There are many studies of long-term recovery from major joint arthroplasty, but little is known about the first days and weeks after operation. We measured function, emotional state and life evaluation before arthroplasty and at seven and 50 days after in a consecutive series of 40 hip and 23 knee replacements.

Pain was relieved significantly at seven days after hip arthroplasty and even more at 50 days. In knee patients, pain relief was modest and was not apparent until 50 days. Functional ability was much improved by 50 days in hip patients, but hardly changed in knee patients. Positive mood and life satisfaction did not improve in either group.

Our findings will help with more accurate information for patients before operation and also in judging the rate of recovery.

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There is little information about recovery during the first few weeks after hip and knee arthroplasty, particularly in terms of speed of recovery from fatigue and emotional disturbance and improvement in quality of life. These are known to be important in recovery from other forms of surgery (Salmon 1992). A recent study of the impact of hip arthroplasty reported psychological improvement by two months (Petrie, Chamberlain and Azariah 1994), but life satisfaction and subjective health were measured by single questions; there was no parallel measurement of function, and pain was assessed only at three days after operation. Duggleby and Lander (1994) described changes in pain during the first five days after hip arthroplasty, and correlated this with cognitive functioning, but did not examine fatigue or emotional state.

Information about short-term recovery is needed in order to inform patients about expected rates of progress, and to help clinicians to assess patients for accurate planning of hospital resources (Clark 1994).

We studied the short-term recovery from hip and knee arthroplasty in 70 patients to assess the timing of satisfactory functional improvement. For hip arthroplasty, this is usually within three months (Lichtenstein, Semaan and Marmar 1993; Borstlap et al 1994); recovery from knee arthroplasty takes longer (Wright et al 1990; Patel, Aichroth and Wand 1991). Our aim was to assess the outcome in terms of functional recovery, fatigue and psychological variables during the two months after operation.

PATIENTS AND METHODS

We interviewed 70 consecutive patients on admission for hip or knee arthroplasty under the care of three surgical teams. No patient refused, but seven were excluded, four because of inability to complete questionnaires, two because they found the questionnaires were too tiring and one because she had previously taken part in the study. These exclusions left 40 patients having a hip arthroplasty (17 men, 23 women; mean age 58.5 years, SD 16.8) and 23 having a knee arthroplasty (8 men, 15 women; mean age 65.8 years, SD 9.8). The hip and knee groups showed no significant differences in age or sex ratio. Most had osteoarthritis (32/40 hips and 17/23 knees).

After hip operations, patients had physiotherapy with active-assisted hip and knee exercises and active knee, foot and ankle movements. On the second postoperative day, after a satisfactory radiograph, they were mobilised on a frame and then on two sticks as soon as possible. Before discharge from hospital, all patients were able to walk on a level surface, a slope and on stairs using two sticks. There was no outpatient physiotherapy, but exercises at home were encouraged.

After knee operations, physiotherapy started on the first postoperative day with strengthening exercises including straight-leg raising, foot and ankle exercises, quadriceps strengthening and active-assisted knee flexion. Continuous
passive motion was used for two hours daily as soon as the patient was able to tolerate it and if wound healing was satisfactory. This was continued daily until a satisfactory range of motion, of approximately 90°, was achieved. After checking radiographs and removing drains on the second day, patients were mobilised on a frame, using a canvas gaiter-splint if quadriceps control was poor. Walking with sticks started as soon as possible. On discharge from hospital, all patients could walk with sticks on a level surface, a slope and on stairs without the assistance of the splint. Outpatient physiotherapy was provided to improve the range of movement and increase muscle strength.

**Psychological and functional assessment.** Patients were assessed for this study at the preadmission clinic (a median of 7.5 days before operation for hips and at 8 days for knees), in hospital seven days after operation and at follow-up at a median of 50 and 49 days after operation, respectively.

We used the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC; Bellamy et al 1988) which separately quantifies pain, stiffness and function at the preoperative and follow-up assessments. Additional assessments on three occasions included those for fatigue (Chandler et al 1993), subjective health (1 to 7 visual analogue scale from ‘terrible’ to ‘excellent’), pain (100 mm line visual analogue scale from ‘no pain’ to ‘worst possible’), mood (Positive and Negative Affect Scale; Watson, Clark and Tellegen 1988), and quality of life (Life Satisfaction Ladder; Cantril 1965).

We subjected the scores to repeated-measures analysis of variance, using SPSS (Norusis 1991) and Genstat (Rothamsted Research Station, Harpenden, UK) contrasting hip with knee patients and comparing times of assessment. When necessary, we assessed the F-ratio by the use of 95% confidence intervals around difference scores, comparing postoperative or follow-up values with those before operation. When patients failed to respond to a questionnaire item the number of degrees of freedom was correspondingly reduced.

**RESULTS**

In the 63 patients entering the study, the most common medical problems were hypertension (9), heart disease (9), thyroid disease (5), asthma (4) and hepatic disease (3). Many patients were receiving drugs which included diuretics (16 patients), beta-adrenergic blocking drugs (7), digoxin (6), calcium channel blocking drugs (5), ACE inhibitors (5), steroids (4) and other immunosuppressive drugs (4).

Seven of the 40 hip arthroplasties were revision procedures; in 24 the femoral prosthesis was cemented. Two of the 23 knee arthroplasties were revisions. For hip arthroplasty, 23 patients had general anaesthesia alone, 16 had combined regional and general anaesthesia and one had regional anaesthesia only. For knee arthroplasty, 11 had general anaesthesia alone, eight had combined general and regional anaesthesia, three had regional anaesthesia only, and for one no record was available. The duration of anaesthesia was similar in both groups; 118 ± 33 minutes for hip and 120 ± 34 minutes for knee patients. The volume of intravenous fluid given was 1971 ± 679 ml for hip and 1658 ± 501 ml for knee patients. Eight hip patients and one knee patient had blood transfusions.

**Outcome.** The means and standard deviations of all the outcome measures at each time point are summarised in Table I. The sphericity of the variance-covariance matrix was confirmed in every analysis; therefore significance levels have not been adjusted.

**Function, fatigue and subjective health.** The change in function on the WOMAC scale differed significantly between hip and knee patients (Fig. 1; F(1,60) = 8.42, p < 0.01). Hip patients had improved at seven weeks but those with a knee arthroplasty showed no change. There was a similar pattern of results for subjective health (F(2,118) = 5.64, p < 0.05) and for fatigue (F(2,118) = 3.52; p < 0.05); again there was no significant change in knee

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![Image](image-url)

**Fig. 1a**

**Fig. 1b**

**Fig. 1c**

Changes in functional disability on the WOMAC scale (a), subjective health (b) and fatigue (c) before hip or knee arthroplasty. The preoperative values are shown by lines meeting the axis. For WOMAC these are compared with those at 50 days. For the other scores results are given for one week postoperatively (1) and 50 days (2). The bars indicate 95% confidence intervals.
patients, but an improvement had appeared in hip patients by seven weeks.

**Pain and stiffness.** Pain ratings on the VAS scale fell in both groups (F(2,118) = 33.48, p < 0.001), but more rapidly and to a greater extent in hip patients (Fig. 2; interaction of group × time: F(2,118) = 4.10, p < 0.05). The reduction in pain in knee patients at one week postoperatively just exceeded the 95% confidence interval, but was much greater by seven weeks. By contrast, pain in hip patients had fallen markedly by one week and even further by seven weeks. On the WOMAC scale also (Fig. 2), pain fell in both hips and knees (F(1,60) = 92.43, p < 0.001), but more in hip than knee patients (changes over time (Fs(1,60) = 8.90, p < 0.01). Hip patients were less stiff at the seven-week follow-up; knee patients had not improved (interaction of group × time: F(1,60) = 11.10, p < 0.01).

**Mood and life satisfaction.** The patients’ negative mood declined by one week postoperatively in both hip and knee patients (Fig. 3; main effect of time: F(2,118) = 3.17, p < 0.05). Positive mood did not change. Figure 3 shows that there was no overall improvement in life satisfaction at this stage; a significant interaction of group × time (F(2,117) = 3.60, p < 0.05) suggested that life satisfaction changed differently in hip and knee patients, but post hoc comparisons could not demonstrate the reason for this finding.

**DISCUSSION**

We have examined changes in many aspects of psychological state at seven days after major joint arthroplasty; there is little published information on this important phase of recovery although it has been reported that the results of hip and knee arthroplasty are equally satisfactory at one year (Norman-Taylor, Palmer and Villar 1995). We found a significant reduction in pain and negative mood one week after hip surgery. By contrast, knee patients showed reduction only in negative mood. Neither group showed any significant change in measures of fatigue, subjective health, positive mood and life satisfaction at this early stage of recovery. This information helps medical and nursing staff to give more accurate expectations of recovery to patients undergoing arthroplasties.

We found a large difference between the rate of recovery

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**Table I.** Mean scores (± sd) for all outcome measures; the maximum possible range is shown for each variable

<table>
<thead>
<tr>
<th>Preoperative</th>
<th>Postoperative</th>
<th>Follow-up</th>
<th>Range of possible scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hip</td>
<td>Knee</td>
<td>Hip</td>
</tr>
<tr>
<td>Positive affect</td>
<td>27.65 ± 6.37</td>
<td>27.65 ± 5.50</td>
<td>27.63 ± 7.02</td>
</tr>
<tr>
<td>Negative affect</td>
<td>15.23 ± 4.94</td>
<td>14.39 ± 5.24</td>
<td>13.50 ± 4.30</td>
</tr>
<tr>
<td>Life satisfaction</td>
<td>7.08 ± 1.95</td>
<td>6.78 ± 2.37</td>
<td>6.45 ± 1.78</td>
</tr>
<tr>
<td>Fatigue</td>
<td>33.95 ± 4.77</td>
<td>32.22 ± 4.63</td>
<td>34.00 ± 5.88</td>
</tr>
<tr>
<td>Pain VAS</td>
<td>7.25 ± 2.24</td>
<td>7.96 ± 2.23</td>
<td>5.53 ± 3.00</td>
</tr>
<tr>
<td>Health</td>
<td>4.00 ± 1.54</td>
<td>3.70 ± 1.55</td>
<td>4.29 ± 1.43</td>
</tr>
<tr>
<td>WOMAC Pain</td>
<td>11.65 ± 3.36</td>
<td>11.96 ± 2.90</td>
<td>-</td>
</tr>
<tr>
<td>WOMAC Stiffness</td>
<td>4.48 ± 1.57</td>
<td>4.00 ± 2.30</td>
<td>-</td>
</tr>
<tr>
<td>WOMAC Difficulty</td>
<td>38.50 ± 10.81</td>
<td>37.22 ± 11.05</td>
<td>-</td>
</tr>
</tbody>
</table>

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Changes in pain (a,b) and stiffness (c) after hip or knee arthroplasty. Preoperative values are shown by lines meeting the axis. These are compared with one week postoperatively (1) and 50 days (2) for VAS and 50 days for the WOMAC pain score. The bars indicate 95% confidence intervals.
of hip and knee patients at seven weeks after operation. Hip patients had lower pain scores, reduction in fatigue, and improvement in self-rated health. In marked contrast, the knee patients showed only a small but significant improvement in pain scores. There was a considerable difference in WOMAC scores. There were significant improvements in pain, stiffness and functional disability in the hip patients, but only a modest improvement in pain with the knees. Our findings confirm previous work which has shown delayed functional recovery in patients having knee arthroplasty and indicate that patients can expect marked functional improvement at less than two months after hip replacement.

The significant early improvement in negative mood which we found at seven days postoperatively did not change further; it seems that the early change was caused by relief from preoperative anxiety and depression, having survived major surgery. There were no significant changes in positive mood and life satisfaction, which bears out previous evidence that positive mood is not simply the absence or con-verse of negative mood (Bradburn 1969; Watson et al 1988). Despite marked relief of pain and, in hip patients, reduction of disability we found no change in the positive aspects of quality of life, such as positive mood and life satisfaction. The method of assessment of life satisfaction which we used has been reported extensively, particularly in elderly groups, and has been shown to correlate with other, more complex measures such as the Philadelphia Geriatric Center Morale Scale (Eddington et al 1990).

Our study related to routine clinical practice in a university teaching centre, with patients recruited sequentially. The information provided helps to describe the recovery characteristics needed to inform patients and allow appropriate planning of resources. Other studies of this type will be necessary in different settings and should be repeated periodically so that the information is sensitive to variations in clinical practice, and keeps pace with clinical development.

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REFERENCES