edge of the acetabular cup, and type IIB, in which the outer edge of the osteophyte exceeded the lateral upper edge of the acetabular cup.

Surgical Technique

All surgeries were performed by the corresponding author. The posterolateral approach to the hip was adopted. After dislocating the femoral head and performing a femoral neck osteotomy, the osteophytes at the base, bottom and around the circumference of the acetabulum were carefully evaluated. A small reamer was used to ream the osteophytes at the base and inferior edge of the acetabulum in the vertical direction until the cotyloid fossa and transverse ligament were exposed. Next, the acetabulum was reamed successively in the direction of abduction to 40–45° and anteversion to 15–20° until satisfactory size and coverage were achieved. The trial was placed on the acetabular side. Next, the femoral side was prepared according to standard procedures. A trial was placed on the femoral head, and the hip joint was relocated. The hip joint was tested with the following movements: a maximal extorsion rotation in a straight position, 45° of internal rotation at 90° of hip flexion, and 40° of abduction and 15° of anteversion at 40° of hip flexion. If the osteophytes impinged on the prosthesis or proximal femur in this process, rongeurs rather than bone chisels were used to remove the impinging osteophytes to avoid iatrogenic fracture. After the removal of the osteophytes, the stability of the hip joint was reconfirmed with the above-mentioned method, the trial was removed, and the definitive prosthesis was assembled.

Postoperative Treatment

Antibiotics were routinely administered for 1 to 3 days to prevent infection. In cases of hip dysplasia due to infectious diseases in childhood, the use of antibiotics was prolonged to 10 to 14 days after surgery. On the third postoperative day, the drainage tube was removed, and the patients began partial weight-bearing walking with the help of a walking aid. After 4 to 6 weeks, the patients returned to full weight-bearing walking.

Clinical and Radiographic Evaluations

Out-patient follow-ups were performed at 1, 3, 6 and 12 months after surgery. Subsequently, yearly follow-ups were performed. The Harris hip score (HHS) was used to assess the function of the hip joint of each patient prior to surgery and at each follow-up examination after surgery [11]. A series of radiographs of the pelvis were obtained at each follow-up visit and were carefully assessed for loosening of the prosthesis and changes in the osteophytes on the superolateral region by two independent observers. Cup abduction angle was measured as the angle subtended by the face of the cup and by the interteardrop line on the anteroposterior pelvic radiographs. Cup loosening was defined as >2-mm variation in the vertical distance between the center of the acetabular cup and the teardrop on an AP pelvic radiograph.

Results

Clinical Outcomes

There were no intraoperative iatrogenic neurovascular injuries or fractures. No infections occurred during the follow-up period. One patient developed deep venous thrombosis in his right lower

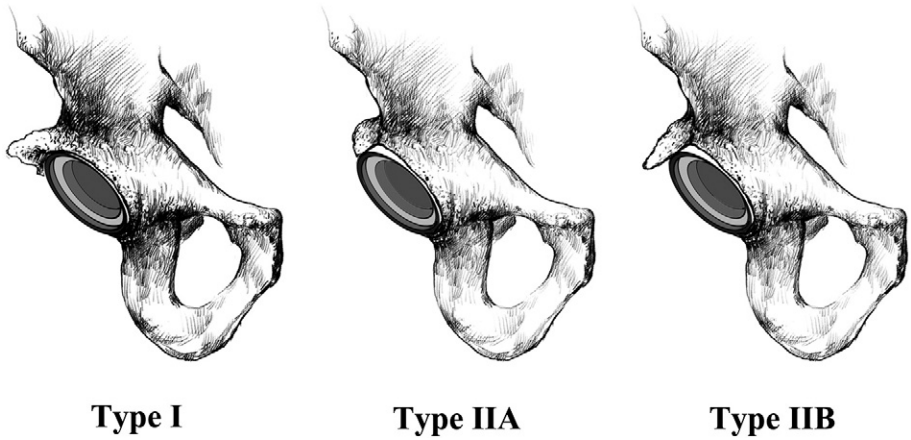

Fig. 1. Types of osteophytes.