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Long-Term Results of Hemiarthroplasty Compared With Arthrodesis for Osteoarthritis of the First Metatarsophalangeal Joint

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ABSTRACT

If operative treatment is opted for grade 3 and 4 osteoarthritis of the first metatarsophalangeal joint, arthrodesis is considered the standard of care. However, if preservation of joint mobility is preferred, implant arthroplasty could be favored. Previous studies have suggested hemiarthroplasty might result in less pain, better function, and greater patient satisfaction compared with arthrodesis. However, these studies only evaluated short-term results (range 2.2 to 6.6 years). The aim of our study was to determine whether patients treated with hemiarthroplasty would show better postoperative outcomes compared with those treated with arthrodesis after ≥5 years after surgery. The American Orthopaedic Foot and Ankle Society hallux metatarsophalangeal interphalangeal (AOFAS-HMI) scale score was used as the primary outcome measure. Secondary outcomes addressed satisfaction rates, patient procedure recommendation, and number of unplanned repeat surgical procedures. We also addressed the influence of the procedures on daily activities (work and sports), the influence of smoking on the postoperative results, and the costs for both procedures. A total of 47 primary arthrodeses and 31 hemiarthroplasties performed between January 2005 and December 2011 were evaluated. After a mean follow-up period of 8.3 (range 5 to 11.8) years, the mean AOFAS-HMI scale score after arthrodesis and hemiarthroplasty was 72.8 ± 14.5 and 89.7 ± 6.6, respectively ($p = .001$). The patients were significantly more pleased after hemiarthroplasty ($p < .001$), and this procedure was recommended more often ($p < .001$). The number of unplanned repeat surgical procedures did not differ between the 2 groups. Patients resumed sports activities significantly sooner after hemiarthroplasty ($p = .002$). The overall crude costs were similar for both procedures. Our results have shown more favorable postoperative outcomes for hemiarthroplasty compared with arthrodesis as operative treatment of osteoarthritis of the first metatarsophalangeal joint after a mean follow-up period of 8.3 years.

Osteoarthritis of the first metatarsophalangeal (MTP-1) joint is characterized by pain and reduced dorsiflexion. Radiographically, the characteristic formation of osteophytes on the dorsal aspect of the joint and progressive joint space narrowing will be present (1). Dorsiflexion in the MTP-1 joint leads to painful impingement and, therefore, limits the gait. Coughlin and Shurnas proposed a classification system for osteoarthritis of the MTP-1 joint in 1999 based on the range of motion and the radiologic and physical examination findings (2).

Nonoperative treatment options include nonsteroidal antiinflammatory drugs, intraarticular infiltration with corticosteroids, physical therapy, and footwear modifications (3,4). If nonoperative treatment is not efficacious, operative treatment can be considered. Arthrodesis of the MTP-1 joint is the most commonly performed procedure for late-stage osteoarthritis (5). If preservation of joint mobility is preferred, resection or implant arthroplasty can considered.

The preferred option for operative treatment is still being debated in the most recent studies. Multiple studies supporting fusion as the preferred procedure have reported better postoperative scores, greater patient satisfaction rates, fewer complications, and better outcomes after gait analysis (6–9). Total joint replacement initially showed favorable results, with a high level of patient satisfaction and preserved range of motion. However, multiple studies have shown increased failure rates after longer follow-up. Because of these relatively poor results, total MTP-1 joint arthroplasty is not recommended (6,10–13). Hemiarthroplasty has become more popular as an alternative to total joint replacement. A multicenter review showed no differences in

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subjective outcomes after arthrodesis or hemi-joint replacement (14). Recent studies by Voskuijl and Onstenk (15) and Simons et al (16) showed similar short-term results after arthrodesis and hemijoint replacement with greater satisfaction rates and the absence of severe postoperative pain after hemiarthroplasty. Hemijoint replacement with the BiopPro® First MPJ (BioPro Inc., Port Huron, MI) implant was associated with high survival rates, ranging from 76% to 96% (8,16–18). However, most of these studies only discussed the short-term results (15,16,19,20).

The aim of our study was to determine whether patients treated with hemiarthroplasty showed better postoperative outcomes than those treated with arthrodesis after a follow-up period of ≥5 years.

Patients and Methods

A cohort of 102 patients who had undergone surgery for osteoarthritis of the MTP-1 joint between January 2005 and December 2011 (including 67 arthrodeses and 47 hemiarthroplasty procedures) were invited to participate in our study. The patients were informed that a questionnaire would be administered and that both feet would be clinically and radiographically examined. Sixty-seven patients (65.7%) responded and were included in our study. Of the 66 patients, 39 underwent 47 arthrodeses using different fixation techniques (e.g., Kirschner wires, plates, staples, and lag screws) and 27 underwent 31 hemiarthroplasties using the BioPro® First MPJ (BioPro Inc.) implant. Both procedures were performed for stage 3 or 4 osteoarthritis according to the Coughlin and Shurnas classification. The postoperative protocol after arthrodesis included 6 to 8 weeks of cast immobilization, with full weightbearing as tolerated after 1 week. After hemiarthroplasty, a stiff-soled shoe for 2 weeks with passive range of motion exercises of the MTP-1 joint as soon as possible was recommended, and physical therapy was advised for postoperative weeks 2 to 8 for these patients. A physical treatment guideline is available for hemiarthroplasty of the MTP-1 joint (19).

The American Orthopaedic Foot and Ankle Society hallux metatarsophalangeal interphalangeal (AOFAS-HMI) scale score (21,22) was used as the primary outcome measure for our study. It includes scores for pain, function, and alignment. The maximum score is 100 points after hemiarthroplasty and 90 points after arthrodesis, with 10 points excluded owing to loss of MTP-1 joint motion. To make the scores comparable for both procedures, we analyzed the AOFAS-HMI scale scores as a percentage of the maximum score. We assessed pain, activity limitations, and footwear requirements by questionnaire, joint stability and joint motion clinically, and alignment radiographically. We defined good alignment of the MTP-1 joint as dorsiflexion ≤30° and valgus of ≤15°.

The secondary outcomes were satisfaction rates, patient recommendation for the performed procedure, and the number of unplanned repeat surgical procedures. Satisfaction rates were measured using a 5-point Likert-scale (1, very satisfied; 2, satisfied; 3, equal; 4, unsatisfied; 5, very unsatisfied) and the procedure recommendation using a 3-point Likert-scale (1, yes; 2, maybe; 3, never). We furthermore addressed the influence of the procedures on daily activities, the influence of smoking and diabetes mellitus on the postoperative results, and the total costs (crude cost of devices and surgical fees) of the procedure. Work and sports activities, smoking behavior, and medical history (e.g., diabetes mellitus) were assessed by questionnaire. To determine the influence of smoking, the postoperative results of active smokers, exsmokers, and nonsmokers were compared. The total costs for each procedure were calculated as the sum of the costs for the performed surgical procedure, repeat procedures, hospitalization time, outpatient clinic visits, radiographs, physical therapy, footwear requirements, and work interruption. The duration of hospitalization, the number of outpatient clinic visits, and the number of radiographs were extracted from the patients' medical records. The hospital's finance department was queried for the costs of the performed surgical procedure (initial and repeat procedures). Local physiotherapists were queried for their prices for a single session of physical therapy, with the average prices used in the calculation of the total costs. The costs of footwear adjustments by a local podiatrist were used for the total costs calculation. The average income in the Netherlands for 2017 was included in the calculations.

Statistical Analysis

The scores of the AOFAS-HMI scale, patient satisfaction rates, recommendation for the performed procedure, and time until resumption of daily activities were analyzed as continuous variables. The independent sample Student *t* test was used to evaluate the differences between these outcomes for both procedures. To determine the influence of smoking on the total AOFAS-HMI scale score, the mean AOFAS-HMI scale score of the smoking and exsmoking group were compared with the mean AOFAS-HMI scale score of the nonsmoking group. A χ^2 test was used to compare the number of unplanned repeat surgical procedures. Differences with $p < .05$ were considered statistically significant.

Results

A total of 47 arthrodeses and 31 hemiarthroplasties in 40 and 27 patients, respectively, were evaluated (Table 1). The mean interval after surgery until evaluation did not differ significantly between the 2 treatment groups ($p = .052$; Table 2).

The mean postoperative AOFAS-HMI scale score was 72.8 ± 14.5 after arthrodesis and 89.7 ± 6.6 after hemiarthroplasty ($p = .001$) Less pain ($p < .001$) was reported after hemiarthroplasty. No differences in function ($p = .148$) or alignment ($p = .514$) were seen between the 2 groups. All patients in hemiarthroplasty group had a preoperative range of motion <20°, equal to stage 3 and 4 of the Coughlin and Shurnas classification. Postoperatively, all hemiarthroplasties resulted in a restored range of motion (range 30° to 74° for 28; >75° for 1), except for 2 patients, who scored less satisfaction. Patients were significantly more pleased after hemiarthroplasty ($p < .001$). Also, this procedure was recommended significantly more often ($p \leq .001$).

Of the 39 patients who underwent arthrodesis, 25 underwent surgery for hardware removal postoperatively. However, this was considered standard treatment rather than unplanned repeat surgery. Unplanned repeat surgery was performed in 4 patients after arthrodesis because of nonunion and in 3 patients after hemiarthroplasty for loosening of the prosthesis in 1 and limited range of motion in 2. The number of unplanned repeat surgical procedures did not differ significantly between the 2 treatment groups ($p = .547$).

No association was found between smoking and the postoperative results (Table 3). Because of the small number of patients with diabetes mellitus (n = 4), no analysis would have been considered meaningful.

All the patients resumed their work, and the average time until resumption did not differ significantly between the 2 groups ($p = .202$). After hemiarthroplasty, patients with sedentary employment returned to work significantly more quickly than did patients with employment requiring mobility ($p = .004$). Patients returned to sports a mean of 6.7 ± 4.6 weeks after hemiarthroplasty compared with a mean of 11.7 ± 5.1 weeks after arthrodesis ($p = .002$). Arthrodesis affected 15 of 21 patients (71.4%) active in sports. Of these 15 patients, 7 stopped their activity, 7 exercised less frequently, and 1 switched to another sport. Hemiarthroplasty affected 3 of 17 patients (17.6%) active in sports. Of these 3 patients, 2 stopped their activity and 1 exercised less frequently (Table 4).

The procedure crude costs for arthrodesis were, globally, 50% less than those for hemiarthroplasty. However, the additional costs for both procedures included the costs for repeat surgery, footwear modifications, and postoperative physical therapy. In our study, 21 of the 39 patients (53.8%) who had undergone arthrodesis required footwear modifications (13 [33%] required orthotics and 8 [21%] required orthopedic shoes or a brace). In contrast, 5 of the 27 patients (18.5%) who had undergone hemiarthroplasty required footwear modification (3 [11%] required orthotics and 2 [7%] required orthopedic shoes;

Table 1
Patient characteristics

Demographic Data	Arthrodesis (n = 47 Procedures)	Hemiarthroplasty (n = 31 Procedures)
Patients (n)	39	27
Male sex (n)	8 (21)	10 (37)
Age (y)		
Mean	62.3 ± 7.7	58.3 ± 6.9
Range	47 to 78	36 to 67
Operated side (n)		
Right side	13 (33)	7 (26)
Left side	18 (46)	16 (59)
Bilateral	8 (21)	4 (15)

Data in parentheses are percentages.

Table 2
Results ≥5 years after procedure (N = 78 procedures in 67 patients)

Variable	Arthrodesis (n = 47 Procedures; 39 Patients)	Hemiarthroplasty (n = 31 Procedures; 27 Patients)	*p* Value
Time after surgery (mo)			
Mean	103.2 ± 25.9	92.9 ± 19.9	.052
Range	61 to 141	62 to 136	
AOFAS-HMI scale score			
Total	72.8 ± 14.5 (80.9 ± 16.1)	89.7 ± 6.6 (89.7 ± 6.6)	.005
Pain overall	30.9 ± 9.7	37.4 ± 4.4	<.001
Stratified by no. of procedures			
No pain	18 (38)	23 (74)	
Mild pain	19 (40)	8 (26)	
Moderate pain	8 (17)	0	
Severe pain	2 (5)	0	
Function	30.8 ± 5.8 (79.1 ± 16.5)	37.7 ± 3.6 (83.8 ± 7.9)	.148
Alignment	14.3 ± 2.2	14.6 ± 1.7	.514
Overall satisfaction score*	2.5 ± 1.2	1.3 ± 0.6	<.001
Satisfaction group			
Very satisfied	11/8 (24/21)	25/22 (81/81)	
Satisfied	17/14 (36/36)	5/5 (16/18)	
Total	28/22 (60/57)	30/27 (97/96)	
Recommendation score†	1.7 ± 0.8	1.0 ± 0.2	<.001
Patients would recommend (n)	23 (59)	30 (97)	
Repeat surgery (n)	29 (62)	3 (10)	
Unplanned	4 (14)	3 (100)	.547
Indication (n)			
Nonunion	4 (100)	0	
Limited range of motion	0	2 (67)	
Loosening of prosthesis	0	1 (33)	

Abbreviation: AOFAS-HMI, American Orthopaedic Foot and Ankle Society hallux metatarsophalangeal-interphalangeal scale.
Data presented as mean ± standard deviation or number of procedures/number of patients, with percentages in parentheses, unless otherwise noted.
* Score: 1, very satisfied; 2, satisfied; 3, equal; 4, unsatisfied; and 5, very unsatisfied.
† Score: 1, yes; 2, maybe; and 3, never.

p = .001). Footwear modifications incur extra costs (range €125 to €2000). Postoperative physical therapy was performed by 10% (n = 4) of the patients after arthrodesis and 30% (n = 8) after hemiarthroplasty. Thus, the total crude costs for both procedures were comparable.

Discussion

Arthrodesis has been reported to be the standard of care for grade 3 or 4 osteoarthritis of the MTP-1 joint by many studies because of the consistently high satisfaction rates, high postoperative AOFAS-HMI scale scores, and less pain postoperatively compared with arthroplasty (6,7,9). Different fixation techniques, such as screws, plates, staples, and Kirschner wires, can be used. Harrison and Harvey (23) reviewed 72 feet treated with arthrodesis of the MTP-1 joint after a period ranging from 1 to 12 years postoperatively. Of the 72 feet, 86% showed complete relief of pain. Fitzgerald (24) noted improved symptoms in 48 of 49 patients after MTP-1 joint arthrodesis ≥10 years after surgery. Bennett and Sabetta (25) reported a 98% fusion rate and improvement in the average AOFAS-HMI score, from 41 preoperatively to 84 postoperatively. Although arthrodesis leads to good postoperative results, it also has some disadvantages, such as the risk of delayed or nonunion, painful hardware, interphalangeal joint arthritis, transfer metatarsalgia, and loss of MTP-1 joint motion (23,24,26).

If preservation of MTP-1 joint mobility is preferred, implant arthroplasty could be considered. An inflammatory response caused by Silastic debris can be avoided by the use of a metallic prosthesis. MTP-1 joint metallic hemiarthroplasty has been performed for >50 years. Townley and Taranow (27) reported a retrospective review of 279 patients after metallic hemiarthroplasty, with 95% of the patients reporting good to excellent results 8 months to 33 years after surgery. A series of 28 patients was reviewed by Taranow et al (20) 33 months after surgery. Of the 28 patients, 23 were greatly satisfied with the results and 25 would have recommended the performed procedure. The complications described after hemiarthroplasty include failure, periprosthetic lucencies, subluxation, recurrence of dorsal osteophytes, and metatarsalgia (8,20,28–30).

Several studies have reported contradictory results for hemiarthroplasty compared with arthrodesis. Raikin et al (8) found

Table 3
Influence of smoking on results (N = 47 arthrodesis in 39 patients and 31 hemiarthroplasties in 27 patients)

At Procedure	Active Smoker	Active Smoker	Nonsmoker	*P* Value*
During evaluation	Active smoker	Exsmoker	Nonsmoker	NA
Patients (n)	5 (5 procedures)	21 (25 procedures)	40 (48 procedures)	NA
Arthrodesis	1	13 (11 patients)		NA
AOFAS-HMI score	91.0 ± 6.5	78.7 ± 20.1	78.8 ± 11.1	.062/.667
Satisfaction	1.0 ± 0.0	1.9 ± 1.1	2.17 ± 1.2	.04/.312
Recommendation	1.0 ± 0.0	1.4 ± 0.7	1.54 ± 0.8	.125/.435
Repeat surgery (n)				.894/.858
Total	1 (20)	8 (32)	23 (48)	
Unplanned	0	2 (8)	5 (10)	

Abbreviations: AOFAS-HMI, American Orthopaedic Foot and Ankle Society hallux metatarsophalangeal-interphalangeal scale; NA, not applicable.
* Active versus nonsmoker/stopped versus nonsmoker.

Table 4
Influence of procedures on daily activities

Daily Activity	Arthrodesis (n = 47 procedures in 39 patients)	Hemiarthroplasty (n = 31 in 27 patients)	*p* Value
Work			
Patients employed (n)	19 (49)	17 (63)	NS
Time until resuming work (wk)	6.2 ± 6.2	4.3 ± 2.4	.202
Sedentary employment	5.0 ± 5.7(n = 9)	2.6 ± 1.1(n = 7)	.228
Mobile employment	7.5 ± 6.7(n = 10)	5.5 ± 2.4(n = 10)	.369
p Value	.354	.004	NA
Sports			
Patients active in sports (n)	21 (54)	17 (63)	NS
Activity stopped	7 (33)	2 (12)	
Altered frequency	7 (33)	1 (6)	
Altered activity	1 (5)	0	
Time to sports activity resumed (wk)	11.7 ± 5.1	6.7 ± 4.6	.002

Abbreviations: NA, not applicable; NS, not significant.

significantly better AOFAS-HMI scores and greater satisfaction rates after arthrodesis after a mean follow-up period of 79.4 months. However, Voskuijl and Onstenk (15) found no differences in the postoperative AOFAS-HMI scores between patients treated with hemiarthroplasty or arthrodesis after a mean follow-up period of 4 years. No differences in subjective outcomes were found between the 2 procedures in a multicenter retrospective review (14). Our study found significantly greater postoperative AOFAS-HMI scores in patients treated with hemiarthroplasty after a mean follow-up period of 67.9 (range 43 to 88) months. Patients reported less pain and demonstrated better function after hemiarthroplasty. Patients treated with arthrodesis (18 of 29 procedures with pain complaints) frequently noted pain in the toeing off phase, in contrast to patients treated with hemiarthroplasty owing to the retained dorsiflexion in the MTP-1 joint in the latter.

A meta-analysis (31) showed satisfaction rates with metal hemiarthroplasty ranging from 75.9% to 95.6%. Another review (5) showed good to excellent patient satisfaction, ranging from 57% to 88% after hemiarthroplasty and 73% to 100% after arthrodesis. In a series of 23 patients treated with hemiarthroplasty, only 2 were not satisfied with the postoperative results because of restricted range of motion (32). In our study, the patients were satisfied to very satisfied in 59.6% of the cases after arthrodesis and 96.8% after hemiarthroplasty. Mild to severe pain was reported by 61.7% of the patients after arthrodesis compared with 25.8% after hemiarthroplasty. We believe the patients treated with arthrodesis were mainly less satisfied because of persistent complaints of pain. With preservation of joint mobility after hemiarthroplasty, a patient's gait is less affected, which could also result in greater satisfaction rates. Our results showed restored range of motion in 29 of 31 performed hemiarthroplasties. However, 2 patients experienced persistent restricted range of motion. One patient had no complaints; however, the second patient underwent capsulolysis 24 months after primary surgery. She continued to have mild pain symptoms and was not satisfied with her persistent restriction of range of motion. However, she had not performed the recommended physical therapy, which might have increased the range of motion after capsulolysis. We recorded the MTP-1 joint motion in subgroups; however, the results could have been more specific if we had used the exact pre- and postoperative angles of range of motion.

Raikin et al (8) reported a 0% revision rate after arthrodesis and a 23.8% revision rate after hemiarthroplasty. Gibson and Thomson (6) also reported that 0 of 38 patients treated by arthrodesis required a repeat surgical procedure. Carpenter et al (33) documented no revision procedures after hemiarthroplasty after a mean follow-up period of 27.3 months. In our study, unplanned repeat surgical procedures were required in 4 patients after arthrodesis (9%) and 3 patients after hemiarthroplasty (10%). Four patients required repeat surgery after arthrodesis because of nonunion. Those 4 patients were all nonsmokers. After hemiarthroplasty, 1 procedure was converted to arthrodesis because of loosening of the prosthesis. The revision was uneventful, with no loss of length evident, and full consolidation had occurred after 5 months (Fig.).

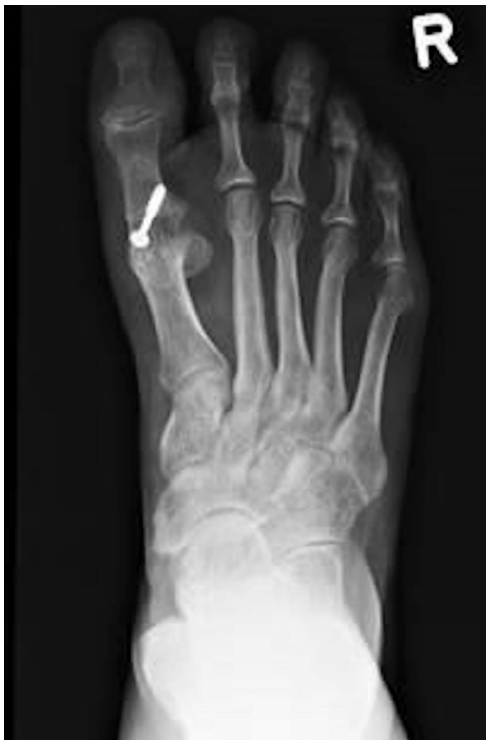

Fig. Radiograph showing revision from hemiarthroplasty to arthrodesis, with no loss of length evident. Full consolidation had occurred after 5 months.

Brodsky et al (34) described the functional outcomes after arthrodesis of the MTP-1 joint. They concluded that arthrodesis is not only a successful procedure for pain relief and deformity correction but also allows for high level of function in daily activities (34). In their study, preoperative sports activities were resumed by 75% of the patients who played tennis, 75% of those who jogged, 80% of those who played golf, and 92% of the patients who hiked. Also, 98% of the patients resumed their work. DeSandis et al (35) reported a significant reduction in the difficulty in performing daily activities and sports activities after arthrodesis. Fitzgerald et al (24) reported significant improvement from activity restriction after hemiarthroplasty. D'Amico et al (19) reported a return to sports and recreational activities by 79% of the patients within an average period of 2.42 months after hemiarthroplasty. In our study, patients treated by hemiarthroplasty showed significant improvement from activity restriction after surgery. We observed functional recovery in which all patients returned to work. Also, those resuming sports activities did so significantly more quickly after hemiarthroplasty. The significant difference could have resulted from the performance of the postoperative protocol. However, full weightbearing after arthrodesis was allowed after 1 week with immobilization for 6 to 8 weeks compared with 2 weeks after hemiarthroplasty. Full weightbearing showed good results with high fusion rates, as described by different investigators (36–39). To eliminate the propulsive phase of gait, most of these investigators have recommended the use of a postoperative shoe or controlled ankle motion walking boot to decrease the risk of fixation failure. A recent study

discussing this concept of early full weightbearing (40), showed biomechanical failure in 4 different MTP fusion modalities in synthetic composite bone and also in cadavers with 2 more rigid modalities. The amount of weightbearing should be determined according to the fusion modality used; however, the period of immobilization will probably be equal. Immobilization makes it difficult to resume sports activities after arthrodesis, even if any form of weightbearing is allowed. This advantage of hemiarthroplasty should be remembered whenever considering surgical intervention for MTP-1 osteoarthritis.

Hyer et al (41) performed a financial cost comparison for 2 different techniques used for arthrodesis of the MTP-1 joint. Crossed screw fixation was significantly less expensive than the dorsal plating technique. No difference was found in the time to fusion. Clement et al (18) analyzed the costs of the BioPro® metallic hemiarthroplasty device. Depending on the complexity and morbidity of the patient, the costs per quality of life year were between £4431 (€5230) for the simple case with no comorbidities and £6361 (€7508) for the complex case with comorbidities We calculated that the procedure costs for arthrodesis are 50% less than those for hemiarthroplasty. However, the additional procedures and adjustments required result in additional costs. In our study, hardware was removed in 25 patients (53.2%) after arthrodesis, and 7 underwent unplanned repeat surgery. Footwear modifications were also more frequently required after arthrodesis than after hemiarthroplasty. Finally, physical therapy is advised and was more often followed after hemiarthroplasty. Eventually, the total costs for the 2 procedures were comparable. It is important to keep in mind, moreover, that a thorough cost effectiveness analysis was not our aim, and we did not consider quality-adjusted life-years or incremental cost differences; and, the result of this report could be useful in the future development of such analyses.

Our results should be interpreted with some reservations. Preoperative AOFAS-HMI scale scores were not available owing to the retrospective collection of data. Therefore, we could not measure the improvement after the 2 performed procedures. The choice for which procedure was performed was determined by surgeon preference, rather than randomization, which could have biased our outcomes. Of the 102 patients (67 arthrodesis and 44 hemiarthroplasties) invited to participate in our study, only 67 (47 arthrodesis and 31 hemiarthroplasties) agreed, and their data were analyzed. This could have biased our results. Although we analyzed the influence of smoking on the results, other confounders could have biased our outcomes. For example, the patients treated with hemiarthroplasty were significantly younger than those treated with arthrodesis. Younger, more active patients and those with mild to moderate stages of osteoarthritis could be less satisfied with arthrodesis because of loss of MTP-1 joint motion.

In conclusion, at a mean of 8.3 (range 5 to 11.8) years after surgery for MTP-1 osteoarthritis, we found higher AOFAS-HMI scale scores after hemiarthroplasty than after arthrodesis. Patients treated by hemiarthroplasty also expressed greater satisfaction with the procedure and would recommend it to other patients with MTP-1 joint osteoarthritis when operative treatment would be considered. Resuming sports activities occurred significantly more quickly after hemiarthroplasty. The overall costs for hemiarthroplasty were quite similar to those for arthrodesis. Thus, we would recommend hemiarthroplasty for future patients with MTP-1 joint osteoarthritis, with a modest preference for younger, more active patients. Prospective, randomized controlled trials are needed to verify our results. However, because of patient preference for preservation of MTP-1 joint motion, we would anticipate a difficult randomization process.

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