

ORIGINAL ARTICLE

Shigeki Momohara · Mika Ikeda · Kaoru Uchida
Kouichiro Kawamura · Tamao Mizumura · Taisuke Tomatsu

Follow-up results of arthroscopic synovectomy for the rheumatoid knee

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Abstract Arthroscopic synovectomy (ASS) of a rheumatoid knee is performed in cases of intractable synovitis. This spares the articular cartilage, and is an effective and simple treatment for chronic knee synovitis. This retrospective study was performed to evaluate the outcome of surgical arthroscopy, and study the clinical results in detail. A total of 160 knees, in 138 patients, were assessed after a mean follow-up of 35 months. There was a statistically significant improvement in pain, synovitis, and walking ability for at least 24 months after surgery. Based on the results of our study, age, duration of rheumatoid arthritis (RA), and erythrocyte sedimentation rate (ESR) and level of C-reactive protein (CRP) at surgery were not predictors of a poor long-term outcome of ASS. However, the clinical results correlated with the Lansbury index, loss of extension of the knee joint, a modified Larsen score, and the Larsen grade of the knee joint. Of the cases studied, total knee arthroplasty (TKA) was performed in 29 knee joints. We concluded that although ASS can reduce local inflammation and delay the need for definitive replacement surgery, patients over 60 years of age who show severe radiographic changes should undergo primary TKA.

Key words Arthroscopy · Rheumatoid knee · Synovectomy · Total knee arthroplasty

Introduction

To prevent the progression of joint damage in rheumatoid arthritis (RA) requires a combination of medical treatment and physical and occupational intervention. If the patient is

in unbearable pain and/or has limited movement, surgery should be considered. Surgical management depends on the preservation of articular cartilage and the degree of synovitis. Arthroscopic synovectomy (ASS) is indicated in intractable synovitis to spare the cartilage. However, the effectiveness of ASS in RA is still under discussion.¹ Open synovectomy was performed in the past, but this was shown to cause significant osteoarthritic changes.^{2,3} Radiation synovectomy is associated with an overall success rate of approximately 50%, and is therefore an effective alternative to surgical synovectomy in cases of chronic synovitis which fails to respond to conservative treatment.⁴ Some authors have reported that ASS is also an effective treatment.^{5–7} An analysis of the scientific data in the literature should contribute to this discussion. This study was carried out in this hospital to evaluate the outcome and efficacy of ASS for persistent knee joint synovitis in patients with RA. We also studied the factors that influenced the results of ASS for rheumatoid knees.

Patients and methods

Arthroscopic synovectomy was carried out on 160 knee joints to treat recurrent swelling in 138 patients with RA, from June 1992 to July 1998. ASS was performed for knees in which there had been no radiographic progression of the rheumatoid arthritic changes, which had been persistently painful for at least 6 months, and in which synovitis had not responded to medical management despite treatment for 1–20 years. Eighteen patients were male (23 knees) and 120 were female (137 knees); the right knee joint was involved 83 times and the left knee joint 77 times. At the time of the operation, the median age of the patients was 53.9 ± 12.9 years (21.7–80.8). The median follow-up at the time of this review was 35 months, with a range of 24–74 months.

The surgical technique employed involved a systematic approach to the synovial pouch of the knee joint. All patients were operated on under spinal anesthesia with a pneumatic thigh tourniquet. Three to five portals were

S. Momohara (✉) · M. Ikeda · K. Uchida · K. Kawamura · T. Mizumura · T. Tomatsu

Department of Orthopaedic Surgery, Institute of Rheumatology, Tokyo Women's Medical University, 10-22 Kawada-cho, Shinjuku-ku, Tokyo 162-0054, Japan
Tel. +81 3 5269 1725; Fax +81 3 5269 1726
e-mail: smomohara@ior.twmu.ac.jp

routinely used to perform the synovectomy, as proposed by Ogilvie-Harris and Basinski,⁵ Smiley and Wasilewski,⁶ and Fiocco et al.⁷ If the swelling was severe, the number of portals was increased and the synovitis was resected in the posterior lesion of the knee joint whereas possible. An electrical power shaver system was used. Meniscal curettage and cartilage shaving or chondrectomy were also carried out when this was judged to be necessary. The patients were encouraged to perform quadriceps exercises and range-of-motion (ROM) exercises immediately after the operation, and to walk after the second postoperative day.

Statistical analysis

Local signs of joint inflammation (pain), ROM, muscle strength, and activities of daily life (ADL) were evaluated before ASS, at 12-month intervals for 2 years after ASS, and at the end of the follow-up period. In this study to assess the results of ASS we used the criteria proposed by the Japanese Orthopedic Association (JOA).⁸ Clinical status was assessed in relation to five parameters: pain, ROM, quadriceps muscle strength, walking ability, and the ability to go up and down stairs. The maximum possible score was 100 points. All results are expressed as the mean \pm standard error. One-way factorial ANOVA was used to compare the preoperative and postoperative stages of RA.

Results

At the time of the operation, the average duration of RA was 10.6 ± 6.3 years (2–30 years), and ASS was performed 4.1 ± 3.2 years (0.5–15 years) after the onset of pain in the knee joint. The Lansbury index was $57.3\% \pm 28.2\%$ (15%–128%). The extension angle of the knee joint was $6.4 \pm 8.9^\circ$ (0–50°) and the angle of flexion was $124.7 \pm 16.8^\circ$ (70–150°) at the time of the operation.

No postoperative morbidity, worsening of pain, infections, loss of ROM, hemarthrosis, or other serious complications were observed at any point during the follow-up. The average total preoperative JOA score was 53.3 ± 15.0 points (13–87), and the postoperative score was 63.6 ± 11.4 points (36–90) at 12 months, 62.1 ± 12.5 points (38–90) at 24 months, and 58.5 ± 14.4 points (23–90) at the end of the follow-up period (Fig. 1). For pain, the preoperative score was 21.2 ± 7.5 points (0–40), and the postoperative score was 30.0 ± 4.9 points (20–40) at 12 months, 29.5 ± 5.1 points (20–40) at 24 months, and 27.0 ± 7.4 points (10–40) at the end of the follow-up period. For walking ability, the preoperative score was 9.9 ± 6.2 points (0–20), and the postoperative score was 13.3 ± 5.3 points (0–20) at 12 months, 12.8 ± 6.9 points (0–20) at 24 months, and 11.4 ± 6.8 points (0–20) at the end of the follow-up period. However, there was little improvement in the scores for ROM, quadriceps muscle strength, and ability to go up and down stairs. The clinical results showed a definite improvement for up to 24 months

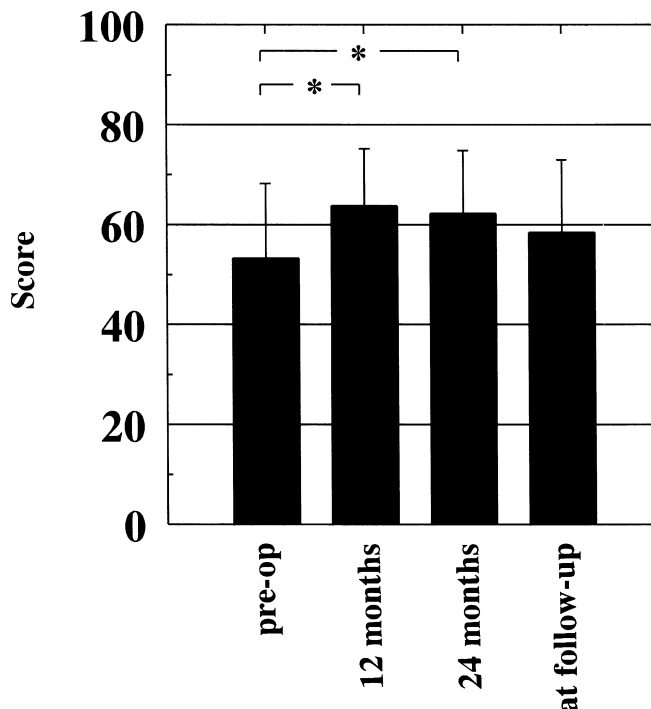


Fig. 1. Japanese Orthopedic Association (JOA) score before and after the operation. The JOA score had increased at 12 and 24 months after the operation, but it eventually decreased to the preoperative value again. * $P < 0.05$

in 72.5% of the cases. However, synovitis had recurred in 14.7% of the knee joints 12 months after the operation, and in 23.5% at the end of the follow-up period. By the time of this report, total knee arthroplasty had been performed on 22 knee joints.

The number of aspirations from knee joints was also investigated. Aspiration was performed preoperatively 4.9 ± 4.7 times (0–30) on average, but the number decreased to 0.9 ± 2.3 times (0–10) after the operation, and 67.7% of the patients never needed to be aspirated again after the operation.

A subjective assessment by the patients reported excellent or good results in 58.2% of cases, fair in 20.9%, and poor in 16.4% at the end of the follow-up period. Moreover, 70.8% of patients said that they had recommended other patients to undergo synovectomy.

The erythrocyte sedimentation rate (ESR) and levels of C-reactive protein (CRP) at surgery and after the operation were investigated. ESR was 53.8 ± 24.3 mm/h (8.6–117), and CRP was 3.5 ± 3.1 mg/dl (0.1–15.8) at the time of the operation. The ESR decreased temporarily at 1 month after the operation, but it increased to the preoperative value after 3 months. On the other hand, the CRP level remained low for about 6 months. However, both ESR and CRP increased to levels close to the preoperative level by 12 and 24 months after the operation (Fig. 2).

Because we wished to study the predictors of this procedure, we divided these patients into three groups, excellent, good, and poor, according to the clinical results at the end of the follow-up period. We found that of the factors assessed

at the time of the operation, age, duration of RA, and ESR and level of CRP at surgery were not predictors of the results of ASS (Table 1). However, the clinical results correlated well with the number of arthritic joints (Lansbury

index), loss of extension of the knee joint, modified Larsen score,⁹ and Larsen grade of the knee joint¹⁰ (Figs. 3–6).

Among these cases, total knee arthroplasty (TKA) had to be performed for 29 knee joints during the 6 years after ASS. Four patients were male (7 knees), and 18 were female (22 knees). At the time of ASS, the median age of these patients was 61.0 ± 9.8 years (29.9–80.8 years), and at the time of the TKA operation it was 64.2 ± 9.6 years (33.9–85.2 years). All the knee joints showed degree III by the Larsen classification¹⁰ at the time of ASS. The average age of the group for which only ASS was done was 52.2 ± 13.2 years (21.7–75.7 years).

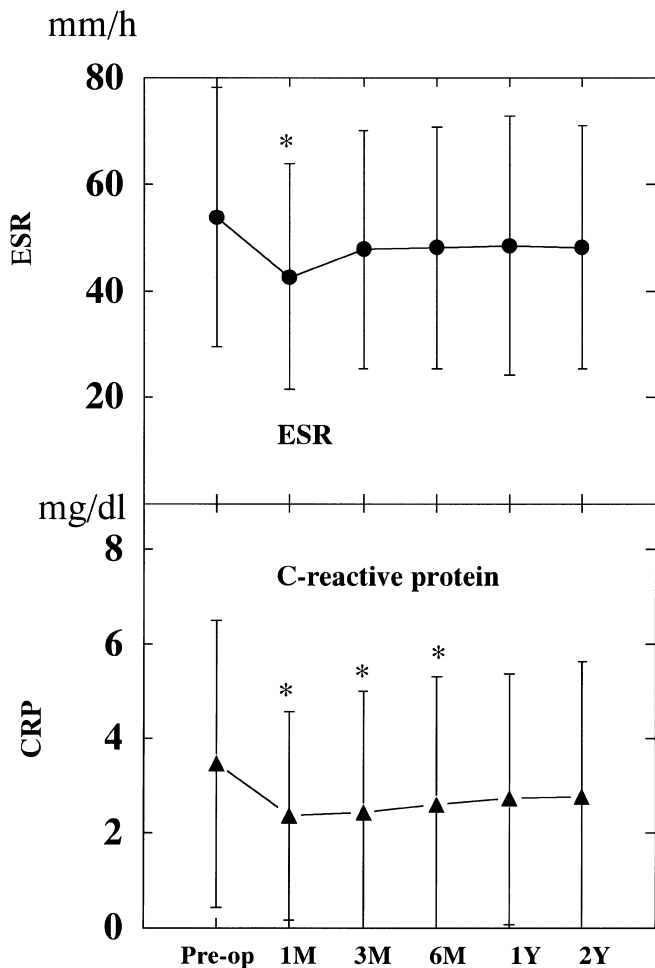


Fig. 2. Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) before and after the operation. The ESR had decreased temporarily at 1 month after the operation, but it increased to the preoperative value after 3 months. On the other hand, the CRP remained low for about 6 months. However, both the ESR and CRP had increased to levels close to the preoperative levels by 12 and 24 months after the operation. * $P < 0.05$

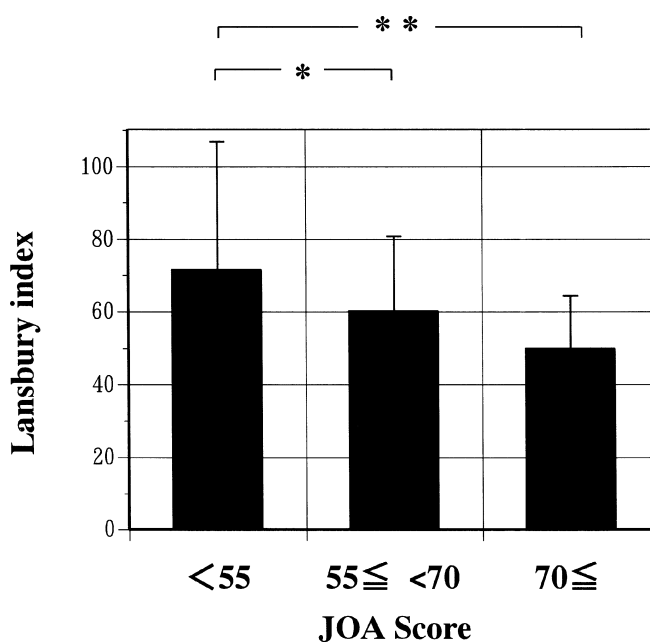


Fig. 3. Japanese Orthopedic Association (JOA) score at follow-up and Lansbury index at surgery. The patients were divided into three groups, excellent, good, and poor, according to the clinical results at the end of the follow-up period. The clinical results correlated well with the Lansbury index at surgery. * $P < 0.05$; ** $P < 0.01$

Table 1. Relationship between JOA score at follow-up and various parameters at the time of surgery

Parameter	JOA < 55	55 ≤ JOA < 70	70 ≤ JOA
Age (years)	54.3 ± 10.1	56.2 ± 11.9	55.7 ± 11.4
Duration of RA (years)	9.3 ± 5.6	9.8 ± 5.1	8.9 ± 5.4
Duration of RA in knee joints (years)	4.1 ± 3.4	4.2 ± 3.3	3.3 ± 2.4
ESR (mm/h)	62.7 ± 25.9	51.7 ± 25.6	50.9 ± 31.1
CRP (mg/dl)	3.9 ± 2.6	3.7 ± 3.6	4.4 ± 4.0
Platelets ($\times 10^4/\text{mm}^3$)	33.0 ± 11.2	30.5 ± 7.5	32.9 ± 9.6

The patients were divided into three groups, excellent, good, and poor, based on the clinical results at the end of the follow-up period. Of the factors measured at the time of the operation, age, duration of RA, ESR, and level of CRP at surgery were not predictors of the results of arthroscopic synovectomy

JOA, Japanese Orthopedic Association; RA, rheumatoid arthritis; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein

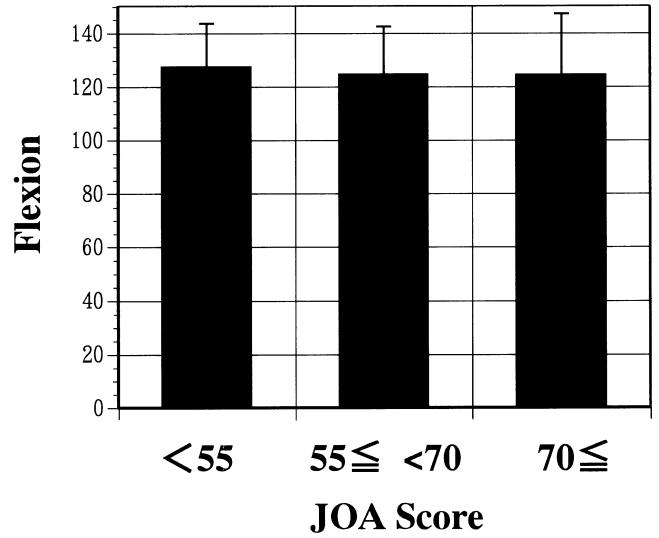
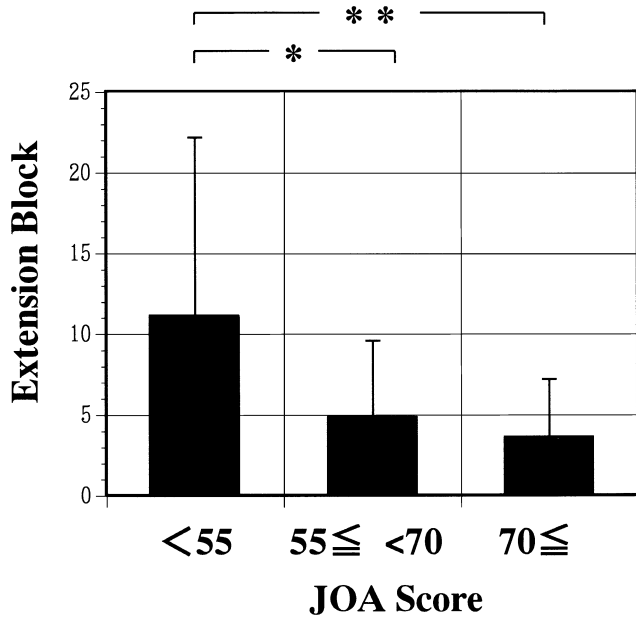


Fig. 4. JOA score at follow-up and range of motion at surgery. The clinical results correlated well with the loss of extension of the knee joint. * $P < 0.05$; ** $P < 0.01$

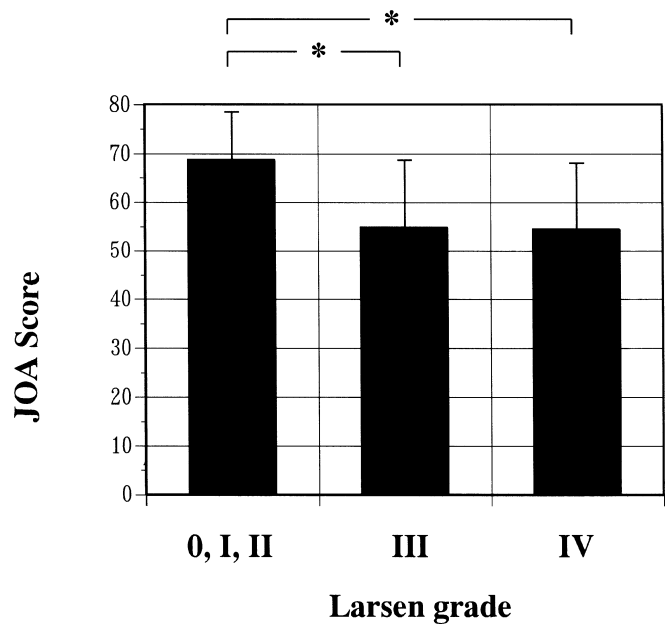
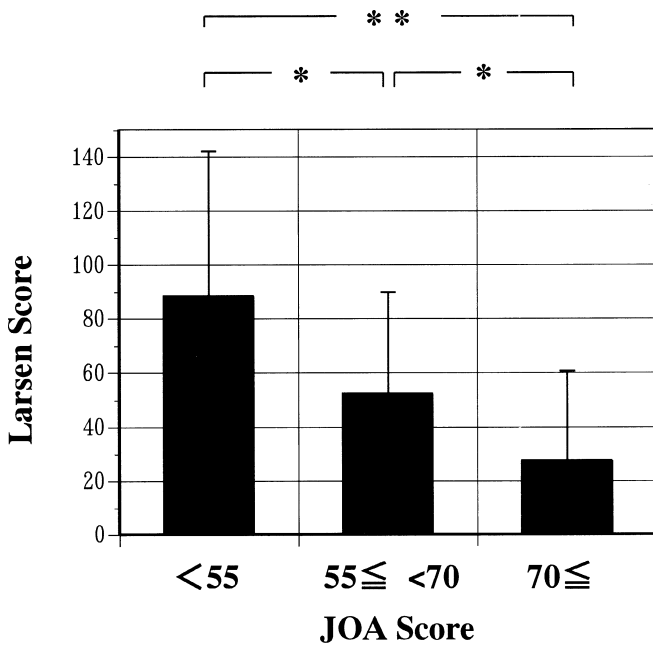


Fig. 5. JOA score at follow-up and Larsen score at surgery. The clinical results correlated well with the Larsen score at surgery. * $P < 0.05$; ** $P < 0.01$

Fig. 6. JOA score at follow-up and Larsen grade of the knee joint at surgery. The clinical results correlated well with the Larsen grade of the knee joint at surgery. * $P < 0.05$

Discussion

There have been many previous studies of ASS of the knee.^{1-3,5-7} ASS appears to be a simple and effective treatment for chronic knee synovitis, and is associated with a low morbidity rate.^{11,12} Smiley and Wasilewski⁶ reported that at a postoperative clinical evaluation after 6 months, 96% of

patients showed good results, and at 2 years, 90% of patients were considered to show good results. At 4 years, 57% of patients continued to do well, and of the knees studied radiographically, 81% showed no progressive radiographic changes at 2 years, while 61.5% showed no deterioration at 4 years. Fiocco et al.⁷ reported that survival curves showed a 61.2% cumulative probability of clinical remission, and 72.8% cumulative probability of a definite

improvement at 36 months. Ayral et al.¹³ reported that the results of ASS were rated good to very good by 71% of patients and 61% of physicians, and the overall improvement in knee arthritis as perceived by the patients was 60%.

Our study indicates that ASS can reduce local inflammation and preserve the ROM of the knee joint for up to 24 months at least, and delay the need for definitive replacement surgery, but the probability of reaching the end point of definite improvement or clinical remission was significantly higher. The clinical results showed a definite improvement in 79.1% of cases for up to 24 months. No postoperative morbidity, worsening of pain, or loss of ROM was observed during follow-up. From our data, it is clear that ASS clearly improves important symptoms and functions such as pain and walking ability, with maintenance of the improvement over reasonable periods. However, no real difference was recognized in quadriceps muscle strength, ROM, and going up and down the stairs before and after surgery. As Fig. 4 shows, our data indicate that in patients with severe extension block, the clinical results were not so good at follow-up. However, there was no relationship between the clinical results and the flexion angle at the time of the operation.

In previous studies,^{11,12,14} it was reported that significant improvements in ROM and standardized second-line medical treatment was maintained. We think that there were some differences in the clinical characteristics of those patients, and in the surgical technique proposed by Fiocco et al.⁷ and that the indications for ASS are important. The clinical findings for patients undergoing ASS at an early stage of RA proved to be superior to those seen after late ASS. The indication for ASS is mainly highly active mono- or pauciarthritis if conservative treatment has proved to be ineffective. Fiocco et al.⁷ reported that the duration of knee-joint synovitis, radiographic severity, and cartilage damage were not predictors of a poor long-term outcome of ASS. Based on the results of our study, age, duration of RA, and ESR and level of CRP at surgery were not predictors of a poor long-term outcome of ASS. However, the clinical results seemed to correlate well with Lansbury index, loss of extension of the knee joint, modified Larsen score,⁹ and Larsen grade of the knee joint.¹⁰

We think that ASS is a safe procedure which, combined with medical treatment, can reduce local inflammation in patients with RA for up to 24 months at least. ASS was at least a valuable palliative procedure for uncontrolled synovitis of the knee. The ASS technique may influence the clinical results. It is not possible to resect the total posterior synovium under the arthroscope. Ryu et al.¹⁵ considered that open surgery was apparently more effective for synovectomy to resect not only synovitis, but also the articular

capsule. ASS is certainly inferior to open surgery in this respect, so methods to improve the effectiveness of treatment with ASS should be investigated.

Total knee arthroplasty had to be performed on 29 of the 160 knee joints treated by ASS. The average age at the time of ASS in the cases that needed TKA was 61 years. However, the average age of the group that only needed ASS was 52.2 years. Therefore, we concluded that although ASS can reduce local inflammation and delay the need for definitive replacement surgery, patients over 60 years of age, with a loss of over 20% in ROM and severe radiographic changes, should undergo primary TKA.

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