

Table 1 Patients' data of unreduced congenital dislocation of the hip (COH) in adults. *Lumbago*, 1 positive, 0 negative; *Gonalgia*, 1 positive, 0 negative; *Ipsi* ipsilateral knee of the unreduced hip, *Contra* contralateral knee of the unreduced hip; *LSA* lumbosacral angle, *Cobb* Cobb angle, *FTA* femorotibial angle, *NA* not available)

Case	Age	Sex	Af- fected hip	Hip condi- tion	Lum- bago	Gonalgia		LSA	Cobb angle	FTA	
						Ipsi	Con- tra			Ipsi	Con- tra
1	47	F	L	OA	1	0	0	45	10	176	180
2	36	M	R	D	1	1	1	44	16	170	
						1	1			167	
3	59	F	R	N	1	0	0	NA	NA	NA	NA
4	25	F	R	D	0	0	0	35	0	176	
			L	D		0	0			180	
5	63	F	R	OA	1	0	0	NA	NA	NA	NA
6	64	M	R	D	1	0	0	53	4	180	
			L	D		0	0			180	
7	59	M	L	N	0	0	0	48	8	172	173
8	45	F	R	N	1	0	0	43	10	174	178
9	52	F	R	OA	0	0	1	47	4	170	181
10	56	F	R	D	1	0	0	52	10	171	
			L	D		0	0			174	
11	26	F	L	N	0	0	0	NA	NA	NA	NA
12	32	F	R	OA	0	0	0	49	0	177	178
13	21	F	R	OA	0	0	0	50	2	171	176
14	41	F	L	OA	1	0	0	48	10	173	178
15	52	F	L	OA	1	0	1	NA	NA	NA	NA
16	62	M	L	OA	1	1	1	53	22	172	180
17	44	F	R	OA	0	0	0	NA	NA	NA	NA
18	46	F	R	D	0	0	0	NA	NA	NA	
			L	D		0	0			NA	
19	49	F	R	OA	0	1	0	51	11	176	177
20	51	F	L	OA	0	1	0	44	9	173	182
21	61	F	R	D	1	0	0	51	10	178	
			L	D		0	0			179	
22	54	F	R	N	0	0	0	47	9	170	178
23	55	F	R	D	1	1	1	NA	NA	NA	
			L	D		1	1			NA	
24	43	F	R	D	0	0	0	48	0	175	
			L	D		0	0			176	
25	43	F	L	OA	1	1	1	52	17	162	180
26	58	F	R	D	1	0	0			178	
			L	D		0	0	61	0	177	
27	70	F	L	OA	1	0	1	52	9	168	179
28	40	F	L	OA	1	0	1	67	16	171	176
29	51	F	L	OA	1	0	1	45	20	174	181
30	62	F	R	D	1	1	1	NA	NA	NA	
			L	D		1	1			NA	
31	52	F	L	N	1	0	0	NA	NA	NA	NA
32	65	F	L	N	1	1	0	49	6	176	179
33	48	F	R	N	0	0	0	NA	NA	NA	NA

served of the contralateral medial joint space in 5 knees and of the contralateral lateral joint space in 2 knees. A positive click sign was noted on McMurray test in 4 knees (3 patients= in the contralateral knee in 3, and bilaterally in 1).

In unilaterally dislocated patients the average femorotibial angle (FTA) in ipsilateral and contralateral complete dislocation was 172 ± 4 deg and 179 ± 2 deg, respectively. The femorotibial angle was significantly increased on the dislocated side compared with the ipsilateral side ($P < 0.01$). The ipsilateral knee of the dislocated hip showed valgus deformity and the contralateral knee of the dislo-

cated hip, varus deformity. Osteoarthritic changes according to Ahlböck were observed in 6 knees, grade I in 3 knees, grade II in 3 knees.

Lumbar spine

Moderate or severe lumbago was observed in 6 of 15 patients under the age of 50 and in 14 of 18 patients over the age of 50 at the final follow-up ($P < 0.01$). Lasegue sign was positive in 3 patients, and sensory disturbance at the level of L5 nerve root was observed in 2 patients. Inter-

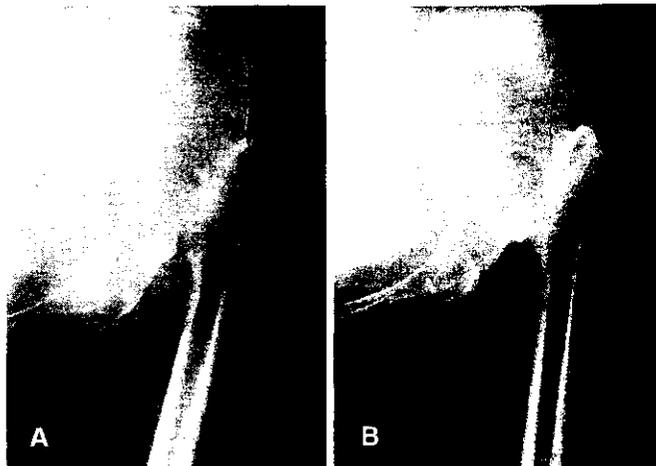


Fig. 3A, B Case 26: anteroposterior view radiographs of a 51-year-old woman. **A** Dislocation index and lateral index were 64 and 65 in lying position. **B** Dislocation index and lateral were 69 and 58 in standing position. Superior and medial migration of the femoral head was observed

mittent claudication because of apparent canal stenosis was present in 2 at the first consultation and in 5 patients at the final follow-up.

Degenerative changes of the lumbar spine were observed in all but 4 younger patients (Fig. 5). Lumbar degenerative scoliosis of more than 5 deg was observed in 16 patients; the apex of the scoliosis was the third or fourth lumbar vertebra in all but 1 case. The average lumbosacral angle was 49 ± 6 deg. Four patients had been surgically treated previously due to lumbar canal stenosis in 3 and prolapse of a lumbar disc in 1, while an additional 5 patients had a history of severe lumbago requiring some conservative treatment.

Discussion

Unreduced congenital dislocation of the hip has been considered almost painless and not an indication for surgical treatment. Wedge and Wasylenko [17] reported that about 60% of affected patients had significant problems, with 40% having no hip pain but an abnormal gait and some difficulty with daily life activities. They reported that older patients functioned relatively well and had little discomfort and acceptable function.

Fig. 4A-D Case 30. Radiographs of a 63-year-old woman at the time of surgery. She had suffered from severe bilateral hip and buttock pain for more than 6 years. **A** Anteroposterior radiograph of the hip before surgery. She could walk no more than 50 m before surgery due to severe bilateral hip pain and lumbago. **B** Anteroposterior radiograph of the hip after bilateral cementless total hip arthroplasty. *Left hip 5.5 years after surgery, right hip 5 years after surgery.* No loosening or osteolysis was observed. She was satisfied with the hips bilaterally but still complained often of severe lumbago and bilateral leg pain. **C, D** Anteroposterior and lateral radiographs of lumbar spine. Severe spondylotic changes were observed

However, our results were somewhat different. Walking ability with unreduced congenital dislocation of the hip was markedly reduced, and walking aids were needed by about 2/3 of patients even at the first consultation. Until the age of 50 years, patients had acceptable function, but older patients suffered significantly from lumbago,





Fig. 5A-D Case 16. Radiographs of a 62-year-old man. He was seen because of severe right hip pain, lumbago and right knee pain. **A** Anteroposterior radiograph of the hip joint showed unreduced congenital dislocation of the left hip and terminal stage of right hip before total hip arthroplasty. **B, C** Anteroposterior and lateral radiograph of the lumbar spine showed severe spondylotic changes: osteophyte formation, disc space narrowing and degenerative scoliosis. He was operated on due to intermittent claudication after right total hip arthroplasty. **D** Anteroposterior radiograph of the bilateral knees. The femorotibial angle (FTA) of the right knee was 178 deg, but arthritic change was not observed. There was moderate knee joint effusion in the right knee

buttock pain and knee pain due to degenerative changes of the hip and/or canal stenosis of the lumbar spine and/or osteoarthritis of the knee. One reason for this unacceptable function was considered to be that the average age of our patients (50 years) was probably greater than that of the patients of Wedge and Wasylenko [17] (whose average age was unclear).

Even if patients with severe hip pain are being treated conservatively, very few would be considered for surgical treatment, because aseptic loosening is a considerable problem for younger patients [2, 5]. Total hip replacement for unreduced congenital dislocation of the hip is still controversial. Some authors have considered complete dislocation as a contraindication for total hip arthroplasty because of the technical difficulties involved and also the major complications of surgical treatment [2, 3, 6, 7, 9-12, 14-16]. Paavilainen et al. [15] also reported relatively good results of 100 total hip arthroplasties with 48 completely dislocated hips in spite of a high complication rate. In this study 6 hips in 5 patients were successfully treated by cementless total hip arthroplasty with subtrochanteric osteotomy and femoral shortening because repeated conservative treatment was ineffective.

Lumbar spine degeneration and knee joint osteoarthritis developed because of the hip instability, leg length discrepancy and pelvic tilt. Increased lumbar lordosis and scoliosis due to leg length discrepancy would not be functional but due to organic changes [13]. With age, spondylotic changes in young patients, canal stenosis in the lumbar spine and varus deformity of the contralateral knee would develop. The most troublesome symptom to treat is lumbago and/or intermittent claudication due to spondylosis and/or lumbar canal stenosis. Before 50 years of age, muscle pain is predominant, but in the later stage (after 50 years of age) degenerative changes are aggravated rapidly. Anteroposterior radiographs often showed scoliosis of the lumbar spine with the apex being the third or fourth lumbar vertebra. Lateral radiographs showed increased lumbar kyphosis and a lumbosacral angle of about 50 deg. Some patients complain of severe lumbago, and conservative treatment is often unsuccessful. Valgus deformity of the ipsilateral knee has been reported. However, contralateral varus knee deformity was more troublesome

because weight-bearing was greatest in the contralateral, dislocated leg. If conservative treatment fails, surgical treatment should be considered to obtain better function.

In conclusion, spinal and knee deformities are caused by the hip instability, leg length discrepancy and pelvic tilt. Before 50 years of age, spondylotic changes or osteoarthritic changes of the spine and knee are not predominant, but after 50 years, degenerative changes develop. Total hip arthroplasty should be limited to patients suffering from repeated, intractable hip pain.

References

- Ahlböck S (1968) Osteoarthritis of the knee. A radiographic investigation. *Acta Radiol Suppl* 277: 7-72
- Chandler HP, Reineck FT, Woxson RL (1981) Total hip arthroplasty in patients younger than thirty years old. *J Bone Joint Surg [Am]* 63: 1426-1434
- Crowe JF, Mani VJ, Ranawat CS (1979) Total hip replacement in congenital dislocation and dysplasia of the hip. *J Bone Joint Surg [Am]* 61: 15-23
- Dunn HK, Hess WE (1976) Total hip reconstruction in chronically dislocated hips. *J Bone Joint Surg [Am]* 58: 838-845
- Halley DK, Wroblewski BM (1986) Long-term results of low-friction arthroplasty in patients 30 years of age or younger. *Clin Orthop* 211: 43-50
- Harley JM, Wilkinson JA (1987) Hip replacement for adults with unreduced congenital dislocation. *J Bone Joint Surg [Br]* 69: 752-755
- Harris WH, Crothers O, Oh I (1977) Total hip replacement and femoral-head bone-grafting for severe acetabular deficiency in adults. *J Bone Joint Surg [Am]* 59: 752-759
- Hartofilakidis G, Stamos K, Karachalios T, Ioannidis TT, Zacharakis N (1996) Congenital hip disease in adults. Classification of acetabular deficiencies and operative treatment with acetabuloplasty combined with total hip arthroplasty. *J Bone Joint Surg [Am]* 78: 683-692
- Hartofilakidis G, Stamos K, Karachalios T (1998) Treatment of high dislocation of the hip in adults with total hip arthroplasty. Operative technique and long-term clinical results. *J Bone Joint Surg [Am]* 80: 510-517
- Hess WE, Umber JS (1978) Total hip arthroplasty in chronically dislocated hips: follow-up study on the protrusio socket technique. *J Bone Joint Surg [Am]* 60: 948-954
- Kliscic P, Jankovic L (1976) Combined procedure of reduction and shortening of the femur in treatment of congenital dislocation of the hips in older children. *Clin Orthop* 110: 60-69
- Linde F, Jensen J, Pilgaard S (1988) Charnley arthroplasty in osteoarthritis secondary to congenital dislocation or subluxation of the hip. *Clin Orthop* 227: 164-171
- Mendes DG (1981) Total hip arthroplasty in congenitally dislocated hips. *Clin Orthop* 161: 163-179
- Naavilainen T (1997) Total hip replacement for developmental dysplasia of the hips. How I do it. *Acta Orthop Scand* 68: 7-84
- Naavilainen T, Hoikka V, Solonen KA (1990) Cementless total hip replacement for severely dysplastic or dislocated hips. *J Bone Joint Surg [Br]* 72: 205-211
- Reikeraas O, Lereim P, Gabor I, Gunderson R, Bjerkedal I (1996) Femoral shortening in total arthroplasty for completely dislocated hips. *Acta Orthop Scand* 67: 33-36
- Wedge JH, Wasylenko MJ (1979) The natural history of congenital disease of the hip. *J Bone Joint Surg [Br]* 61: 333-338
- Woolson ST, Harris WH (1983) Complex total hip replacement for dysplastic or hypoplastic hips using miniature or micro-miniature components. *J Bone Joint Surg [Am]* 65: 109-108

Osteophyte of the femoral head after transtrochanteric rotational osteotomy

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Abstract The relationship between change in the shape of the femoral head and the clinical results after transtrochanteric rotational osteotomy for osteonecrosis of the femoral head was investigated. Fifty-six hips in 50 patients, followed for at least 2 years, showed no progressive collapse and no osteoarthrotic change during that time. The growth of a superolateral osteophyte of the femoral head was observed postoperatively at a higher rate with progression of the preoperative stage. Excessive restoration of the rotated necrotic lesion of the femoral head was observed at a higher rate in hips with the growth of the superolateral osteophyte. The total Japanese Orthopaedic Association score at final follow-up in hips with these shape changes of the femoral head was significantly inferior to the score in hips without these changes. There was a tendency for hips with a low ratio of intact articular surface of the femoral head in the weight-bearing area to the acetabulum just after surgery to manifest these shape changes. Although such changes of the femoral head were considered to represent remodeling to stabilize the hip joint, excessive remodeling could worsen the clinical results.

Key words Transtrochanteric rotational osteotomy
Osteophyte · Osteonecrosis · Hip

Introduction

Idiopathic osteonecrosis of the femoral head is a disease of the hip joint whose exact etiology remains unknown. The natural history in patients with extensive lesions involves a progressive collapse, leading to secondary osteoarthritis. The results of arthroplasty for osteonecrosis of the femoral head were inferior to those for osteoarthritis in younger patients.^{3-5,7,12,13} Moreover, several problems, for example, osteolysis and loosening,

have not been solved yet. Otherwise, transtrochanteric rotational osteotomy¹⁵ is a joint-preserving operation for osteonecrosis of the femoral head whose follow-up results remain controversial.^{1,6,8-10,14,16-18} These difficulties have been attributed to several factors. However, most studies have agreed that an important problem in short-term follow-up after surgery is the progressive collapse of the new weight bearing surface, while a major problem in mid- to long-term follow-up is osteoarthrotic change. Since 1989, we have performed Sugioka's transtrochanteric rotational osteotomy for osteonecrosis of the femoral head. The clinical and radiographic results in patients followed for an average of 4.6 years have been described.⁹ When the results after the operation were investigated, various changes in the shape of the femoral head, without progressive collapse or osteoarthrotic change, were observed postoperatively. In particular, osteophyte formation on the superolateral surface of the femoral head and shape changes in the medial area of the femoral head, which is the rotated necrotic lesion, were often noted. However, no study has described in detail either the influence of these changes on the postoperative results or their significance.

The purpose of this study was to investigate the possible relationship between the shape changes of the femoral head and the clinical results, and to consider the significance of these changes after transtrochanteric rotational osteotomy.

Patients and methods

At Nagoya University Hospital, from February 1989 to March 1998, transtrochanteric rotational osteotomy was performed on 138 hips affected by osteonecrosis of the femoral head. At the time of this study, 101 hips had been followed-up for more than 2 years after surgery. Thirteen hips were lost to follow-up. Of the remaining

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88 hips, 56 hips, in 50 patients, were followed-up for more than 2 years (range, 2 to 9 years; mean, 5 years) without progressive collapse or osteoarthrotic change. Narrowing of the joint space of the hip joint on the anteroposterior (AP) radiograph during the follow-up was defined as osteoarthrotic change. The patients (37 men and 13 women) had an average age of 39 years (range, 15 to 64 years) at operation. As for the causes of osteonecrosis of the femoral head, 38 were steroid-induced, 9 were alcohol-associated, 6 were idiopathic, 2 were posttraumatic, and 1 was associated with Gaucher's disease. The progression of osteonecrosis of the femoral head was classified into four stages, as described by the Japanese Investigation Committee for Intractable Disease of the Ministry Health and Welfare.¹¹ Twenty-three hips were considered to be stage 2; 26 hips, stage 3; and 7 hips, stage 4. In all hips, Sugioka's original procedure of fixing the intertrochanteric osteotomy with two or three large screws was followed. Fifty-three hips underwent transtrochanteric anterior rotational osteotomies, and 3 underwent transtrochanteric posterior rotational osteotomies. Postoperatively, skin traction of 2 kg was applied continuously for the first week and for 2 additional weeks at night only. Partial weight-bearing with crutches was permitted 10 weeks postoperatively. The use of crutches was recommended for 6 months postoperatively.

Assessment

The Japanese Orthopaedic Association (JOA) score was used for clinical assessment. Serial radiographs were taken preoperatively, immediately after surgery, 6 months after surgery, and then annually. The ratio of the intact area of the posterior part of the femoral head to the total articular surface on preoperative lateral radiographs (frog-leg position), and the ratio of the intact area of the femoral head in the weight-bearing area to the acetabulum on an AP plain radiograph immediately after surgery were measured^{15,16} (Fig. 1). On the AP radiograph, the migrated distance of the center of the femoral head, and osteophyte formation on the superolateral surface of the femoral head (such as the superocervical osteophyte described by Bombelli²) were measured postoperatively (Fig. 2). Measurements were performed three times by the same orthopedic surgeon, who was not privy to the other examinations at the time of assessment. The data were assembled using a digitizer (KL4300; Graphtec, Tokyo, Japan) and personal computer (PC-9800; NEC, Tokyo, Japan). Measurement values were corrected by the distance between the tear drops. A difference of more than 2 mm was defined as significant.

Excessive restoration was our conclusion when the medial margin of the rotated necrotic lesion located in

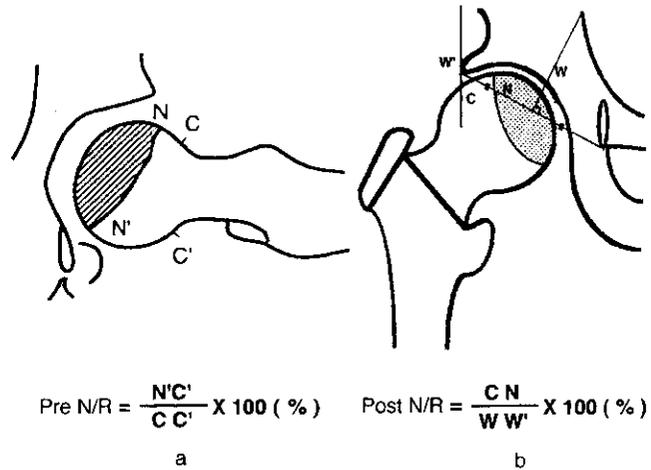


Fig. 1a,b. Method of measuring **a** the ratio of the intact area of the posterior surface of the femoral head to total articular surface on the lateral view of preoperative hip radiograph (*pre N/R*), and **b** the ratio of the intact area of the femoral head in the weight-bearing area to the acetabulum on an anteroposterior (AP) plain radiograph immediately after surgery (*post N/R*). **a** *NN'*, Necrotic focus; *CC'*, total articular surface; *N'C'*, intact area of the posterior surface of the femoral head. **b** *W'*, Edge of the acetabulum; *CN*, intact articular surface of the femoral head; *WW'*, weight-bearing area of the acetabulum

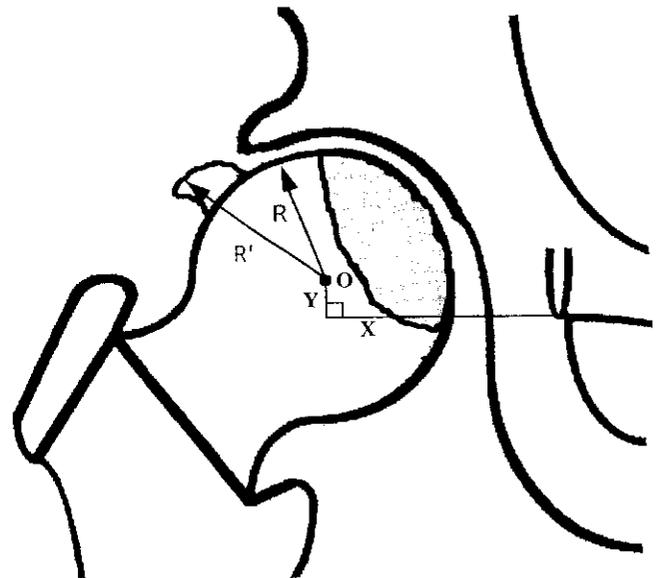


Fig. 2. Method of measuring the migrated distance of the center of the femoral head and the development of osteophyte formation on the superolateral surface of the femoral head. *O*, Center of the femoral head; *R* (mm), radius of the femoral head; *R'* (mm), distance from the center of the femoral head to the top of the osteophyte; *X* (mm), horizontal distance from the lowest point of the tear drop to the center of the femoral head; *Y* (mm), vertical distance from the lowest point of the tear drop to the center of the femoral head; *R - R'* (mm), size of the osteophyte formation; *X* (mm), *Y* (mm), position of the center of the femoral head

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