Radiological classification of hip arthropathy associated with long-term hemodialysis

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Introduction:
Currently, more than 200,000 patients are estimated to undergo hemodialysis in our country. As long-term hemodialysis patients have increased, various orthopaedic complications have emerged as substantial clinical problems affecting the quality of life. Especially, the hip joint is often involved. Various types of hip lesions have been reported requiring surgical treatment. Development of a huge cystic lesion at the femoral neck associated with ß2-microglobulin amyloid accumulation frequently leads to pathological fracture. On the other hand, total hip arthroplasty (THA) is indicated for severe joint destruction derived from ß2-microglobulin amyloid deposition. However, the results of the surgeries for this cohort of patients are relatively poor, and a high incidence of complications has been reported. Therefore, meticulous surgical decision making based on the evaluation of morbidity of each patient is critically important. For the accurate assessment of the disease process, establishment of the classification system and observation the natural course of the disease process are mandatory. In this study, we propose a new classification system of hemodialysis-related hip arthropathy and apply this system to clinical management of our patient population

Materials and Methods:
We analyzed the conventional anterior-posterior radiograph of the hip of the patients with long-term hemodialysis for more than ten years. All of these patients presented with symptoms in and around the hip such as pain, discomfort, and instability. In total, 103 hip lesions were identified in 84 patients. Average age of the patients at the time of first visit was 57 years (range, 42 to 72 years). Duration of hemodialysis averaged 19.6 years (range, 10 to 34 years). The 103 hip lesions were classified into 3 types. Type 1 is cystic type and these type 1 hips are further divided into subtypes of A, B, C and D based on the location of the cyst (A, lateral part of the femoral neck; B, medial part of the femoral neck; C, femoral head, and D, acetabulum) Type 2 is arthritis type showing joint space narrowing. Type 3 change is characterized by deformity of the femoral head. These Type 3 hips were further divided into two stages. In stage 1, the affected hip presents atrophy or deformity of the femoral head, while manifestation of RDC (rapidly destructive coxarthrosis) like deformity is categorized as Stage 2

Results:
Fifty-eight hips were classified as Type 1. Among these hips, number of the lesions classified as subtypes of 1-A, B, C, D were 36, 7, 5, 3 hips respectively. Seven cases showed multiple cystic lesions, and were classified as Type A+B (5 hips) and Type A+C (2 hips). Sixteen hips were classified Type 2, while 18 hips were classified Type 3. Among the 18 Type 3 hips, 14 and 4 hips were stage 1 and 2 respectively. Manifestation of combined type changes were also observed. In this group of patients, 4 hips presented with Type 1-C + Type 2 changes, 6 hips with Type 2+ Type 3 changes and 1 hip with Type 1-A+Type 2+Type 3 combination. Surgeries were performed for 60 hips (58.2%). Curettage with bone graft and internal fixation for cystic regions were performed for 28 hips, while 29 cemented THA’s and 3 bipolar hip arthroplasties were performed for the patients with severe joint destruction and pathological fracture due to cystic lesions.

Discussion:
In the long-term hemodialysis patients, various types of hip lesions due to ß2-m amyloid deposition are identified requiring surgical treatment. However, there has been no standardized treatment guideline based on the condition of the bone and joint pathologies. Cystic lesions may lead to pathological femoral neck fracture posing difficulties in surgical options. THA is indicated for some of these situations. To prevent this complication, we have performed curettage with bone graft and internal fixation for the cases with the cystic lesion occupying greater than 50 % of the width of the femoral neck4). On the other hand, the result of THA for patients with long-term hemodialysis was relatively poor, complicated with high incidence of loosening and infection2-4). Additionally, severe destructive change of the acetabulum and insufficient bone stocks can be problematic in surgical management of the patients with Type 3-stage2 change. The natural courses of destruction in this cohort of patients are characterized by rapid progression during the follow-up period. Thirteen of 16 Type 2 hips (86.7%) showed progressive joint space narrowing, and 11 of the 14 Type 3-Stage 1 hips progressed to stage 2 changes (RDC like deformity) during the follow-up period. Accurate and consistent selection of surgical procedure and timing is essential in management of the patients with hemodialysis-related hip problems. The classification system proposed in this study can be used in evaluating the condition and prognosis of the morbidity and help in decision making process for this patient population.

References

Figure legends
Fig.1: Type1 (cystic type)
A. Type1-A (lateral part of the femoral neck)  B. Type1-B (medial part of the femoral neck)   C. Type1-C (femoral head), and D. Type1-D (acetabulum)

Fig.2: Type 2 (arthritis type)
A. Type1  B. Type2, C. Type3 Deformity of the femoral head.  A. Stage 1 (atrophy or deformity of the femoral head)  B. Stage 2 (RDC like deformity)

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Accurate and consistent selection of surgical procedure and timing is essential in management of the patients with hemodialysis-related hip problems. The classification system proposed in this study can be used in evaluating the condition and prognosis of the morbidity and help in decision making process for this patient population.

References