

# Acute hemiarthroplasty after proximal humerus fracture in old patients

## A retrospective evaluation of 18 patients followed for 2–7 years

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We evaluated the outcome of acute shoulder hemiarthroplasty in 18 patients following displaced three- and four-part fractures of the proximal humerus. The mean age of the patients was 82 (70–92) years and the average follow-up time was 3.5 (2–7) years. No revision due to loosening was performed. All patients were evaluated concerning activities of daily living, degree of pain (VAS-scale, 0–100 mm) and range of motion. The patients had a low functional level, but were able to sleep on the operated side

and keep up their hobby. 11 patients were painfree and the worst pain recorded was 28 mm. Range of motion for all movements, except extension, was statistically significant lower than for the non-operated side. We conclude that in elderly patients acute hemiarthroplasty following three- or four-part fractures of the proximal humerus results in good pain relief, but a more limited range of motion than that reported for younger patients.

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The appropriate treatment for three- and four-part fractures of the proximal humerus with substantial displacement and comminution is controversial. Several authors have suggested closed treatment (Einarsson 1958, Mills 1974, Leyshon 1984, Young 1985), but most studies have shown unsatisfactory results (Knight and Mayne 1957, Sven-Hensen 1974, Clifford 1980, Geneste 1980, Stableforth 1984, Bigliani 1990, Bigliani et al. 1991). Many studies also show poor results after open reduction and internal fixation (Neer 1970, Sturzenegger et al. 1982, Jaberg et al. 1992). Although humerus head replacement for acute proximal humerus fractures generally has resulted in painfree shoulders (Neer 1970, Tanner and Cofield 1983, Moeckel et al. 1992) function has been variable (Kraulis et al. 1976, Tanner and Cofield 1983, Green et al. 1992, Goldman et al. 1995). In general, younger patients have gained a better range of motion than older ones. We evaluated the function after acute hemiarthroplasty of the shoulder in older patients.

### Patients and methods

Between 1988 and 1994, 23 patients over the age of 70 years were operated with Neer-shoulder arthroplasty at St. Göran's Hospital for acute three- and four-part fractures.

At the time of follow-up, 3 patients had died and 2 were lost to follow-up for reasons unrelated to their shoulders, leaving 18 patients (7 three- and 11 four-part fractures) for this study. Their mean age was 82 (70–92) years and 15 were women. 7 fractures involved the dominant extremity. 15 patients had fallen on the floor or ground, 2 from stairs and 1 patient fell during skiing. Before the fracture, all patients could perform daily activities independently; no patient reported preexisting shoulder disease. 7 fractures involved the dominant extremity. The time between injury and surgery averaged 7 (1–25) days.

With the patients in a semisitting position, a deltopectoral incision was made. Strong non-absorbable sutures were used to reattach the tuberosities to each other. The tuberosities were also attached to the humeral shaft and to the prosthesis, by use of holes in the lateral fin of the prosthesis. The prosthesis (Neer, 3M, Rotherham, England) was cemented in approximately 30°–40° retroversion (Figure). We did not use a bone graft from the head fragment. No patient had a complete cuff rupture. The operations were performed by orthopedic specialists, with some difference in experience concerning shoulder surgery. Physical therapy began on the first or second postoperative day and consisted of an active range of motion of the elbow, wrist and hand and passive range of motion of the shoulder. Passive range of motion



The left shoulder of a 75-year-old woman with a four-part proximal humerus fracture. After the operation.

Table 1. Activity scores for the operated shoulder (n 18).

Activity	Median score	Score <sup>a</sup>			
		0	1	2	3
Are you able to put on a coat?	2	1	7	9	0
Are you able to sleep on the operated side?	3	0	2	4	12
Are you able to scratch your back?	0	13	5	0	0
Can you manage your personal hygiene daily?	2	3	6	9	0
Can you comb your hair?	1	5	8	5	0
Are you able to reach a shelf above your head?	0	13	4	1	0
Are you able to lift 2 kg above your head?	0	17	1	0	0
Are you able to keep up your hobby?	3	0	2	5	11

0 = unable to do this, 1 = very difficult, 2 = some difficulties and 3 = not difficult (Richards et al. 1994)

<sup>a</sup> number of patients

was gradually increased and active range of motion begun at 5-6 weeks.

At the follow-up after a mean of 3.5 (2-7) years, shoulder function, range of motion of the shoulder and degree of pain were recorded. Shoulder function was subjectively evaluated by 8 questions concerning the ability to perform daily activities with the operated arm (Table 1). Painfree forward elevation, abduction, extension, internal and external rotation of both the operated and unoperated sides were recorded in a standardized manner. Pain was subjectively evaluated by recording the worst pain during a 24-hour period using a VAS scale, 0 being no pain at all and 100 worst possible pain. Radiographs were routinely taken at the 2-month follow-up. Later radiographs were not routinely performed, since pain and function have

been shown not to correlate to radiographic findings (Goldman et al. 1995), and the aim of our study was to establish the functional outcome of the operated shoulder.

Since the material was about normally distributed, the statistical analysis of the range of motion was performed with the parametric t-test.

## Results

1 patient had a soft tissue release performed 2 years after the primary arthroplasty (1 year before the follow-up evaluation) in an attempt to improve the range of motion and reduce pain. Her range of motion was slightly increased in all planes and pain was reduced. No other patient was re-operated on. All patients could sleep on the operated side. They had some difficulties in putting on a coat and managing personal hygiene daily with the operated arm. They were unable to scratch their backs and reach a shelf above their heads. 3 patients could not manage on their own. Most of the patients could keep up their hobbies, including knitting and gardening (Table 1). 11 patients were painfree, and no patient graded the pain at more than 28 mm on the VAS scale. The radiographs taken 2 months postoperatively showed no displaced tuberosities or any other other failures.

The range of motion of the operated shoulder and the unoperated shoulder was different for all movements except extension ( $p < 0.001$ ), (Table 2). The 9 youngest patients in the group (mean 76 (70-82) years) did not have a statistically significant better range of motion than did the 9 oldest patients (mean 87 (83-92) years). There were no differences in range of motion between patients with three-part fractures and those with four-part fractures.

## Discussion

Several studies have found relatively painfree shoulders after acute shoulder hemiarthroplasty for three- and four-part fractures of the proximal humerus (Neer

Table 2. Mean range of motion (degrees) on the operated and non-operated sides (n 18)

	Non-operated	Operated
Extension	37 (20-45)	22 (10-35)
Abduction	93 (70-110)	50 (30-80)
Forward elevation	150 (110-170)	55 (30-90)
Internal rotation	L3 (Th8-L4)	gluteal area (L4-greater troch.)
External rotation	48 (20-70)	12 (0-50)

1970, Tanner and Cofield 1983, Moeckel et al. 1992). However, none of these studies dealt with patients having an average age of over 80 years.

Our results for these elderly patients are well in agreement with these earlier findings. The excellent pain relief is a strong indication for treating displaced three- and four-part fractures of the proximal humerus with a hemiarthroplasty. In many cases pain can be a greater problem than restriction in range of motion, especially in elderly patients with relatively small demands for physical performance.

The range of motion in all planes was restricted and affected the activities of daily living. 3 of the patients, all close to or over 90 years of age, were not able to manage on their own, and 1 of them lived in a nursing home. Although these 3 patients also had medical problems unrelated to their shoulders, the restriction in range of motion of the shoulder contributed to their disability. The other patients managed daily living well, although a few of them were dependent on some help from wife or husband.

Green et al. (1992) showed that patients younger than 60 years had a better range of motion than older ones, and in a study by Goldman et al. (1995), patients younger than 70 years had a greater range of motion than older patients (mean age 77 years). We found no difference in this respect. Thus, the patients in our study had less motion than previously reported, but they were also older than those in earlier studies. Range of motion is dependent on the ability to restore the function of the rotator cuff at surgery and the quality of the postoperative rehabilitation. In three- and four-part fractures, the rotator cuff can be restored by securely reattaching the tubercles, thus facilitating bony union. In these elderly patients, the tuberculum fragments are more osteoporotic and comminuted than in younger patients. Furthermore, some of the patients in the present study were unable to participate fully in the intense and prolonged rehabilitation program necessary for an optimal functional outcome.

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