Locomotion score in rheumatoid arthritis

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A total locomotion score suited for clinical evaluation of patients with rheumatoid arthritis was developed and fulfilled the 1980 criteria of WHO. The grading system distinguished a subjective score for pain and ability from an objective score for physical signs, and it assessed the upper and lower extremities separately. The total locomotion score consisted of the total subjective and total objective scores combined. The three total assessments each showed a linear relationship to Steinbrocker's four functional classes when tested in 106 rheumatoid patients with ARA criteria 5–8. The interobserver reliability was good. The multifactorial assessment data were monitored by a computer.

In recent years, various functional assessments have been developed for measuring disability. The systems vary considerably, however, as to hard objective measures and soft subjective assessment.

In 1949, the Steinbrocker committee (1) presented the well-known classification as an overall estimation of the functional disability in rheumatoid arthritis (RA). Later, various grading systems (Table 1) have been used to assess activities of daily living (ADL), as well as social function. In orthopedic practice, systems have been developed for evaluating the results of hip or knee reconstructive surgery, i.e., assessment of single joint function and gait ability.

However, subjective assessment, activity level, and objective findings have not been fully differentiated in previous grading systems. In 1980, WHO (2) presented a classification of the manifestations of disease separating impairment, disability, and handicap (Table 2). The disease is the intrinsic abnormal situation following some pathology.

The present study was undertaken as an attempt to develop a clinical assessment of the locomotor system in RA fulfilling the WHO criteria. Measures of objective clinical evaluation as well as subjective assessment and activity level, separately and combined, were considered necessary for an adequate classification of patients with widespread joint disease and for monitoring the effectiveness of reconstructive interventions.

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Material and methods

The assessment method was tested on patients with RA fulfilling ARA criteria 5–8 (3, 4). They represented 60 of 82 cases with this diagnosis found in an adult population of 5,259 individuals aged 45 years and above in the Swedish community of Åtvidaberg (population 12,707). For comparison of our assessment system with Steinbrocker's grading system, a total of 106 RA patients were examined, i.e., 46 patients attending the rheumatology and orthopedic clinics were added to obtain a population large enough that Steinbrocker's four grades could be represented (Table 3). For examination of interobserver reliability, our assessment was applied to a total of 19 patients (10 RA and 9 arthrotic patients) preoperatively and at 3 months postoperatively to total joint replacement (hip or knee). We made the assessments and filled in the forms with the scoring scales; we are both experienced specialists in orthopedics.

Computerized regression analyses (SPRS-X) with 2-tailed probability tests (5) were used. A computer was used in monitoring the data.

Our total assessment included a subjective and an objective part evaluated both separately and combined: the upper and lower extremities were evaluated separately and combined, resulting in a total locomotion score (Figure 1). The subjective score included pain and ability; the objective score, physical signs recorded by careful clinical examination. A point rating was obtained for pain, ability, and objective findings, and for upper and lower extremities, resulting in a locomotion score. In addition, our patient chart included a page for general physical status, medication, and laboratory tests for monitoring the activity of the general inflammatory disease.

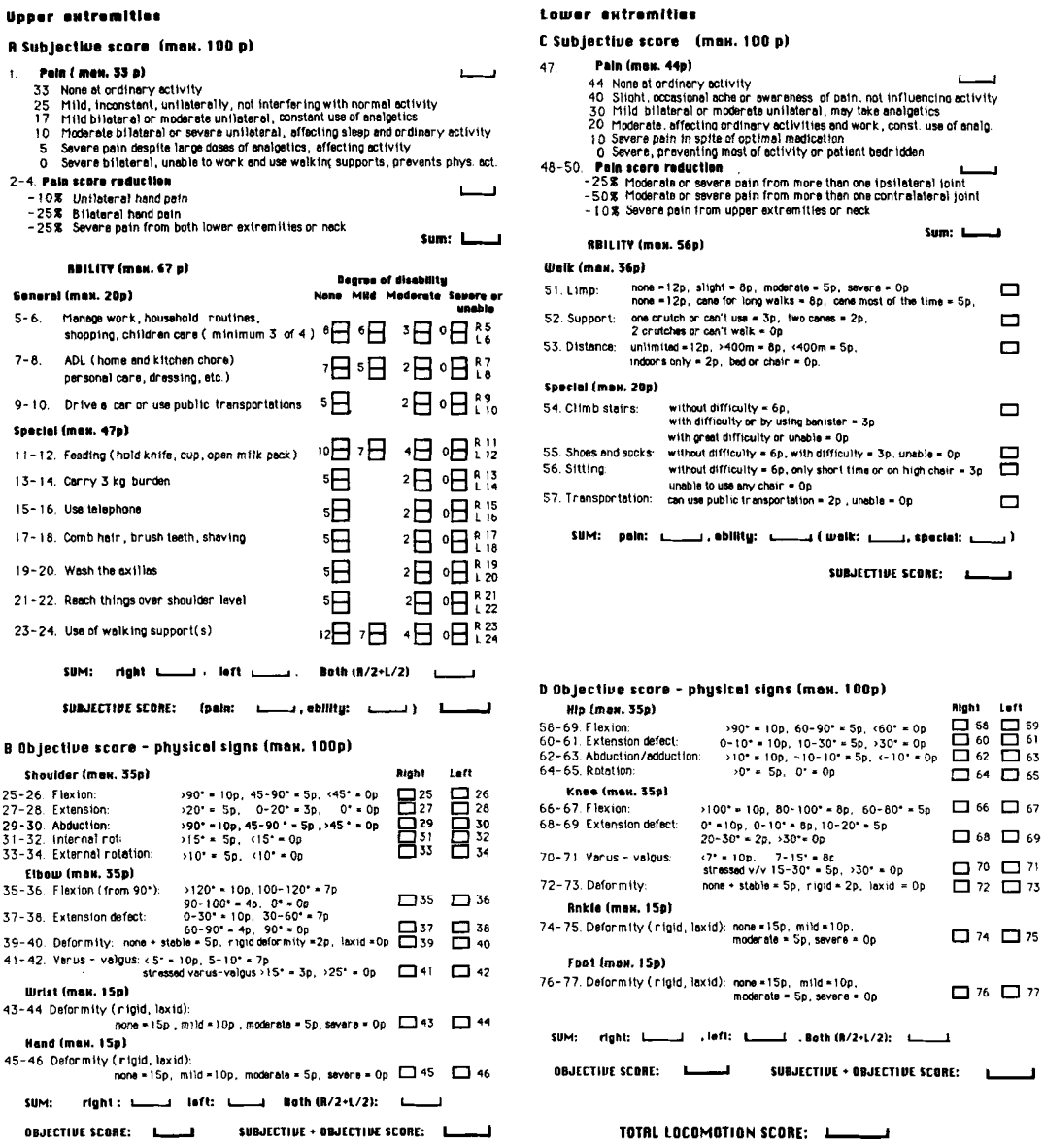

Figure 1. Detailed and total locomotion score in chronic arthritis

As to pain, both intensity and location were considered. For the upper extremities, reductions were made for presence of unilateral hand pain (–10 percent), bilateral hand pain (–25 percent), and severe pain from both lower extremities or the neck (–25 percent). Conforming to clinical experience, pain was given large influence on the total score. For the lower extremities, reductions were made for pain from more than one ipsilateral joint (–25 percent), as well as for pain from two or more bilateral joints (–50 percent), and for severe pain from the upper extremities or the neck (–10 percent).

Results

The interobserver reliability was good, particularly with regard to subjective score and total locomotion score (Figures 2), showing no difference between the two observers. This held true also for the objective

Table 1. Published scoring scales for function in musculoskeletal disorders

Reference	Year	Disease[a]	Assessment[b]				Subject[c]	Evaluation[d] form
			Pain	Impairment	Disability	Handicap		
9	1952	O	1	1	1	0	hip	B
10	1954	O	1	1	1	0	hip	B
11	1954	+	1	1	1	0	hip	B
12	1963	+	1	1	1	1	hip	B
13	1965	+	0	0	1	2	ADL	A
14	1967	+	1	1	1	0	hip	B
15	1969	A	1	1	1	1	knee	B
16	1969	O	1	1	1	0	hip	B
17	1973	A	1	0	2	1	ADL	A
18	1973	+	1	1	1	0	knee	B
19	1973	+	1	1	1	0	knee	B
20	1974	+	0	1	1	0	knee	B
21	1975	+	1	1	1	0	knee	B
22	1976	+	1	1	1	0	knee	B
23	1977	A	0	0	2	2	ADL	A
24	1978	+	1	1	1	0	knee	B
25	1978	+	1	0	2	1	ADL	A
26	1978	A	0	0	2	2	ADL	A
27	1980	A	0	0	1	2	ADL	A
28	1980	A	1	0	1	2	ADL	A
29	1982	A	0	0	2	1	ADL	A
30	1982	+	1	1	1	0	knee	B
31	1984	+	1	2	0	0	knee	B
32	1985	+	1	0	1	1	hip	A

[a] O Osteoarthrosis, A arthritis, + both or other diagnoses.
[b] 0 Not involved, 1 involved, 2 main subjects (Refers to Table 2).
[c] ADL Activities of daily living.
[d] A Questionnaire only, B other subjective and objective status involved.

Table 2. Assessment of disease (from WHO Classification Manual, Geneva 1980)

	Impairment	Disability	Handicap
Definition	Functional and structural departure from the normality.	Restriction or lack of functional ability and activity. Results from impairment.	Disadvantages to the individual to perform or limits the fulfillment of a role as a normal individual.
Example	Joint deformity and instability, edema, paralysis	Feeding, personal hygiene, gripping or walking difficulties	Economic independence and mobility restrictions
Integration	Objective	Subjective	Social

score, although a slight tendency towards a systematic difference was noted. The findings were also valid when the RA patients and those with arthrosis were monitored separately. The variations in score obtained from patients differing as to the number and severity of affected joints showed a linear relationship for both subjective and objective scores and for total locomotion score, as well.

A linear relationship was found between the subjective score and Steinbrocker's four functional classes (Figure 3). For objective score, as well as total locomotion score, somewhat low values were obtained for the patients belonging to Class 1, whereas those representing Classes 2–4 showed a linear relationship. Generally, the subjective score was lower than the objective score. This was most evident for the patients having more widespread joint affections and belonging to Classes 2–4.

Table 3. Data from 106 patients with rheumatoid arthritis evaluated with locomotion score

A	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77
1	10	.	.	.	5	5	8	3	3	8	8	10	10	10	10	10	10	5	5	10	10	10	10	10	10	6	5	5	5	5	10
2	30	.	.	.	8	12	12	8	6	8	2	10	10	10	10	10	10	5	5	10	10	10	8	10	10	6	5	15	10	10	10
3	10	.	.	.	12	8	8	1	3	8	2	10	10	10	10	10	10	5	5	10	10	10	10	10	10	5	6	10	10	10	10
4	10	.	.	10	5	5	5	1	3	8	2	10	10	10	10	10	10	5	5	8	8	6	2	10	8	6	2	10	10	10	10
5	44	.	.	.	12	12	12	3	6	6	2	10	10	10	10	10	10	5	6	10	8	8	10	10	10	6	5	15	15	15	15
6	20	.	.	.	5	8	5	3	3	8	2	10	10	10	10	10	10	5	5	10	10	8	8	10	10	6	5	10	10	5	5
7	20	.	.	.	12	8	8	3	3	8	2	10	10	10	10	10	10	5	5	10	10	10	10	10	10	5	5	5	5	5	5
8	20	.	.	.	3	8	8	1	3	8	2	10	5	10	10	5	10	0	5	8	8	8	5	8	10	0	5	15	15	15	15
9	10	.	.	.	2	5	8	1	3	8	0	0	5	5	10	5	10	0	8	8	8	8	10	10	10	6	5	10	10	10	10
10	30	.	.	.	12	8	12	8	5	8	2	10	10	10	10	10	10	5	5	10	10	10	10	10	10	5	5	15	15	10	10
11	10	.	.	10	8	5	8	1	6	8	2	10	10	10	10	10	10	5	6	8	10	10	10	10	10	6	5	10	10	10	10
12	10	.	50	10	5	5	8	1	3	8	2	10	10	10	10	10	10	5	6	8	8	5	2	10	8	2	0	15	15	5	5
13	20	.	.	.	12	8	8	8	6	3	2	10	10	10	10	10	10	5	5	10	10	10	10	10	10	5	5	10	10	15	15
14	20	.	.	.	8	12	12	8	6	8	2	10	10	10	10	10	10	5	5	10	10	8	10	10	10	5	5	15	15	10	10
15	10	.	50	.	8	5	8	3	6	3	2	10	10	10	10	10	10	5	5	10	10	10	10	10	10	6	5	10	10	10	10
16	20	.	.	.	12	8	8	8	6	3	2	10	10	10	10	10	10	6	5	10	10	10	10	10	10	6	5	10	10	10	10
17	10	.	.	10	8	5	8	3	6	3	2	10	10	10	10	10	10	5	5	10	4	10	5	10	10	6	2	15	15	10	10
18	30	.	.	10	12	8	8	1	3	8	2	10	10	10	10	10	10	5	5	10	10	10	10	10	10	6	6	15	15	5	5
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81	10	.	.	.	5	0	6	3	6	3	0	10	10	10	10	10	10	6	6	8	10	8	10	8	10	2	5	10	10	5	6
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83	30	.	.	.	8	2	8	3	3	3	0	5	5	10	5	10	10	5	5	8	8	5	8	8	8	2	2	10	10	10	10
84	40	.	.	10	8	8	8	3	6	8	2	10	10	10	10	10	10	6	5	10	10	10	10	10	10	5	5	15	15	5	5
85	20	.	.	.	6	2	8	3	3	8	2	5	0	5	5	5	0	6	0	10	10	5	5	10	10	2	2	10	10	10	10
86	30	.	.	.	8	8	8	3	5	6	2	10	10	10	10	10	10	6	5	10	10	8	8	10	10	5	5	10	10	10	10
87	40	.	.	.	8	8	12	3	3	6	2	5	5	10	10	6	6	5	6	10	10	10	10	10	10	5	5	10	10	5	5
88	30	.	.	.	5	5	8	3	5	8	0	10	10	10	10	10	10	5	6	8	10	5	10	8	10	2	5	15	15	15	15
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92	40	.	.	.	8	12	6	3	0	3	0	10	10	10	10	10	10	6	5	10	10	10	10	10	8	6	0	15	15	0	0
93	10	.	50	10	0	0	5	1	3	3	0	10	10	10	10	10	10	6	6	6	5	2	2	10	10	6	6	15	15	6	6
94	44	.	.	.	8	2	5	3	5	8	2	10	10	10	10	10	10	5	5	10	10	10	10	8	10	5	5	15	15	0	0
95	20	.	50	10	5	2	5	1	0	3	2	5	0	5	5	10	5	5	0	10	8	8	8	10	10	5	5	15	10	15	15
96	44	.	.	.	8	8	6	3	6	8	2	10	10	10	10	10	10	5	6	10	10	8	10	10	10	5	5	15	15	10	10
97	30	.	.	.	12	8	8	3	3	6	2	10	6	10	10	10	10	5	6	10	10	10	10	10	10	6	5	15	15	10	10
98	30	.	.	.	12	8	8	3	5	8	2	10	10	10	10	10	10	5	5	8	8	6	10	10	10	5	5	15	15	10	15
99	40	.	.	.	12	12	12	8	6	8	2	10	10	10	10	10	10	5	5	10	10	10	10	10	10	5	5	10	10	10	5
100	40	.	.	.	12	8	8	3	3	6	2	10	10	10	10	10	10	5	5	10	10	10	10	10	10	6	5	15	15	15	15
101	40	.	.	.	12	12	12	8	6	8	2	10	10	10	10	10	10	6	5	10	10	10	10	10	10	5	5	15	15	15	15
102	40	.	.	.	12	12	12	6	6	8	2	10	10	10	10	10	10	5	6	10	10	10	10	10	10	5	5	15	15	10	10
103	30	.	.	.	8	12	12	6	5	8	2	10	10	10	10	10	10	5	6	10	10	8	8	10	10	6	5	10	10	0	0
104	30	.	.	10	8	12	8	1	0	6	0	10	10	10	10	10	10	5	5	8	8	10	10	10	10	6	5	10	10	5	5
105	30	.	.	.	8	12	8	8	3	3	2	10	10	10	10	10	10	5	5	10	10	10	10	10	10	5	5	15	15	5	5
106	10	.	.	.	5	8	5	1	3	3	0	10	10	10	10	10	10	5	5	10	8	10	10	10	10	5	5	5	5	10	10

Table 3. Key to data

A Patient number (1–106 vertical).
B Sex 1 = male, 2 = female.
C Steinbrocker's functional classes:

1 = complete functional capacity and without handicap.

2 = functional capacity adequate for daily activity with discomfort and limited mobility.

3 = decreased functional capacity and only adequate to perform little or none of the duties of usual work and self-care.

4 = patient in wheelchair or bedridden.

Locomotion score (horizontal 1–77)

1-46 Upper extremities

1–24 Subjective score
- 1. Pain
- 2– 4. Pain score reductions
- 5–10. General ability
- 11–24. Special ability

25–46 Objective score
- 25 –34. Shoulder
- 35 –42. Elbow
- 43 –44. Wrist
- 45 –46. Hand

47-77 Lower extremities

47–57 Subjective score
- 47. Pain
- 48–50. Pain score reductions
- 51–53. Walking ability
- 54–57. Special ability

58–77 Objective score
- 58 –65. Hip
- 66 –73. Knee
- 74 –75. Ankle
- 76 –77. Foot

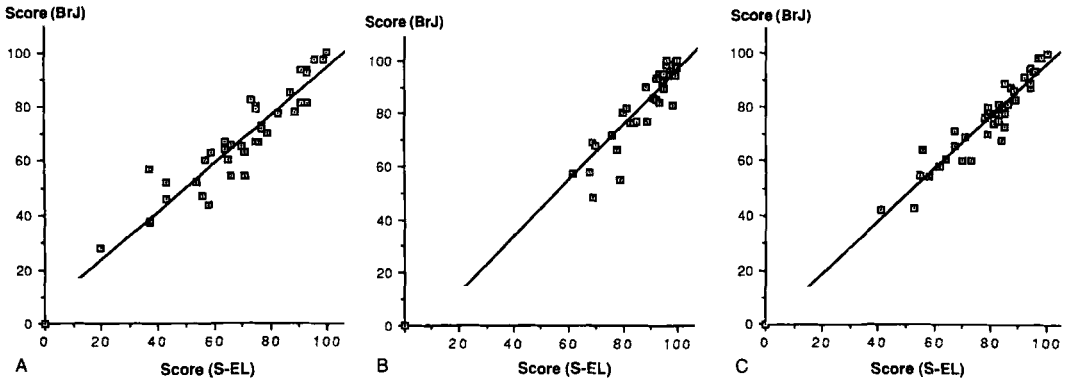

Figure 2. Interobserver reliability. Total subjective (A) and objective (B) scores, and (C) locomotion score (subjective + objective) in 19 patients on two occasions.

Discussion

For the assessment of RA patients and, in particular, the measurement of the effectiveness of reconstructive operations, an evaluation system designed not only for the individual joint, but also for the total locomotor system, seems mandatory. The limitations of previous grading systems have been pointed out (6–8) stressing the importance of a generally agreed, reproducible assessment.

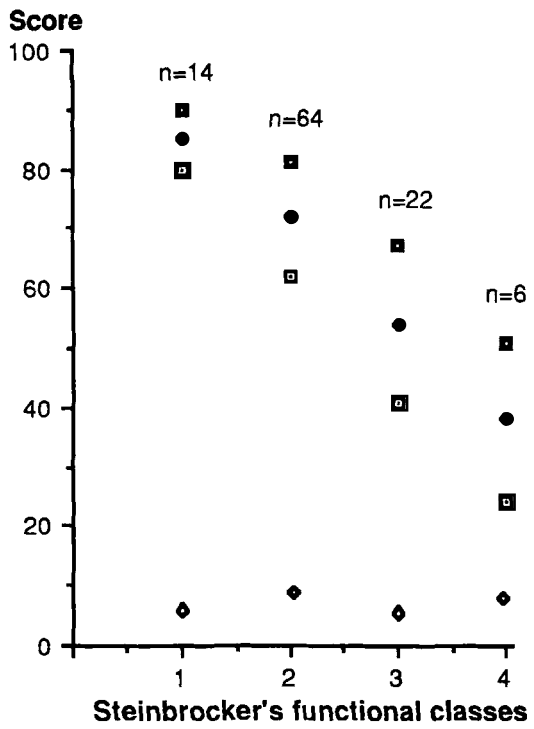

Figure 3. Our scoring system, i.e., total subjective score, total objective score, and total locomotion score, in comparison with Steinbrocker's four functional classes in 106 rheumatoid patients fulfilling ARA criteria 5–8.

The existing grading systems monitor single-joint function or the combination of single-joint function and the patient's ability, or, on the other hand, the activity of daily living and ability or overall disability and handicap. In our opinion the objective evaluation (hard data) has to be separated from the subjective assessment of pain and ability (soft data) to make the measurement in the form of a combined or total score valid. Further, this separate monitoring of the subjective part reduces the effect from biological changes of the disease, emotional and psychologic status of the patient, and his own opinion and expectations of the total score outcome.

Our point grading was constructed on the basis of long-term clinical experience from RA surgery. Computerized data analyses permitted the monitoring of the grading scales in various ways. However, we want to point out that our grading system, in fact, represents our original assessment, which we made without knowing anything about the final results. One could discuss whether or not the subjective score, including the assessment of pain, would be lowered to a level close to that of the objective score. However, in view of the impact of pain on the quality of life, as well as on the functional ability, we decided not to introduce any changes. The burden of pain, particularly in the RA patients with advanced multiple joint involvement, was thus paid full attention to. These matters illustrate the necessity of separating the subjective and objective assessments before a combined total score is monitored.

In conclusion, our assessment was found to have good interobserver reliability in the clinical routine and to permit good, and almost linear, differentiation between RA patients representing Steinbrocker's four functional classes. It seems to monitor properly the total assessment of patients with varying degree of widespread joint involvement. The assessment will be used in subsequent studies designed to classify RA patients in an epidemiologically representative, total population and, further, to evaluate the effectiveness of reconstructive surgery from various points of view.

References

1. Steinbrocker O, Traeger C H, Batterman R C. Therapeutic criteria in rheumatoid arthritis. JAMA 1949;140: 659–62.
2. International Classification of Impairments, Disabilities and Handicaps. WHO, Geneva 1980.
3. Ropes M W, Bennett G A, Cobb S, Jacox R, Jessar R A. 1958 revision of diagnostic criteria for rheumatoid arthritis. Bull Rheum Dis 1958;9:175–6.
4. Kellgren J H, Jeffrey M R, Ball J. The epidemiology of chronic rheumatism. A symposium. Blackwell Scientific Publ, Oxford 1963.
5. Siegel S. Nonparametric statistics for the behavioral sciences. McGraw Hill, New York 1956.
6. Andersson G. Hip assessment: a comparison of nine different methods. J Bone Joint Surg (Br) 1972;54(4): 621–5.
7. Liang M H, Cullen K E. Evaluation of outcomes in total joint arthroplasty for rheumatoid arthritis. Clin Orthop 1984;(182):41–5.
8. Bombardier C, Tugwell P. Measuring disability: guidelines for rheumatology studies. J Rheumatol 1983;10 (Suppl):68–73.
9. Judet R, Judet J. Technique and results with the acrylic femoral head prosthesis. J Bone Joint Surg (Br) 1952; 34:173–80.
10. Merle d'Aubigné R, Postel M. Functional results of hip arthroplasty with acrylic prosthesis. J Bone Joint Surg (Am) 1954;36:451–75.
11. Shepherd M M. Assessment of function after arthroplasty of the hip. J Bone Joint Surg (Br) 1954;36:354–63.
12. Larson C B. Rating scale for hip disabilities.Clin Orthop 1963;31:85–93.
13. Mahoney F, Barthel D. Functional evaluation: The Barthel Index. Md State Med J 1965;14(2):61–5.
14. Lazansky M G. A method for grading hips. J Bone Joint Surg (Br) 1967;49(4):644–51.
15. Geens S, Clayton M L, Leidholt J D, Smyth C J, Bartholomew B A. Synovectomy and debridement of the knee in rheumatoid arthritis. II. Clinical and roentgenographic study of thirty one cases. J Bone Joint Surg (Am) 1969;51(4):626–42.
16. Harris W H. Traumatic arthritis of the hip after dislocation and acetabular fractures: treatment by mold arthroplasty. An end result study using a new method of result evaluation. J Bone Joint Surg (Am) 1969;51(4):737–55.
17. Lee P, Jasani M K, Dick W C, Buchanan W W. Evaluation of a functional index in rheumatoid arthritis. Scand J Rheumatol 1973;2(2):71–7.
18. Freeman M A, Swanson S A, Todd R C. Total replacement of the knee using the Freeman Swanson knee prosthesis. Clin Orthop 1973;94:153–70.
19. Convery F R, Beber C A. Total knee arthroplasty: indications, evaluation and postoperative management. Clin Orthop 1973;94:42–9.
20. Larson R L. Rating sheet for knee function. In: Diseases of the Knee Joint (Ed. Smillie I S). Churchill Livingstone, Edinburgh 1974:29.
21. Kettelkamp D B, Thompson C. Development of a knee scoring scale. Clin Orthop 1975;(107):93–9.
22. Insall J N, Ranawat C S, Aglietti P, Shine J. A comparison of four models of total knee replacement prostheses. J Bone Joint Surg (Am) 1976;58(6):754–65.
23. Convery F R, Minteer M A, Amiel D, Connett K L. Polyarticular disability: a functional assessment. Arch Phys Med Rehabil 1977;58(11):494–9.
24. Aichroth P, Freeman M A R, Smillie I S, Souter W A. A knee function assessment chart. J Bone Joint Surg (Br) 1978;60:308–9.
25. Jette A M, Deniston O L. Inter-observer reliability of a functional status assessment instrument. J Chronic Dis 1978;31(9–10):573–80.
26. Liang M, Schurman D J, Fries J. A patient administered questionnaire for arthritis assessment. Clin Orthop 1978;(131):123–9.
27. Fries J F, Spitz P, Kraines R G, Holman H R. Measurement of patient outcome in arthritis. Arthritis Rheum 1980;23(2):137–45.
28. Meenan R F, Gertman P M, Mason J H. Measuring health status in arthritis. The arthritis impact measurement scales. Arthritis Rheum 1980;23(2):146–52.
29. Chambers L W, Macdonald L A, Tugwell P, Buchanan W W, Kraag G. The McMaster Health Index Questionnaire as a measure of quality of life for patients with rheumatoid disease. J Rheumatol 1982;9(5):780–4.
30. Lysholm J, Gillquist J. Evaluation of knee ligament surgery results with special emphasis on use of a scoring scale. Am J Sports Med 1982;10(3):150–4.
31. Oglesby J W, Wilson F C. The evolution of knee arthroplasty. Results with three generations of prostheses. Clin Orthop 1984;(186):96–103.
32. Kavanagh B F, Fitzgerald R H Jr. Clinical and roentgenographic assessment of total hip arthroplasty. A new hip score. Clin Orthop 1985;(193):133–40.