THE BILATERAL HIP MIGRATION PATTERNS AT THE TIME OF UNILATERAL TOTAL HIP ARTHROPLASTY FOR OSTEOARTHRITIS ARE RELATED AND ARE ASSOCIATED WITH SURVIVAL UNTIL FUTURE CONTRALATERAL TOTAL HIP REPLACEMENT

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Introduction

We previously observed (1) in subjects with advanced unilateral hip osteoarthritis (OA) that the migration patterns of the ipsilateral and in particular the contralateral femoral heads are risk factors for future total hip replacement (THR) in the contralateral hip. Along with the quantitative joint space width, the migration pattern of the contralateral hip was the most significant aggregate predictor of the need for subsequent contralateral THR: the risk in the presence of a superolateral migration pattern was more than 5 times greater than that of a medial pattern. Given that both ipsilateral and contralateral migration patterns were each individually significant predictors of future contralateral THR, we sought to further characterize the relationship between the femoral head migration pattern and survival until subsequent contralateral THR.

Methods

Of 163 consecutive patients who underwent initial THR for primary hip OA at Rush-Presbyterian-St. Luke’s Medical Center between the years 1984-1986, radiographs were available for assessment of the ipsilateral migration pattern in 99 patients and the contralateral pattern in 106 patients. Of these, the ipsilateral pattern was indeterminate in 15 and the contralateral pattern in 19. Migration patterns were described according to Resnick (2) as superolateral, superomedial, medial, and axial and were read by two trained observers. Kaplan-Meier survival curves were used to obtain survival characteristics (analyzed by log rank test), and the Pearson chi-square test was used to analyze for the presence of any significant association in bilateral migration pattern. Cox regression was used to determine relative risk.

Results

The frequencies of the four migration patterns in the available ipsilateral and contralateral hip were determined among all patients (ipsilateral: N=84; contralateral: N=87) and among those patients in whom a migration pattern was available bilaterally (N=69) (Table 1). In both groups, the superolateral migration pattern was the commonest pattern of the ipsilateral hip and the medial migration pattern was the commonest pattern of the contralateral hip. Significant bilateral concordance was present between the hips for two of the three main patterns (excluding the axial migration pattern, of which there were too few examples), superolateral and medial, but was not seen in the case of the superomedial pattern. These relationships are shown in Table 2 (“Concordant patterns”), where the patterns in the ipsilateral (first column) and contralateral (second column) hips are displayed according to whether there was bilateral concordance or discordance between the patterns. As also noted in Table 2 (“Discordant patterns”), two discordant patterns were also associated, although only one reached statistical significance.

There were significant differences in survival until second, subsequent, contralateral THR depending on the migration pattern of the contralateral hip. Kaplan-Meier survival was greatest for the medial migration pattern, followed in order by the superomedial, superolateral, and axial migration patterns (p = 0.0011; log rank test) (Fig. 1). Further, discordance between the migration patterns was significantly associated with increased survival, as also demonstrated by Kaplan-Meier survival (p = 0.036; log rank test) (Fig. 2). Cox regression analysis showed a 3.12-fold (95% CI, 1.02 to 9.60) increased relative risk for a concordant versus a discordant pattern.

Discussion

The femoral head migration pattern in the contralateral hip was related to survival until future contralateral THR. Moreover, concordance in migration patterns was also related to survival. Bilateral concordance was present for the superolateral and medial patterns, but not for the superomedial pattern. Finally, a medial contralateral migration pattern was also significantly associated with a superolateral ipsilateral migration pattern.

Excluding the rare axial migration pattern, the most common ipsilateral migration pattern was superolateral and the least common was medial. The medial pattern was however the most common pattern of contralateral hip migration. This contralateral pattern conferred the lowest risk for contralateral THR; conversely the contralateral superolateral pattern conferred the highest risk. Resnick (2) noted that the superolateral migration pattern was concordant in half and the superomedial and medial migration patterns in the majority of subjects with primary hip OA. Bilateral concordance of the common, high-risk superolateral pattern may partly explain why bilateral condordance in migration patterns was a predictor of the need for contralateral THR.

The superolateral and, to a lesser extent, medial patterns have been attributed to abnormalities in acetabular contour, which might be expected to be bilateral. The cause of the superomedial migration pattern is unknown. Although it is unclear why concordance in the superomedial migration pattern was not seen in the present study, Resnick’s patients were not restricted to endstage OA patients and it may be that symmetry is lost as ipsilateral superomedial migration progresses to endstage (pre-THR) disease. Alternately, factors other than underlying structural or systemic (e.g., obesity) abnormalities, such as mechanical loading, may explain the evolution of bilateral hip OA in certain populations.

References

1) Case et al., ACR Annual Scientific Meeting. In press.