

Shoulder surgery in rheumatoid arthritis

Surgery was performed on 43 shoulders in 38 rheumatic patients with disabling pain. Fifteen of 22 synovectomized shoulders were available for examination an average of 2 years postoperatively. Twelve patients were satisfied with their operations and had painfree shoulders. Nine shoulders had almost normal mobility but four patients with an advanced shoulder arthropathy had gained little motion. Two patients with severe pain had been re-operated on with arthroplasty. In 15 patients with 18 shoulder replacements, the postoperative gain in motion was limited in all shoulders. Seven out of eleven shoulders had significant pain after hemi-arthroplasty, whereas five out of seven shoulders were painfree after total replacement. It seems that synovectomy can give results which are comparable with total arthroplasty if applied in early stages of rheumatoid disease.

Claes J. Petersson

From the University of Lund
Department of Orthopedics
at Malmö General Hospital,
S-21401 Malmö, Sweden

Introduction

Ansell & Arden (1967) and Pahle (1973) described synovectomy in rheumatoid bursitis and arthritis of the shoulder. Pahle (1981) and Pahle & Kvarnes (1985a) reported favourable results after synovectomy not only in early cases but also in late cases with destructive arthropathy. Neer (1974) reported results after hemi-arthroplasty in gleno-humeral arthrosis and Neer et al. (1982) reviewed a series of 173 shoulders, including 69 with rheumatoid arthritis, treated with metal-to-plastic total shoulder replacement.

We have examined our results of synovectomy or arthroplasty in painful rheumatic shoulders.

Material and methods

Synovectomy series

Twenty-two shoulders in 21 patients – 5 men and 16 women – aged 60 ± 10 years underwent synovectomy. The indications for synovectomy were severe, protracted shoulder disability with increasing pain and decreasing function in spite of systemic drug therapy and hydrocortisone injections. Radiographically 19 shoulders belonged to Larsen et al. (1977) Class 0–III (Figure 1). Only three shoulders were classified as Larsen IV (Figure 2).

Synovectomy was performed with a modification of the technique described by Pahle (1973). A semi-circular incision by-passing the acromio-clavicular

joint exposed the anterior deltoid that was released from the acromion and the lateral end of the clavicle (Figure 3). In 11 shoulders with communicating full-thickness supraspinatus tendon ruptures, synovectomy of the gleno-humeral joint was performed through the rupture. In the remaining shoulders the gleno-humeral joint was approached through an incision in the rotator interval between the supraspinatus and the subscapularis tendons. Small and medium sized supraspinatus tendon ruptures, that could be closed without tension, were sutured. Large, complete ruptures extending from the subscapularis to the infraspinatus tendons in six shoulders were left unsutured. Anterior acromioplasty according to

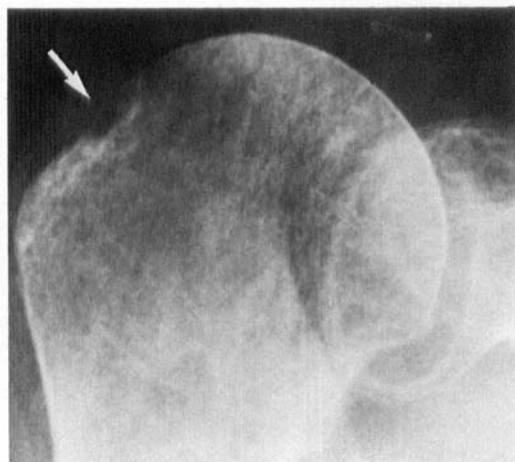


Figure 1. Preoperative radiograph of the right shoulder of a 68-year-old woman. Normal joint space, osteoporosis and erosion of the anatomical neck (arrow). Larsen Class II.



Figure 2. Preoperative radiograph of the left shoulder of a 59-year-old man. Destructive arthropathy with erosions and narrowing of the joint space. Larsen Class IV.

Neer (1972) was performed in 17 shoulders and resection of the outer end of the clavicle in 16.

Suction drainage was used for 24 hours. Postoperatively the arm was placed in slight abduction supported by a cushion for four weeks. No postoperative complications were encountered.

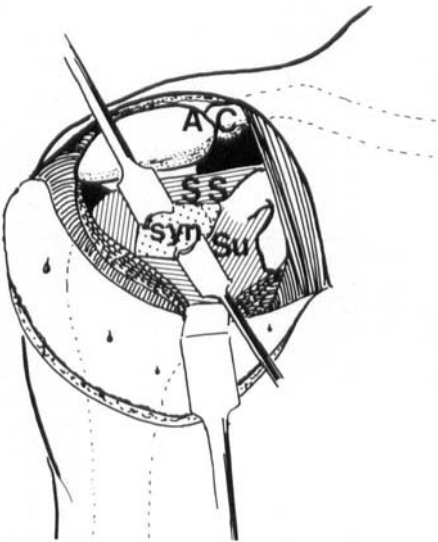


Figure 3. Schematic view of the right shoulder indicating the skin incision and the gleno-humeral approach in the interval between the supraspinatus and the subscapularis tendons. The coraco-acromial ligament and the subacromial bursa have been resected. A = Acromion, C = Clavicle, SS = Supraspinatus tendon, Su = Subscapularis tendon, and syn = Synovial capsule.

At follow-up an average of 48 months postoperatively two patients had died and two had undergone shoulder arthroplasty. Five patients could not attend the follow-up examination, but they answered a questionnaire. Thus, 12 patients with 13 operated shoulders were available for evaluation. The follow-up results were classified with respect to the patient's satisfaction, shoulder pain and mobility including forward flexion, abduction in the frontal plane and external rotation with the arm in abduction (American Academy of Orthopaedic Surgeons 1965). All shoulders were examined radiographically and classified according to the Larsen system.

Arthroplasty series

Twenty-one shoulders in 17 patients – 6 men and 11 women – aged 68 ± 18 years underwent shoulder arthroplasty due to disabling shoulder pain and loss of function, radiographic destruction and severely reduced joint space. Hemi-arthroplasty (Neer 1974) was undertaken in 14 shoulders. Total shoulder replacement (Neer et al. 1982) was performed in seven shoulders. Bone cement was used in all total replacement operations and in three hemi-arthroplasties. Postoperatively the training programme designed by Neer was followed as far as possible. However, several multi-disabled patients turned out to have difficulties in following the programme, and in these cases a reduced postoperative training programme had to be designed. No postoperative complications were encountered.

At follow-up an average of 42 months post-operatively, 15 patients with 18 operated shoulders were evaluated clinically and radiographically. Two patients with three operated shoulders who were unable to attend answered a questionnaire.

Results

Synovectomy series (Table 1)

One man with constant pain and very little gain in shoulder mobility was dissatisfied with the operation. Preoperatively he had a destructive arthropathy of Larsen Class IV that was unchanged at the follow-up. One woman with restricted motion described intermittent shoulder pain. Radiographically she had developed destructive arthropathy. However, she had less functional disability than preoperatively and she was satisfied with the operations and had painfree shoulders. On average they had gained in forward flexion (44° , $p < 0.001$), in

Table 1. Preoperative, peroperative and follow-up data of 13 synovectomized shoulders.

Patient	Before operation								Operation				Follow-up							
	Sex M/F	Age years	Side R/L	RA duration years	Forward flexion°	Abduction°	External rotation°	Radiological Larsen class	Bursitis yes/no	Supraspinatus tendon Normal = N Degeneration = D Rupture = R	Follow-up months	Satisfied yes/no	Shoulder pain None or insignificant = 1 Intermittent = 2 Constant = 3	Forward flexion°	Abduction°	External rotation°	Radiological Larsen class			
1	F	31	R	3	80	50	10	II	No	N	66	Yes	1	90	45	45	III			
2	F	61	R	33	150	150	0	II	No	R	62	Yes	1	180	180	90	II			
3	F	73	L	18	70	90	0	II	No	D	56	Yes	1	150	150	45	II			
4	M	70	R	8	80	90	10	IV	No	D	55	No	3	90	60	30	IV			
5	M	62	R	18	180	180	60	II	No	R	55	Yes	1	180	180	80	II			
6	M	54	R	6	100	90	20	IV	No	N	55	Yes	1	160	135	45	IV			
7	F	63	L	26	45	50	30	II	Yes	R	54	Yes	2	80	70	60	IV			
8*	M	46	R	2	80	80	10	II	No	N	48	Yes	1	150	150	45	II			
9	F	60	L	16	60	60	60	III	Yes	D	47	Yes	1	80	60	30	-			
8*	M	47	L	3	80	80	10	I	No	N	45	Yes	1	150	150	45	III			
10	F	56	R	5	180	170	80	0	Yes	N	35	Yes	1	180	180	80	0			
11	F	62	L	8	80	45	10	I	Yes	R	19	Yes	1	180	180	80	III			
12	F	66	R	4	80	45	60	I	Yes	R	18	Yes	1	160	160	70	I			

* Bilaterally operated

Table 2. Preoperative, peroperative and follow-up data of 18 shoulder replacements.

Patient	Before operation								Operation				Follow-up							
	Sex M/F	Age years	Side R/L	Duration of RA years		Forward flexion°	Abduction°	External rotation°	Radiological Larsen class	Hemiarthroplasty = Hemi Total replacement = Tot	Supraspinatus tendon Normal = N Degeneration = D Rupture = R	Follow-up months	Activity of RA at follow-up High/Low	Satisfied Yes/No	Shoulder pain None or insignificant = 1 Intermittent = 2 Constant = 3	Forward flexion°	Abduction°	External rotation°		
1*	F	70	R	22	30	50	20	V	Hemi	N	63	High	No	2	45	45	10			
2*	F	62	R	40	80	60	0	IV	Hemi	D	63	High	No	3	90	90	20			
1*	F	70	L	22	40	50	20	IV	Hemi	D	60	High	No	2	60	60	30			
3	M	50	L	8	90	70	45	IV	Hemi	N	60	Low	Yes	1	135	135	60			
4	F	71	R	13	30	30	0	IV	Hemi	R	55	High	Yes	2	80	60	40			
5	F	56	L	23	50	45	0	IV	Hemi	N	53	Low	No	2	80	45	0			
6	F	52	L	29	70	20	5	V	Hemi	N	52	Low	Yes	1	60	60	0			
7	M	59	L	10	90	60	0	IV	Hemi	D	51	Low	Yes	1	90	80	20			
8	F	58	L	19	90	20	20	V	Hemi	N	50	Low	Yes	1	90	80	30			
9	F	59	L	19	20	20	10	IV	Hemi	D	45	Low	No	3	10	10	0			
10*	M	74	R	21	60	45	0	IV	Tot	R	27	Low	Yes	1	100	90	45			
11	M	65	L	28	45	30	0	IV	Tot	N	26	Low	Yes	1	90	80	10			
10*	M	74	L	21	45	45	0	IV	Tot	N	25	Low	Yes	1	80	45	30			
12	F	76	R	10	90	70	0	V	Tot	R	25	High	No	1	60	45	10			
13	F	59	R	20	70	45	5	V	Tot	N	25	High	Yes	2	60	45	10			
14	F	66	R	26	30	30	0	IV	Hemi	R	22	High	Yes	2	70	45	45			
15	F	66	R	5	45	45	10	V	Tot	N	22	Low	Yes	1	150	80	40			
2*	F	65	L	43	45	45	0	V	Tot	N	18	High	Yes	2	80	80	0			

* Bilaterally operated

abduction (40° , $p < 0.01$) and in external rotation (29° , $p < 0.02$). The follow-up results in shoulders with degeneration or full-thickness rupture of the supraspinatus tendon at operation did not differ from those with normal supraspinatus tendons.

Five patients answering a questionnaire were satisfied with their operated shoulders but two of them had intermittent shoulder pain.

Arthroplasty series (Table 2)

At follow-up eight patients were satisfied with their operations and were free of shoulder pain. Four patients were satisfied even though they had intermittent shoulder pain. Five patients operated on with hemi-arthroplasty had intermittent or constant shoulder pain and were dissatisfied with their operations. One was painfree after total replacement but dissatisfied because of shoulder stiffness. No shoulder had a full range of motion at follow-up and only three shoulders could be elevated more than 90° . However, there was a small average gain in shoulder mobility both in forward flexion (22° , $p < 0.01$), abduction (22° , $p < 0.01$) and external rotation (14° , $p < 0.01$).

The operated shoulders of eight patients with highly active rheumatoid arthritis at follow-up were more painful than those patients

with low activity ($p < 0.02$ chi-square test). The results in shoulders with degenerated or full-thickness ruptured supraspinatus tendons at operation were the same as in shoulders with normal tendons.

One of two patients answering the questionnaire was satisfied with her two operated pain-free shoulders. The radiographic examination did not indicate mechanical loosening of the prosthesis in any case. In two non-cemented hemi-arthroplasty operated shoulders a resorption zone was found round the distal end of the shaft measuring 3 and 4 mm, respectively (Figure 4). In none of the cemented humeral or glenoid components did the resorption zone between cement and bone exceed 2 mm (Figure 5). A superior migration of the humerus decreasing the subacromial space to less than 5 mm was observed in eight hemi-arthroplasty operated shoulders an average of 4 years post-operatively. The clinical result in these shoulders did not differ from the rest.

Discussion

Until now only a few rheumatic patients have met the criteria for shoulder surgery (Clayton & Ferlic 1975). However, there is growing evidence that patients with incapacitating shoulder pain not responding to closed treatment should be considered as candidates for surgery.

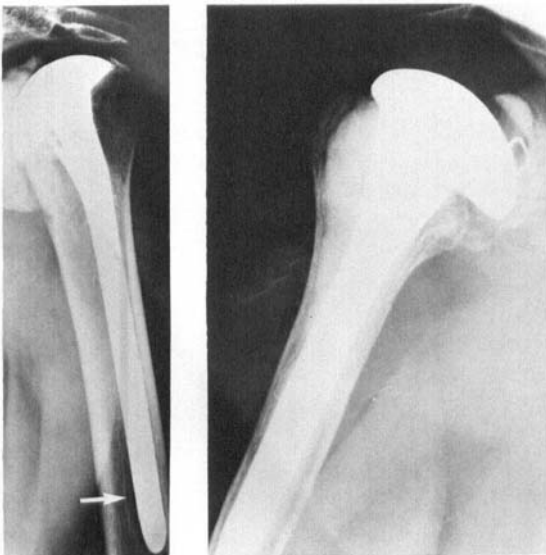


Figure 4. (left). Radiograph of the left shoulder of a 55-year-old man five years after hemi-arthroplasty. Resorption zone at the distal end of the shaft (arrow). The shoulder is painfree.

Figure 5. (right). Radiograph of the right shoulder of a 68-year-old woman at follow-up two years after total replacement. There is a resorption zone round the glenoid cement measuring 1 mm. The shoulder is painfree.

Our results suggest that a considerable gain in motion and pain relief can be expected after synovectomy in most painful rheumatic shoulders with bursitis, synovitis and restricted joint motion. This is true of early cases with well preserved articular cartilage, but Pahle (1981) and Pahle & Kvarnes (1985a) reported a favourable outcome of synovectomy and joint debridement in more advanced cases. In our series only a few advanced cases underwent synovectomy and the results seemed inferior to those after early synovectomy with persisting pain and restricted motion in two patients. However, two patients synovectomized with advanced arthropathy had to undergo joint replacement.

The results of 18 shoulder replacements did not follow the favourable results pattern reported by Neer et al. (1982). Five patients were dissatisfied with their operations and nine shoulders caused considerable pain. The patients of our series were on average older than those of Neer et al. (1982). Eight patients, five with total replacement, were painfree and satisfied, considering their postoperative gain in shoulder mobility – although small – functionally valuable, especially for dressing and personal hygiene. Marmor (1977), Clayton et al. (1982) and Pahle & Kvarnes (1985b) also reported small gains in shoulder motion after Neer hemi- and total shoulder replacements consistent with relief and improved function. Therefore, total replacement can give results which are comparable with early synovectomy.

Acknowledgement

Financial support was obtained from the Herman Järnhardt Foundation.

References

- American Academy of Orthopaedic Surgeons (1965) Joint motion. Method of measuring and recording. E. & S. Livingstone, Edinburgh, London.
- Ansell, B. M. & Arden, G. P. (1967) Synovectomy of the shoulder. Proc. Symposium on Early Synovectomy in Rheumatoid Arthritis, Amsterdam, pp. 125–128.
- Clayton, M. L. & Ferlic, D. C. (1975) Surgery of the shoulder in rheumatoid arthritis. A report of nineteen patients. *Clin. Orthop.* **106**, 166–174.
- Clayton, M. L., Ferlic, D. C. & Jeffers, P. D. (1982) Prosthetic arthroplasties of the shoulder. *Clin. Orthop.* **164**, 184–191.
- Larsen, A., Dale, K. & Eek, M. (1977) Radiographic evaluation of rheumatoid arthritis and related conditions by standard reference films. *Acta Radiol. Diagn.* **18**, 481–491.
- Marmor, L. (1977) Hemiarthroplasty for the rheumatoid shoulder joint. *Clin. Orthop.* **122**, 201–203.
- Neer, C. S. II (1955) Articular replacement for the humeral head. *J. Bone Joint Surg.* **37-A**, 215–225.
- Neer, C. S. II (1972) Anterior acromioplasty for the chronic impingement syndrome in the shoulder. A preliminary report. *J. Bone Joint Surg.* **54-A**, 41–50.
- Neer, C. S. II (1974) Replacement arthroplasty for glenohumeral osteoarthritis. *J. Bone Joint Surg.* **56-A**, 1–13.
- Neer, C. S. II, Watson, K. C. & Stanton, F. J. (1982) Recent experience in total shoulder replacement. *J. Bone Joint Surg.* **64-A**, 319–337.
- Pahle, J. A. (1973) Synovektomie des Schultergelenks. *Orthopäde* **2**, 70–72.
- Pahle, J. A. (1981) The shoulder joint in rheumatoid arthritis: Synovectomy. *Reconstr. Surg. Traumat.* **18**, 33–47.
- Pahle, J. A. & Kvarnes, L. (1985a) Shoulder synovectomy. *Ann. Chir. Gynaec.* **74**, Suppl. 198: 37–39.
- Pahle, J. A. & Kvarnes, L. (1985b) Shoulder replacement arthroplasty. *Ann. Chir. Gynaec.* **74**, Suppl. 198: 85–89.