Early individualized postoperative occupational therapy training in 100 patients improves ADL after hip fracture

A randomized trial

Birgit Hagsten[1,2], Olle Svensson[3] and Ann Gardulf[4]

[1]Department of Occupational Therapy, Huddinge University Hospital, Stockholm, [2]Department of Nursing, Karolinska Institutet, Stockholm, [3]Perioperative Sciences, Division of Orthopedics, Umeå University Hospital, Umeå, [4]Nursing Research and Development Unit at Huddinge University Hospital, Stockholm, Sweden.
Correspondence AG: ann.gandulf@nursres.hs.sll.se
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Background **It is not clear whether occupational therapy is of value for hip fracture patients.**

Patients and methods **In a randomized trial we studied the effects of an early, individualized, postoperative occupational training (OT) program on the ability of hip fracture patients to perform ADL and IADL. Secondary endpoints were self-reported fear of pain and pain when performing ADL and IADL. The need for technical aids and/or home adaptations was also investigated. 100 eligible patients (aged ≥ 65 years, with independent residence) were randomized 50:50 to an OT or control group (conventional care). During their hospital stay, members of the OT group received individual daily training which included the use of technical aids. Before discharge, the occupational therapist paid a home visit together with the patient. All patients were assessed 2–4 days after surgery, at discharge and after 2 months, using the Klein-Bell ADL scale and a modified version of the Disability Rating Index.**

Results **At discharge, the OT group had better ability to dress, to take care of personal hygiene and bathing activities independently, and to make toilet visits. Age, sex, type of fracture or length of stay at the hospital made no significant contribution to explaining the better ADL ability on discharge. After 2 months, all patients had regained their ADL and IADL abilities. Half of the patients required technical aids and adaptations in their homes.**

Interpretation **Individualized OT-training speed up the ability of patients to perform ADL, thus enhancing the likelihood of patients returning to independent living and reducing the need for postoperative care at home.**

Hip fracture is a major healthcare problem in terms of cost and suffering (Zethraeus et al. 1997, Haentjens et al. 2001, Tidermark et al. 2002). Most patients are octogenarians and have many other social and medical problems.

Intensive, physiotherapy training during the postoperative period improves the functional capacity of the patient (Barnes and Dunovan 1987, Guccione et al. 1996), as this training focuses mainly on the function of various muscle groups that are important for the mobility of the patient. Occupational therapy (OT) training focuses on the activities that are necessary for independent living, i.e., the patient's ability to perform the activities of daily living (ADL) and the instrumental activities of daily living (IADL). It has been suggested that hip fracture patients should receive OT training soon after surgery (Kumar and Redford 1984, Thorngren 1991, Byers and Parker 1992, Stewart and McMillan 1998), but there have been no controlled trials of whether this training improves the ADL and IADL abilities of patients faster. We carried out a randomized, controlled trial to study the effects of an early, individualized, post-operative OT training program.

Participants and methods

Patients

The hip fracture patients included in the study were treated at the Orthopedic Department of

Huddinge University Hospital and were aged ≥ 65 years of age, proficient in Swedish, lucid, had independent residences and did not use walking or technical aids.

Randomization

Eligible patients were asked to participate in the study consecutively. 5 patients declined. 100 patients were randomly assigned to an intensive OT training program (OT group) or to routine postoperative care in the ward (control (C) group) (Figure 1). For randomization, 50 + 50 opaque envelopes with cards stating OT or C, were sealed, numbered from 1 to 100 and mixed by an external person. The numbered envelopes were drawn consecutively. 10 patients were excluded before the first OT assessment (Figure 1). 10 corresponding assignment cards were put in new envelopes, sealed and inserted in a blind manner among the remaining ones.

Assessments

The occupational therapist for the study (B.H.) assessed all patients three times at which time the patients also answered a questionnaire (Figure 1). The first and second assessments were done at the orthopedic ward (3–4 days after the surgery and on discharge), and the third assessment was done in the home of the patient 2 months after surgery.

Intervention

All patients were given the same degree of postoperative care over the first 3–4 days after surgery. During this period, no visits or instructions were given by an occupational therapist on how to perform ADL. After the first assessment, an occupational therapist not otherwise engaged in the study gave the OT group patients individualized training, which lasted 45–60 minutes each weekday morning. The therapist and the patient planned the training activities that were important for self-care and independence at home. With support and under supervision, the patient trained as independently as possible to get up from the bed, to go to the bathroom and perform morning activities, and to dress. The need of each patient regarding technical aids was investigated and the patient was trained with the aids that were considered necessary. During the hospital stay, both the occupational therapist for the study and the patient visited the patient's home to decide together how to prepare and adapt the home environment for maximum independence.

Controls received conventional care from the nursing staff. All 100 patients received instruction from a physiotherapist about how to walk with mobility aids. The occupational therapist was not involved in discussions or decisions of discharge. All patients in the OT group were discharged to their homes. 1 patient was not assessed at discharge, as the staff at the ward forgot to notify the occupational therapist. In the C group, 1 patient was discharged directly to a nursing home and was therefore not assessed (Figure 1).

Instruments

ADL and IADL ability was assessed by using the Klein-Bell (1982) ADL scale, which has been translated into Swedish and validated (Hagsten and Söderback 1994, Söderback et al. 1994, Larsson et al. 1999). In this study, 75 observation points within 4 areas: dressing, toilet visits, mobility and bathing/hygiene, were considered to be relevant. The occupational therapist for the study watched the patient perform each specified activity, and scored it as either failed (assistance required, 0 points) or achieved (activity performed without verbal or physical assistance from another person, but with technical aids required). Achieved was graded on a scale of 1–3 points, depending on the difficulty that each activity was considered to reflect (Klein and Bell 1982).

The Disability Rating Index (DRI) (Shalén et al. 1994) was modified and used. The 14 items asked concerning self-reported ability to perform ADL and IADL activities were divided into three groups in this study: ADL activities, indoor IADL activities and outdoor IADL activities. Visual analogue scales (VAS), 100 mm long, were used with the anchors of 1 = no difficulty at all and 100 = impossible. Two study-specific items were added to investigate possible fear of performing ADL/IADL and pain level during performance (VAS with 1 = no fear/no pain, 100 = unbearable fear/greatest pain).

Statistics

A pilot study (Hagsten and Söderback 1994) had

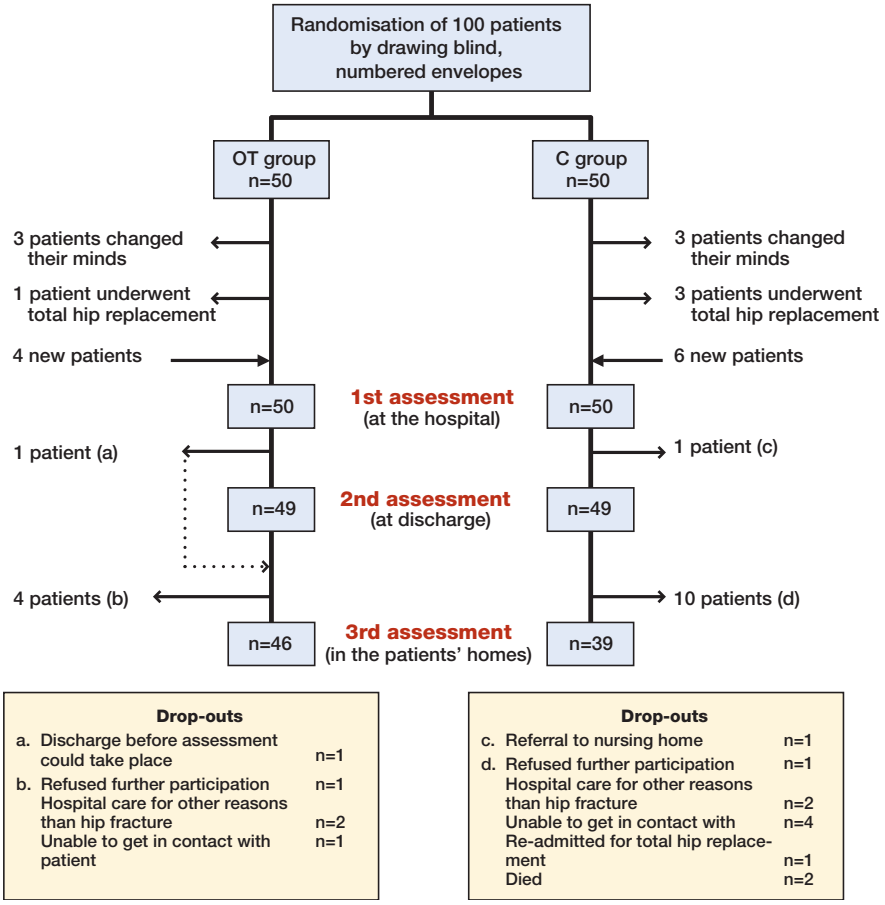

Figure 1. Trial profile.

showed that the scoring of the effects of the OT training in four assessed areas could be expected to result in standard deviations (SD) between 0.5 and 1.0. If the effect of the OT training in this study was of the order of 0.6 SD, the effect would be discovered with a power of 80% if the risk level was set at 5% and the sample size consisted of 44 patients in each group. To compensate for anticipated attrition and missing data, the sample size was increased to 50 patients per group.

To facilitate the choice of method using mean comparisons (ANCOVA) for the Klein-Bell ADL scale, the scores from the second assessment (discharge) and the first assessment (3–4 days after surgery) were correlated (product-moment correlation). Student's t-test was used for comparisons between the OT group and the C group regarding DRI and VAS for pain/fear. Regression analyses were used to investigate whether any background variables (age, sex, type of fracture, length of stay in hospital) possibly contributed to the results.

The homogeneity of each of the three areas in the DRI was assessed by the alpha coefficient: 0.60 for the ADL activities, 0.56 for the indoor IADL activities and 0.70 for the outdoor IADL activities.

Ethics

The patients were given oral and written information, and informed consent to participate was obtained. The local Ethics Committee at Huddinge University Hospital approved the study.

Results

Background data are given in Table 1. At discharge, the OT group had a better ADL ability within three

Table 1. Demographic and medical data regarding the hip fracture patients at inclusion

	OT group (n = 50)	C group (n = 50)
Age, mean (range)	81 (68–93)	79 (65–95)
Hospital stay, median number of days (range)	13 (3–33)	10 (3–23)
Gender, number (%)		
Women	42 (84)	38 (76)
Men	8 (16)	12 (24)
Marital status		
Living alone	33 (66)	32 (64)
Type of fracture		
Cervical	25 (50)	35 (70)
Trochanteric	25 (50)	15 (30)
Need for adaptation of the home	26 (52) [a]	

[a] Home visits only performed with in the OT group.

of the four Klein-Bell areas (Table 2). Regression analyses showed that age, sex, type of fracture or length of stay at the hospital did not significantly contribute to explaining the differences found at discharge. Both groups improved over time and after 2 months the mean percentage of the ADL and IADL scores amounted to almost 100% for both groups (Figure 2).

Self-reported DRI did not differ between the groups, but age had an effect: the younger the patient, the worse the self-assessed ADL. Self-reported IADL ability at discharge contributed significantly to the results at follow-up: the better the self-assessed ability at discharge, the better the self-reported IADL ability at follow-up. Regression analyses also showed that, paradoxically, the OT training contributed to perceived worse outdoor IADL ability at follow-up.

Fear or pain did not differ between the groups at discharge or at follow-up. Regression analyses showed that age contributed significantly to the degree of pain reported at follow-up: the younger the patient, the more the pain at follow-up. Also the degree of fear of performing ADL activities 3–4 days after surgery contributed significantly to the degree of fear at follow-up.

Home visits during the hospital stay showed that 52% of the OT group needed technical aids and adaptation of their homes. Preventive changes, e.g., removal of loose rugs, were needed in 90% of the homes. The home visits to all patients after 2 months revealed that 3 patients in the C group were in need of care (2 patients required immediate surgery and 1 required a consultation because of vascular deficiency).

Discussion

Modern hip fracture treatment with early mobilization has led to very short stays in hospital, even for the elderly. This means that there is a great need for early and effective postoperative physical ADL and IADL training. We found that OT training speed up patient recovery regarding dressing, toilet visits and bathing/hygiene. No difference in mobility was found between the OT group and the C group at discharge, which is probably an effect of the

Table 2. The effects of the OT training on ADL abilities at discharge

Areas	DF [a]	Root MSE [b]	F-test for OT [c]	Coviarance adjusted mean score [d]		Prob. F-test [e]
				C group	OT group	
Dressing	2.91	0.50	79	0.92	1.85	0.0001
Toilet visits	2.90	0.37	5.97	2.03	2.22	0.02
Mobility	2.91	0.32	2.20	1.59	1.69	0.1
Bathing/hygiene	2.91	0.23	17	1.52	1.72	0.0001

[a] degrees of freedom.
[b] the pooled within-group standard deviation.
[c] shows the effect of the occupational therapy at the second assessment.
[d] using covariance/adjusted mean scores means that the influence of the score from the same variable at the first assessment is eliminated. The higher the adjusted mean score, the better.
[e] F-test of differences between means.

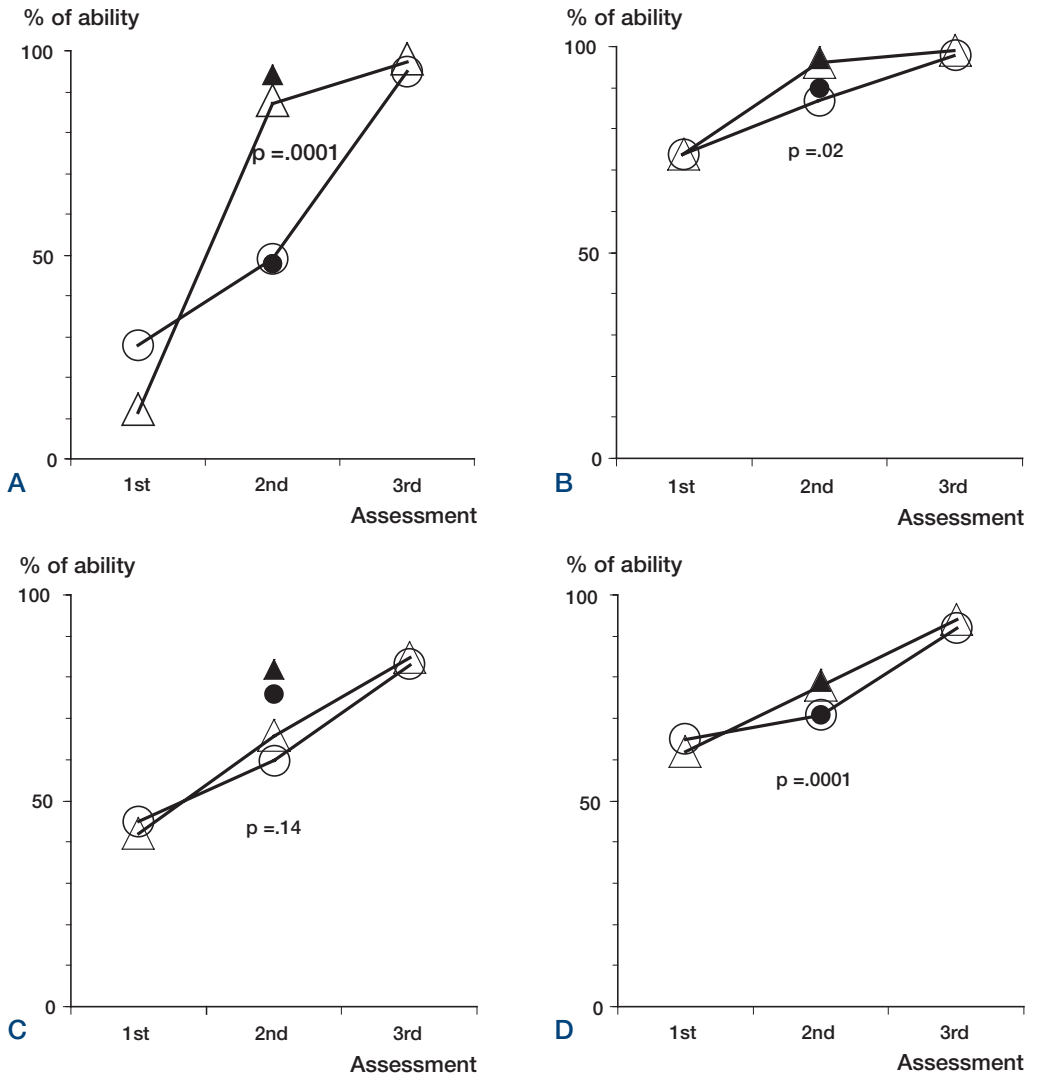

Figure 2. The ADL and IADL abilities assessed by the Klein-Bell ADL scale in patients receiving OT training (△=OT group) and controls (○=C group). The data are given as mean percentages of maximum scores. At the second assessment (discharge), the adjusted means, expressed as percentages of maximal performance, are also shown (▲=OT group, ●=C group). A) dressing, B) toilet visits, C) mobility, and D) bathing/hygiene,

mobility training that all patients received from the physiotherapist.

Many factors have been studied regarding possible influences on the postoperative course and some of these have been associated with reduced postoperative functional recovery, e.g., old age, sex, cognition, postoperative complications and pre-fracture functional status (Birge et al. 1994, Strömberg et al. 1997, Koval et al. 1998, Dai et al. 2001). We found no specific factor that contributed to the improved ADL in the OT group at discharge. We therefore believe that individualized OT training, including how to use technical aids, has a clinical effect in the early phases of rehabilitation.

In individualized OT training, patient-chosen tasks result in better functional performance than tasks based on a biomechanical approach and training (Buddenberg and Schkade 1998). Especially among elderly patients and in cultures where the family is constantly at the patient's bedside during the hospital stay (Dai et al. 2001), passivity may become a problem for the rehabilitation pro-

gram. Many elderly people probably believe that a hip fracture is the end of independent life. The psychological support from the occupational therapist during the training may therefore be important in encouraging the patients and showing them that it is possible and harmless to perform ADL shortly after surgery. Since the patient's ability to perform ADL/IADL is limited to a large extent by psychological factors (Close et al. 1999), patient education and motivation are key issues.

The home visit turned out to be important in more than one way. The patients often showed where the accident had happened. A home visit among the elderly appears to be an excellent occasion for patient education and fall prevention (Close et al. 1999). Fear was often the greatest obstacle to performing ADL/IADL at home, and a dialogue with a healthcare professional reduced this fear. The home visit also revealed patients in need of medical care. Without a follow-up home-visit program, we found that some elderly patients may believe that reduced physical abilities and pain are natural sequelae of a hip fracture and therefore do not contact the hospital or district healthcare unit.

Age contributed to perceived, self-assessed ADL ability and pain at discharge. Younger patients probably have greater self-expectations about ADL/IADL ability and also knowledge of and demand for better pain relief. Perhaps elderly patients are less inclined to complain of postoperative pain and do not tell the staff about it (Feldt and Oh 2000).

As expected, both groups improved over time during the first few months. However, we still find the improved ADL/IADL at discharge to be important, as this increases the possibility of the patients returning to their homes with greater independence and autonomy. A quicker return home, with less daily help from district nurses, the district occupational therapist and/or family members, also has an influence on the direct and the indirect costs of healthcare and for the families. In one study (Hagsten and Söderback 1994), the occupational therapist spent about 12 hours on each patient, including the OT training at the ward, a home visit before discharge and three follow-up home visits. This meant an intervention cost of USD 342 per patient, as compared to USD 400 for every extra day (24 hours) of hospital care with only conventional care (according to costing figures for 1992).

For practical reasons, we were not able to hide the allocation of patients in each group from the nursing staff. The occupational therapist who trained the patients in the OT group met these patients but not those in the C group. By using the Klein-Bell ADL scale, on which each observed activity is scored as failed or achieved on the basis of very clear instructions, the influence of the study occupational therapist on the ADL/IADL assessments was reduced. The patients themselves answered the self-assessments (DRI) without the occupational therapist or anyone else being present in the room.

We conclude that individualized OT training can speed up a patient's abilities to perform ADL on discharge from hospital, which enhances the possibility of the patient returning to independent living at home. We also consider that follow-up visits are rational for these elderly patients, to make sure that they are performing well and that they are not in need of further medical and/or nursing intervention, or rehabilitation.

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Birgit Hagsten performed the study and wrote the paper under supervision. During the study, Olle Svensson was Professor at the Department of Orthopedics at Huddinge University Hospital and had medical responsibility for all patients. Ann Gardulf was the main supervisor of the project. All investigators were involved in the design of the study.

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No competing interests declared.

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