SIMULTANEOUS OR STAGED BILATERAL TOTAL KNEE REPLACEMENTS IN RHEUMATOID ARTHRITIS

A PROSPECTIVE STUDY

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In a prospective study of 100 knee arthroplasties in patients with rheumatoid arthritis, simultaneous bilateral surgery was compared with staged bilateral replacements. All patients had improved function following their operations but those who had staged surgery only achieved maximum benefit after the second knee had been replaced. The complication rate was no greater for simultaneous surgery and we therefore advocate the method for those patients who require bilateral replacements.

Patients with rheumatoid arthritis frequently have bilateral joint involvement and require multiple surgery. When the knees are involved a choice exists between staged or simultaneous arthroplasty. Previous reports have described mixed groups of osteoarthritic and rheumatoid patients (Brotherton et al 1986; Morrey et al 1987; Ritter and Meding 1987) and most were retrospective (Gradillas and Volz 1979; Morrey et al 1987). All the large studies involved several surgeons with varied surgical techniques and regimes of postoperative management (Brotherton et al 1986; Morrey et al 1987). Meaningful assessment of their results is therefore difficult. We report a prospective study in which simultaneous total knee arthroplasty is compared with staged bilateral replacements in patients with rheumatoid arthritis.

PATIENTS AND METHODS

A consecutive series of 50 rheumatoid patients who had 100 knee replacements between 1982 and 1986 were studied prospectively. Of these, 32 had bilateral simultaneous total knee replacements (group I) and 18 had staged procedures (group II).

All the operations were performed by, or under the direct supervision of, the senior author using the Insall

Burstein total condylar prosthesis. The mean age in group I was 62 years (range 32.6 to 77) and in group II, 58 years (range 37 to 72). The sex distribution was similar in the two groups (group I 8 male, 24 female; group II 4 male, 14 female) and the duration of symptomatic knee disease was similar (group I, 13 years; group II, 10 years). In group I, 71% of patients were taking systemic steroids at the time of operation; in group II, 63%.

All operations were performed in a clean air enclosure and the surgeons wore body exhaust suits. Tourniquets were used but applied without Esmarch bandaging to avoid skin damage. The tourniquets were released prior to skin closure so that haemostasis could be achieved. Each patient received antibiotic cover (cefuroxime 750 mg three times daily) which was continued for 24 hours after removal of the suction drains. Gentamicin impregnated cement was used. Thromboembolic prophylaxis, using low dose Warfarin, was commenced on the night of surgery and continued for six weeks. The international normalised ratio (INR) was maintained between 1.7 and 2.2. To reduce the risk of gastro-intestinal stress ulceration each patient received ranitidine 150 mg twice daily for eight weeks.

The postoperative rehabilitation regime was also the same in both groups. Patients were instructed in static quadriceps exercises on the first postoperative day and started straight leg raising at 48 hours. At this stage the wound was inspected for haematoma and, if deemed satisfactory, knee flexion was allowed. Walking started with an Orthoplast back slab which was used until the patient had achieved good quadriceps control and flexion to 60°. After discharge from hospital, out-patient physiotherapy continued until full mobilisation was attained.

The computer data was submitted for analysis to the Medical Statistics Computing Unit at Edinburgh Uni-

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RESULTS

Since the aim of this study was to compare the functional results of the two surgical regimes, no attempt was made to assess the long-term outcome.

Patient independence. Improvement in their independence was achieved by all patients (Table I); in particular those who were bedridden or confined to a wheelchair all became independent and no deterioration was observed during the period of follow-up (minimum 3 years).

Table I. Assessment of independence (*per cent*)

	Group I simultaneous surgery		Group II* staged surgery	
	Pre-op	Post-op	Pre-op	Post-op
Fully employable	0	0	10	6
Light or part time work	13	21	8	20
Full range of housework				
Unemployable/light housework	58	68	39	68
Confined to house/self care	22	11	35	6
Bedridden/wheelchair life	7	0	8	0

* one patient had reached retirement age when reviewed, hence the change from 10% to 6% in the number of patients fully employable

Walking and general mobility. Although many of our patients had involvement of other lower limb joints, their ability to walk (Table II) and to get out of a chair (Table III) was improved in both groups.

Knee movement. There were no significant differences in the pre- and postoperative range of knee movement between the two groups. At review, at least three years after operation, group I had a mean flexion range of 101° and group II, 100°.

Table II. Walking ability (*per cent*)

	Group I simultaneous surgery		Group II staged surgery	
	Pre-op	Post-op	Pre-op	Post-op
Unlimited	4	5	5	10
Slight restriction	0	10	0	6
Up to 1 km	6	32	2	16
Up to 500 m	10	26	8	30
50 to 100 m	48	22	32	38
Indoors only	30	5	45	0
Unable to walk	6	0	8	0

Time under anaesthesia. Patients who had staged procedures were anaesthetised for a mean time of 86 minutes longer than those in group I. Group I patients also required less peri-operative blood transfusion, a mean of four units in group I compared with six units in group II.

Table III. Ability to get out of a chair (*per cent*)

	Group I simultaneous surgery		Group II staged surgery	
	Pre-op	Post-op	Pre-op	Post-op
With ease	0	21	3	16
With difficulty	3	16	13	26
Only using arms (rocking)	75	58	78	58
Unable	22	5	6	0

Stay in hospital. The total length of hospital stay for patients who underwent staged procedures was more than twice that of those who had simultaneous surgery (group I mean 22 days, range 13 to 44; group II mean 22 days for each replacement, range 12 to 44).

Complications. There were no intra-operative complications in either group. Two patients who had staged procedures required surgical evacuation of a haematoma within four days of operation. In both these cases the INR was within our range for thrombo-embolic prophylaxis (1.7 to 2.2). Another patient in this group required a manipulation under anaesthesia for limited flexion, three months following surgery.

Two patients who had undergone simultaneous surgery developed persistent pyrexia postoperatively. No cause could be found and this had resolved in both by the 18th postoperative day. None of our patients had clinical evidence of either thrombosis or embolism.

One patient with staged arthroplasties developed infection in both knees two years after surgery. This, we believe, was due to haematogenous spread from an untreated infected lesion on the toe. The knees became symptomatic soon after the toe sepsis and the same organism was grown from both sources. The patient was subsequently treated by one-stage exchange arthroplasties and the results, 18 months later, were satisfactory with no deterioration in function.

DISCUSSION

In patients with advanced rheumatoid arthritis total knee arthroplasty is widely accepted as the best treatment for pain relief and restoration of function. When both knees are affected, replacement of one joint does little to improve the patient's overall function. However, simultaneous replacements should only be considered if the results are as good, and the complications no greater than in staged procedures. Several reports have compared

simultaneous and staged surgery, but in mixed populations of rheumatoid and osteoarthritic patients and using a variety of prostheses (Hardaker et al 1978; Brotherton et al 1986; Morrey et al 1987). Rheumatoid patients present specific problems which invalidate direct comparison with osteoarthritic patients and conclusions drawn from studies in which both diseases were included may be meaningless. Similarly, the use of a variety of prostheses by several surgeons makes the interpretation of results difficult. It is for these reasons that this prospective study in rheumatoid arthritic patients was undertaken, with particular emphasis on the functional results.

Our patients showed improvement in all aspects of function following surgery, and compare well with previously reported results (Brotherton et al 1986; Morrey et al 1987). Their functional gains were the same in both groups but patients who had simultaneous surgery achieved their improved level of function sooner than the others.

The benefits of surgery were always limited until the other knee had been replaced. On questioning, the patients who underwent simultaneous surgery thought their rehabilitation easier than did those who had completed the first part of staged replacements.

Another advantage of simultaneous surgery was the economy of the physiotherapist's time. When simultaneous surgery was performed the patient could carry out exercises on both knees after receiving one period of instruction. We estimate that simultaneous bilateral surgery results in a 25% saving of physiotherapy time.

One of the criticisms of simultaneous surgery has been the reportedly high incidence of complications (Gradillas and Volz 1979) and, indeed, Wapner, Ballas and Mallory (1984) advised against simultaneous surgery for that reason. However, this has not been our experience nor that of some others (Hardaker et al 1978; Brotherton et al 1986). Impaired wound healing, one of the

complications frequently reported following both simultaneous and staged knee replacements, did not occur in our series, possibly because all operations were performed in a clean air enclosure. Tourniquets used without Esmarch bandaging may have reduced the risk of skin damage and meticulous attention was paid to the handling and suturing of the soft tissues. One complication which has been reported commonly in simultaneous surgery is thrombo-embolism (Gradillas and Volz 1979; Wapner et al 1984). The use of low dose Warfarin prophylaxis in our experience reduces this incidence.

As we have found no significant differences, either in the functional results or in the incidence of complications, between simultaneous and staged knee replacements in patients with rheumatoid arthritis we suggest that simultaneous surgery should be preferred since it has the advantage of reducing the number of anaesthetics and hospital admissions.

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REFERENCES

- Brotherton SL, Roberson JR, de Andrade JR, Fleming LL. Staged versus simultaneous bilateral total knee replacement. *J Arthroplasty* 1986; 1:221-8.
- Gradillas EL, Volz RG. Bilateral total knee replacement under one anaesthetic. *Clin Orthop* 1979; 140:153-8.
- Hardaker WT, Ogden WS, Musgrave RE, Goldner JL. Simultaneous and staged bilateral total knee arthroplasty. *J Bone Joint Surg [Am]* 1978; 60-A:247-50.
- Morrey BF, Adams RA, Ilstrup DM, Bryan RS. Complications and mortality associated with bilateral or unilateral total knee arthroplasty. *J Bone Joint Surg [Am]* 1987; 69-A:484-8.
- Ritter MA, Meding JB. Bilateral simultaneous total knee arthroplasty. *J Arthroplasty* 1987; 2:185-9.
- Wapner JL, Ballas SL, Mallory TH. Rationale for staged versus simultaneous bilateral total knee replacements. *Orthop Trans* 1984; 8:398.