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PDF issue: 2026-11-29

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(Citation)
Bulletin of allied medical sciences Kobe : BAMS (Kobe),4:81-88

(Issue Date)
1988-12-26

(Resource Type)
departmental bulletin paper

(Version)
Version of Record

(URL)
https://hdl.handle.net/20.500.14094/80070295

KOBE UNIVERSITY

Posterior Release Surgery for Severe Flexion Contracture of the knee in Patients with Rheumatoid Arthritis

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Thirteen knees with severe flexion contracture in rheumatoid patients were evaluated clinically and radiographically at an average of 12.5 years (range, one to nineteen years) after posterior release surgery. The average extension in the thirteen knees was 46.2 degrees preoperatively, and 11.5 degrees postoperatively through posterior release. Even thongh the patients were able to walk after posterior release, the majority of the patients with knee extended complained of knee pain soon after surgery. Seven knees required further surgery after correction of flexion deformity. The average time to reconstructive surgery after posterior release was 11.1 months. It is emphasized that in the treatment of severe flexion deformity of thee knee in patients with rheumatoid arthritis, posterior release surgery was effective for only correcting the deformity; posterior subluxation of the tibia, knee pain and instability occured soon after surgery. Therefore, we conclude that patients may require additional reconstructive surgery soon after the posterior release.

Key Words
Rheumatoid arthritis,
Flexion contracture,
Knee joint,
Posterior release,
Follow-up study.

INTRODUCTION

In rheumatoid arthritis (RA) flexion contracture of the knee is much more common than extension contracture. When the flexion contracture exceeds 40°, the patient is usually confined to a wheelchair. Severe flexion contracture of the knee sometimes also leads to adduction-flexion contracture of the hip joint which forces patients to remain in bed. Therefore, prompt attention should be paid to patients to avoid progression of flexion contracture of the knees. Flexion contractures in rheumatoid patiens can usually be at least partially corrected by such conservative treatment as traction with balanced suspension, splints, or braces with systemic standard medical therapy for RA patients. However severe flexion contracture of the knee often requires further surgical correction of deformity. The purpose of this paper is to report the results of posterior release surgery for severe flexion deformity (more than 40°) of the knee in patients with RA who have been followed for ten years or more postoperatively.

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CLINICAL MATERIALS

Thirteen posterior capsulotomies (1,2)

with hamstring lengthning of the knee in ten patients with rheumatoid arthritis (3) were performed by members of the orthopaedic staff at Kobe University School of Medicine between 1963 and 1977 (Table 1). All patients were available for clinical and radiographic follow-up. The average age of the ten patients at the time of posterior-release was 38.5 years (range, eighteen to sixty-three years). The average duration of rheumatoid disease involvement preoperatively was 13.6 years (range, four to thirty-six years). The indication for all posterior releases was failure of conservative treatment, including local injection of steroid, traction with balanced suspension, application of corrective casts, and use of splints or braces.

PRE-OPERATIVE CONSERVATIVE TREATMENTS

We attempted to corect deformity by conservative measures pre-operatively except in four of the cases. These measures were used before surgery to make the operation less extensive and after surgery to increase correction (4) (Table 1). Skin traction with balanced suspension was carried out on three knees, skeletal traction from maleoli (Fig 1) on five and a corrective cast with turnbuckle apparatus (Fig 2) was used on one knee. These measures were continued until the presence of peroneal nerve irritation.

RESULTS

The average extension in the nine knees was 88.3 degrees at pretreatment, and 43.3 degrees after conserva-

Table 1. Descriptive Date and Pre-and Postoperative Procedures for All Patients.

Case No	Patient	Age	Disease Duration (yrs)	Knee ROM (Ext-Flex) (degrees)	Pre-operative conservative treatment	Preoperative ROM (Ext-Flex)	Operative§ procedure	Post-op ROM (Ext-Flex)
1	TS	32	16	50-90*	serial cast wedging	30-90*	PC+B+T	0-110
2	MW	54	20	100-120*	skeletal traction	50-90*	PC+B+T	25-100
3	YN	38	5	40-145	------	40-90	PC+B+T+G	5-70
4	KH	63	7	90-135	------	90-135	PC+B+T+ST+SM	30-80
5	HK	49	36	45-145*	skin traction	30-140*	PC+B+T+ST+SM	15-140
6	FT(R)	38	12	65-155*	skin traction	55-135*	PC+B+T+ST+SM	15-135
	FT(L(	38	12	65-150*	skin traction	55-150*	PC+B+T+ST+SM	15-135
7	SI(R)	18	4	140-150*	skeletal traction	40-70*	PC+B+T+SM	15-50
	SI(L)	18	4	65-100*	skeletal traction	40-70*	PC+B+T+SM+ST	10-30
8	TO(R)	48	20	145-150*	skeletal traction	45-85*	PC+B+T+SM+ST	0-30
	TO(L)	48	20	120-140*	skeletal traction	45-70*	PC+B+T+SM+ST	0-60
9	TT	26	10	40-90	------	40-90	PC+B+SM+ST	10-90
10	SN	30	11	40-90	------	40-90	PC+B+T	20-90
Average		38.5	13.6	77.3-127.7 88.3-133.5*		46.2-104.6 43.3-100*		11.5-86.2

* Range of motion of the knee before preoperative conservative treatments
** Average ROM of knees treated non-surgical procedures
§ Surgical procedures. PC: posterior capsulotomy and lengthning of tendons, B: biceps femoris, T: iliotibial band, G: gracilis, ST: semitendinosus and SM: semimembranosus

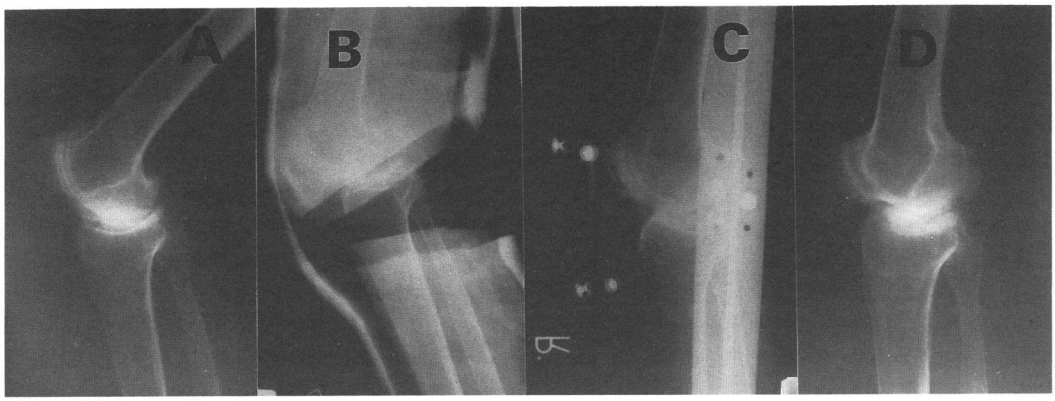


Figure 1. Serial radiographs of the left knee in case 8. A: lateral view of left knee at admission, B: 10 days after skeletal traction from maleoli, C: 14 days after skeletal traction and D: postoperative radiograph of the posterior release.



Figure 2. Radiographs of right knee in case 1. She was treated conservatively by serial cast wedging with balanced suspension. A: lateral view of the right knee at admission, B: 14 days after serial cast wedging, C: 21 days after cast correction and D: after posterior release surgery.

tive corrections (Table 1). While the total arc of motion did not improve significantly, there was moderate improvement in extension of the knees.

SURGICAL TECHNIQUE AND POSTOPERATIVE CARE

Through a posterolateral incision about 10-12cm long over the lateral aspect of the knee joint just proximal to the femoral condyle to the head of the fibula, the iliotibial band was divided transversely just above the joint space. As the peroneal nerve was retracted posterioly, the biceps tendon was exposed. The lateral head of the gastrocnemius muscle was then dissected subperiosteally, and the perios-

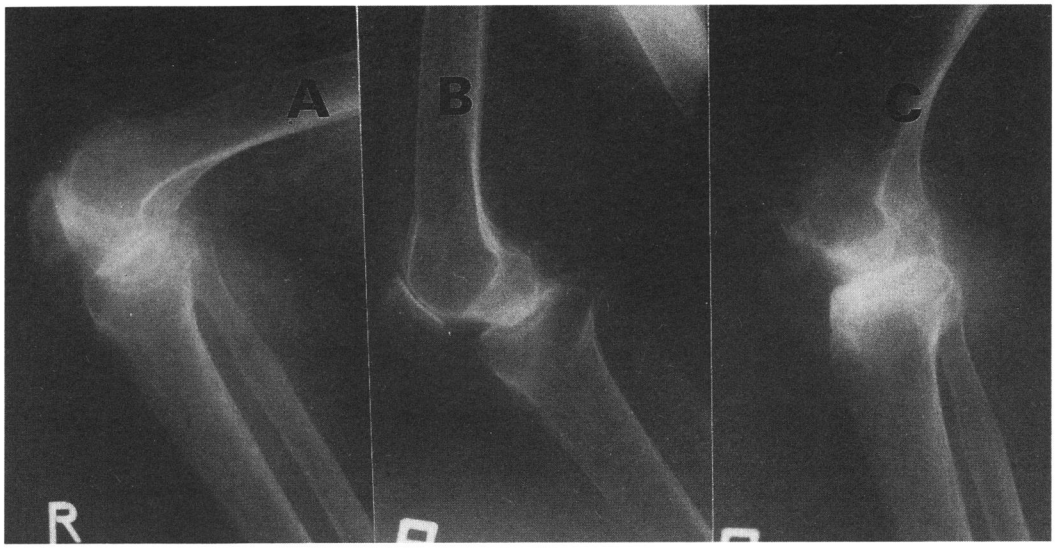


Figure 3. Lateral view of radiographs of case 2. A: at admission, B: after skeletal traction and C: after posterior release. Note the joint destruction and posterior subluxation of tibia have gradually progrssed

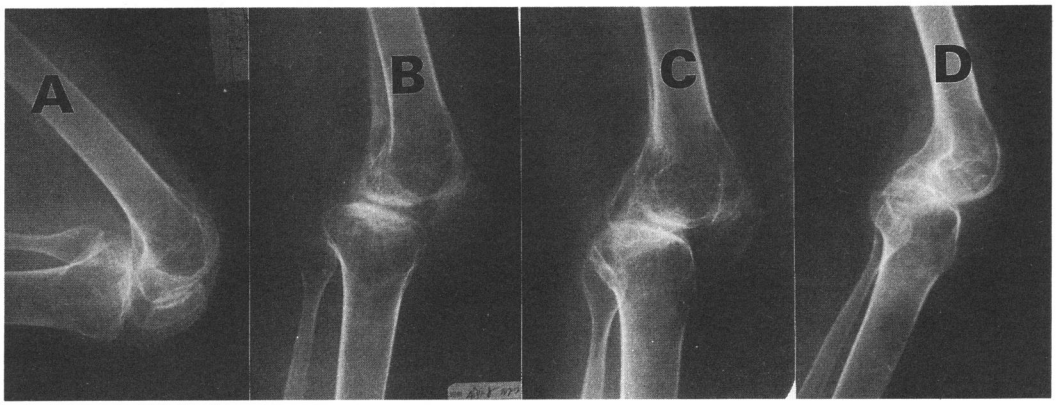


Figure 4. Serial radiographs of the right knee in case 7. A: severe flexion contracture at initial visit, B: 17 days after skeletal traction from maleoli, C: aftre posterior release surgery and D: patellectomy performed 10 months after posterior release.

Table 2. Postoperative Course of Posterior Release.

Case No	Patient	ROM after posterior release	Time reconstruction (months)	Surgical procedure	Follow up (yrs)	Hip surgery	Functional capacity
1	TS	0-110	-----	-----	6	-----	Able to walk with cruches
2	MW	25-100	-----	-----	3	THR	Always in bed
3	YN	5-70	3	Hemiarthro-plasty (Mckeever)	10	-----	Able to walk with cruches
4	KH	30-80	-----	-----	17	-----	Wheel chair
5	HK	15-140	-----	-----	1	-----	Able to walk with cruches
6	FT(R)	5-135	8	Hemiarthro-plasty (MacIntosh)	19	THR	Able to walk with a cane
	FT(L)	15-135	12	HTO---TKR	19	THR	Able to walk with a cane
7	SI(R)	15-50	10	Patellectomy	18	Femoral head resection	Able to walk with a cane
	SI(L)	10-30	1	TKR	18	THR	Able to walk with a cane
8	TO(R)	0-30	26	TKR	6	-----	Able to walk with a cane
	TO(L)	0-60	18	TKR	6	-----	Able to walk with a cane
9	TT	10-9o	-----	-----	17	Cup arthroplasty	Able to walk with cruches
10	SN	20-90	-----	-----	18	THR	Able to walk with a cane
Average		11.5-86.2	11.1		12.5		

TKR: Total knee replacement, THR: Total hip replacement

teal elevator posterior joint capsule exposed. Following exposure, a medial incision just proximal to the adductor tubercle and just distal to the joint line was added. Post-medial muscles were retracted subperiosteally from the condyles as described for the lateral side. The posterior joint capsule was then sharply cut transversly (1,2). If necessary the posterior cruciate ligament was also released from the tibial attachment. All visible synovial tissue, including that covering the cruciate and collatereal ligaments, was sharply excised, together with any pannus along the perimeter of the articular cartilage. When the lateral and medial hamstrings were severely contracted, these tendons, tractus iliotibial band, and gracilis muscle were lengthened by Z-plasty (summerized in Table 1). Standard closure was performed only on the subcutaneous tissue and skin. After surgery, the extremity was immobilized in a well-paded long leg cast with the knee in an extended position. At two weeks the cast was removed and physical therapy emphasizing development of quadriceps power then began. In order to prevent the recurrence of flexion contracture of the knee, we usually used a night splint in extended position for at least 6 months.

POST-OPERATIVE COURSE AND ADDITIONAL SURGERY

Through the surgical procedure described above, the average extension in the thirteen knees was 46.2 degrees preoperatively, and 11.5 degrees postoperatively. Furthermore total area of motion also improved significantly

(Table 1). Even though the patients were able to walk after posterior release with their knee extended, the majority of the patients complained of knee pain soon after surgery. These complaints were related to the frequent debilitation caused by rheumatoid disease including cartilage destruction, posterior subluxation of tibia (Fig 3), and ligamentous involvements. Furthermore, the fixed patella in intercondylar notch in flexed position moved upward after correction of flexion contructure, leading to patellofemoral pain. Thus seven knees required further surgery after correction of flexion deformity by posterior release: three total knee arthroplasties, two hemiarthroplasties, one high tibial osteotomy and one patellectomy (Fig 4; Table 2). Of these one patient who required hemiarthroplasty of the right knee and high tibial obsteotomy on the left knee further required total knee reconstructive surgeries in two and five years (case 5, FT). The average time to reconstructive surgery after posterior releases was 11.1 months (range, one to twenty six months). Radiographs of the patients who needed further surgery had shown continual derioration of the joints. As severe flexion contracture of the knee is often complicated with hip problems, seven additional hip surgeries in 5 patients were required soon after the posterior release surgeries. With these patiens histories taken into consideration, the walking ability of all patients at the present time is shown in Table 2. Most of the patients except case 2 and case 4 were able to walk with a cane or cruches in an average follow-up time of 12.5 years (range, one to nineteen years).

DISCUSSION

Joint contractures are common sequelae of many arthritic disorders. In patients with rheumatoid arthritis flexion contracture of the knee is a relatively common problem caused mainly by contraction of the posterior articular capsule and shortening of the tendons on the flexor side. When a flexion contracture is present, it was demonstrated that degenerative change and erosion would likely occur in the area of cartiage with no contact with an opposing surface (5). Such areas may become infiltrated by synovial pannus (6). Persistant flexion deformities which seriously interfere with function and which have not responded to splints or manipulation frequenty require a surgical procedure, namely posterior capsuloplasty (1,2). Many methods of correcting flexion contractures of the knee have been described: hamstring tenotomy (7,8), release of tensor fascia lata (9), posterior capsulotomy (1), and supracondylar femoral osteotomy (10,11). It is our experience that contractures of less than 30 degrees were easily corrected by conservative treatment including traction, splints, braces and serial plaster cast wedging. However, contractures of greater than 40 degrees are often associated with incomplete correction and a high rate of recurrence. Thus for more severe contractures, soft tissue release should be considered, following the conservative treatment described above.

Our analysis of posterior release in thirteen knees with severe flexion contracture (more than 40 degrees) at an average of 13.5 years after posterior release, showed that only one patient

had practically normal function and almost full active extension (case 1). Most of the patients complained of knee pain soon after surgery, even though they were able to walk after posterior release. Thus in rheumatoid patients the correction of severe flexion contracture by posterire release frequently leads to posterior subluxation of the tibia on the femur and a stiff and painful joint. Therefore, we should bear in mind that additional arthroplastic surgery might be required in few years after posterior release surgery. In fact seven knees in our series required further surgery. The average time to reconstructive surgery was 11.1 months, suggesting that this procedure can indeed be effective in lessening the flexion contracture, but can produce pain and instability in a short period of time. Total arthroplasty and himiarthroplasty were thus carried out for relief of pain, correction of deformity, elimination of instability and increase in knee movement. Furthermore, as there is frequently an associated deformity and joint destruction of the hip in patients with rheumatoid arthritis, we have carried out seven hip surgeries in order to improve functional capacity, as described in Table 2. Thus, our results for posterior release were less satisfactory than those reported elsewhere (1,2).

Finally it should be emphasized that in the treatment of severe flexion deformity of the knee in patients with rheumatoid arthritis, posterior release surgery was effective for only correcting the deformity and preceded posterior subluxation of tibia, knee pain and instability in short periods of time. Since patients with late (Stage Ⅱ – Ⅲ) disease may require subsequent adequate serial surgical tment to establish functional capacity, young patients and patients at an early stage of the disease which is resistant to conservative management should be considered ideal candidates for this posterior release procedure.

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