Open Surgical Treatment for Snapping Scapula Provides Durable Pain Relief, but so Does Nonsurgical Treatment

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Received: 28 June 2015 / Accepted: 21 October 2015 / Published online: 30 October 2015
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Abstract

Background Resection of the medial upper corner of the scapula is one option for treating patients with a painful chronic snapping scapula. However, the degree to which this procedure results in sustained relief of pain during long-term followup, and whether surgical treatment offers any compelling advantages over nonsurgical approaches at long-term followup, are not known.

Questions/purposes We asked: (1) At long-term followup after surgical treatment of a painful snapping scapula, did patients' pain decrease? (2) Did scapulocostal crepitation improve? (3) Did patients return to work?

Methods Between 1971 and 1992, 15 patients underwent surgery by one surgeon for persistent (> 1 year) and severely painful crepitus around the superomedial scapula that did not respond to nonsurgical approaches. The procedure consisted of an open resection of the superomedial corner of the scapula and release of the levator scapulae muscle. Patients treated surgically were compared with a

group of nine patients treated nonsurgically between 1975 and 1997; their treatments included temporary physiotherapy, massage, and NSAIDs. In general, the patients treated nonsurgically presented with less pain. However, during much of this study period, objective pain and functional scales were not in common use, and so baseline scores were not available. Of the 15 patients treated surgically, nine participated in a clinical and questionnaire survey at a mean of 22 years (range, 16–35 years), and 12 participated in a questionnaire survey a mean 27 years after surgery (range, 23–43 years). Of the nine patients treated nonsurgically, seven participated in a clinical followup and questionnaire survey at a mean followup of 16 years (range, 10–25 years), and all nine completed a questionnaire survey at a mean of 22 years (range, 17–33 years). Patient age at onset of symptoms was a mean of 27 years. The clinical followup and questionnaires focused on pain, crepitation, and work status.

Results With the numbers available, there was no difference in pain scores between patients treated surgically and those treated nonsurgically (mean VAS pain with exertion 0.8 ± 1.3 versus 1.5 ± 1.6 ; $p = 0.357$); in fact, pain scores were quite low in both groups. Pain improved promptly in seven of 12 patients treated surgically, but lasted for at least several years in all patients treated nonsurgically. Crepitus persisted variably in both groups at final followup, with no apparent difference between the groups in terms of its frequency, but it was not consistently associated with pain at final followup in either group (six of 12 patients treated surgically, all painless; and all of seven clinically examined patients treated nonsurgically, two without pain, had crepitus at latest followup; $p = 0.004$), whereas at initial presentation, the crepitus had been painful in all patients. All patients in both groups had returned to work after surgery or the first consultation.

The institution of one or more of the authors (MV, HV) has received, during the study period, funding from EVO, HUS (government grant from the Helsinki University Hospital District, Helsinki, Finland).

All ICMJE Conflict of Interest Forms for authors and *Clinical Orthopaedics and Related Research*® editors and board members are on file with the publication and can be viewed on request.

Each author certifies that his or her institution approved the human protocol for this investigation, that all investigations were concluded in conformity with ethical principles of research, and that informed consent was obtained for participation in the study.

This work was performed at the Research Institute Orton, Invalid Foundation, Helsinki, Finland.

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Conclusions Carefully selected patients who undergo this procedure appear to obtain sustained relief of painful crepitus at long term, but so do patients treated nonsurgically. Since the decision to treat these patients surgically was somewhat subjective, and since patients treated nonsurgically did so well (although the surgically treated patients improved faster), we cannot conclude that surgery is better than nonsurgical treatment. Multicenter comparative studies with carefully applied indications are needed.

Level of Evidence Level III, therapeutic study.

Introduction

A snapping scapula can produce severe shoulder dysfunction [5, 6, 9, 15, 16, 18, 26, 27]. Patients, often young adults, report crepitus, grinding sensations, or snapping noises, which may be painful. The condition usually is managed nonsurgically [8], but when symptoms persist, some are treated with surgery [3, 4, 8, 11, 13, 21, 22, 24]. Various open surgical [10, 15, 16, 24] or arthroscopic [2, 7, 9, 12, 14, 19, 20] treatments have been described, from a simple [24, 25] to a more-substantial resection of almost the entire supraspinatus fossa [8] with associated bursectomy [12] or bursectomy alone [18, 20].

Several studies showed good short-term outcomes after superomedial angle resection [9, 10, 20]. However, to our knowledge, no long-term outcome reports exist that describe results with or without this surgery.

We therefore asked: (1) At long-term followup after surgical treatment of painful snapping scapula, did patients' pain decrease? (2) Did scapulocostal crepitation improve? (3) Did patients return to work?

Patients and Methods

Between 1971 and 1992, we surgically treated 15 patients with a chronic painful snapping scapula without any bony deformities, and between 1975 and 1997, we followed nine patients who had almost no treatment. All had insidious onset of pain in the periscapular region with associated audible crepitation or snapping. The indication for operative treatment was chronic (> 1 year) painful snapping scapula with no other problems in the neck or shoulder region. All patients treated surgically had not responded to conservative treatments like muscle-strengthening exercises, physiotherapy, NSAIDs, and local corticoid injections. During that time, the surgeon (MV) avoided operating on patients for pain in the absence of crepitus, since those patients are likely to have referred pain from other sources, such as the cervical spine. All patients had scapulocostal syndrome without relevant trauma or radiologic changes.

Tangential scapular radiographs were taken, but no CT or MR images were obtained. The disorder was on the right side in four patients and on the left in eight, and of these 12, only one was left-handed.

The procedure consisted of resection of the superomedial border of the scapula without any bursal resection, the patient being in prone position, and the extremity draped free. In addition, the procedure included release of the levator scapula muscle. The triangular piece of bone resected was approximately $4 \times 2\frac{1}{2} \times 2\frac{1}{2}$ cm. Care prevented injury of the caudal branch of the accessory nerve innervating the caudal part of the trapezius muscle. In surgery, the only pathologic finding in four of the patients was a small clean tubercle in the medial upper corner of the scapula (Luschka's tubercle). We found no pathologic bursa formation. Bleeding was minimal; no drainage was necessary. Postoperatively, unlimited shoulder motion was possible within a few days. Postoperative sick leave averaged 1 month (range, 0.5–3 months).

Of the 15 patients treated surgically, two had died, one was untraceable, and nine (five males, four females) participated in a clinical and questionnaire survey at a mean followup of 22 years (range, 16–35 years) (Table 1). One of 12 patients replied to a questionnaire survey 25 years after surgery, and two took part in a telephone survey 23 and 24 years after surgery. Of the nine patients treated nonsurgically, seven participated in a clinical followup and questionnaire survey at a mean followup of 16 years (range, 10–25 years) and two replied to a questionnaire survey at 20 years. One patient's left side was treated surgically (Patient 2, Table 1) and her right side was treated nonsurgically (Patient 3, Table 2). The mean age of the patients at onset of symptoms was 21 years (range, 12–31 years) (Table 2).

Before surgery, 11 of 12 patients were unable to work for median 1 month (mean, 5 months; range, 1–14 months). The occupations of these patients involved heavy shoulder loads for four patients, moderate loads for five, and light or no loads for two. The time between symptom onset and surgery averaged 4 years (range, 2–7 years). All but one patient was right-handed. In four patients, snapping occurred in the right shoulder.

We compared the group of patients treated surgically with a group of nine patients (two males, seven females) treated nonsurgically for a snapping scapula from 1975 to 1997. At first consultation, a mean 6 years (range, 2–11 years) after onset of symptoms, nonsurgical treatment, if any, was adopted for those patients, as the patients and the senior author (MV) believed the symptoms were not severe enough to warrant elective shoulder surgery. In general, these patients differed from the group treated surgically in that at baseline they presented with less pain; however, during much of this study period, objective pain and

Table 1. Preoperative and followup data of 12 patients treated surgically for chronic painful snapping scapula

Patient number	Age at onset (years)	Sex	Side/dominant	Heaviness of work	Time to surgery (years)	Clinical followup (years)	Questionnaire followup (years)	Pain at rest VAS [#]	Pain at night VAS	Pain at exertion VAS	Crepitation to work	Back to work	Discomfort at work VAS	Discomfort at leisure VAS
1	17	F	L/R	Medium	7	17	24	0	0	1	Slight	Yes	1	1
2	19	F	L/R	Heavy	5	17	27	0	0	0	No	Yes	0	0
3	13	F	L/R	Light	2	(2 [#])	25	0	0	2	No	Yes	0	2
4	45	M	R/R	Heavy	5	23	30	0	0	0	Slight	Yes	0	0
5	26	M	L/R	Heavy	5	35	43	0	0	0	No	Yes	0	0
6	27	M	R/R	Medium	2	(1 [#])	23	0	0	0	Slight	Yes	0	0
7	29	M	L/R	Medium	2	24	24	0	0	3	No	Yes	0	0.3
8	36	F	L/L	Medium	2	(7 [#])	24	0	0	0	No	Yes	1	0
9	46	F	L/R	Heavy	2	16	23	0	0	3.6	No	Yes	0	0.6
10	25	F	R/R	Light	3	22	30	0	0	0	Marked	Yes	0	0
11	24	M	R/R	Light	3	22	30	0	0	0	Slight	Yes	0	0
12	19	M	L/R	Medium	5	21	29	0	0	0	Slight	Yes	0	0
Mean	27.2				3.6	21.9	27.7	0	0	0.8			0.2	0.3

[#] Not included in long-term clinical followup study; ^{##}VAS = 0–10, 0 = no pain, 10 = maximal pain.

Table 2. Data of nine patients with chronic painful snapping scapula treated nonsurgically

Patient number	Age at onset (years)	Sex	Side/dominant	Heaviness of work	Time before first consultation*	Clinical followup (years)	Questionnaire followup (years)	Pain at rest VAS [#]	Pain at night VAS	Pain at exertion VAS	Crepitation to work	Back to work	Discomfort at work VAS	Discomfort at leisure VAS
1	12	F	R/R	School	5	(1 [#])	20					Yes		
2	26	F	L/R	Heavy	5	(2 [#])	20	0	0	0	Slight	Yes	0	0
3	20	F	R/R	Heavy	4	16	26	0	0	0	Severe	Yes	0	0
4	18	F	R/R	School	2	11	18	0.5	0.4	1.6	Severe	Yes	0.1	0.2
5	31	M	L/R	Heavy	6	20	20				Severe	Yes		
6	21	F	R/R	School	2	10	17	0	0	0.7	Severe	Yes	0	0
7	31	F	R/R	Light	10	17	25	4	0	4	Slight	Yes	2	1
8	12	F	L/R	Light	11	11	26					Yes		
9	24	M	R/R	Heavy	5	25	33	1.7	1.4	2.5	Severe	Yes	1.6	1.6
Mean	21.7				6	15.7	22.8	1.0	0.3	1.5			0.6	0.5

* Duration of the symptoms (years) before first consultation with the senior author (MV); [#]not included in the clinical long-term followup study; ^{##}VAS = 0–10, 0 = no pain, 10 = maximal pain.

functional tools were not in common use, therefore VAS pain scores at baseline were not available. They were assessed clinically at the first consultation by the senior author (MV), by questionnaire in 2002, clinically in 2006, and again by questionnaire in 2014 a mean 22 years (range, 17–33 years) after symptom onset. Some patients had received physical therapy, NSAIDs, and local corticoid injections without receiving permanent relief. During the initial consultation, we offered only nonsurgical options. Surgical options were discussed only after a patient had considered and/or tried those nonsurgical options.

Before the first consultation, all nine patients were able to work. The occupations of these patients involved heavy shoulder loads for four patients and light or no loads for five. The mean patient age at onset of symptoms was 21 years (range, 12–31 years).

The long-term results were assessed in 2006, a mean 22 years after surgery by the junior author (HV), who had not participated in the treatment of these patients. The last questionnaire survey was done in 2014, a mean 27 years after surgery. On both occasions in 1991 and 2006, the patients were reviewed by questionnaire and examined clinically. At the 2006 followup, radiographs of the scapula also were obtained. The questionnaire asked for VAS ratings of pain at rest, with exertion, and at night, and discomfort at work and with leisure. A subjective 1 to 4 grading scale was used to ask patients about crepitus, and patients also described their work status.

The mean age of the patients at followup was 58 years (range, 40–80 years) in the surgical group and 44 years (range, 32–64 years) in the nonsurgical group. We received approval of the local ethics committee for this study.

A t-test was used to analyze pain relief, discomfort, and crepitation in the surgical group compared with the nonsurgical group. A statistically significant threshold was accepted at p less than 0.05, two-tailed. We performed all statistical analyses with SPSS® (Version 20.0; IBM Corp, Armonk, NY, USA).

Results

With the numbers available, at latest followup there was no difference in pain scores between patients treated surgically or nonsurgically (mean $\pm$ SD VAS pain at rest 0 ± 0 versus 1.0 ± 1.6 , at night 0 ± 0 versus 0.3 ± 0.6 , and with exertion 0.8 ± 1.3 versus 1.5 ± 1.6 , $p = 0.174$, 0.248 , and 0.357 , respectively); in fact, pain scores were quite low in both groups. Pain disappeared for seven patients treated surgically immediately after surgery, and all 12 patients had normal painless shoulder ROM and strength. For the patients treated surgically, discomfort at work was mean VAS 0.2 ± 0.4 and discomfort at leisure 0.3 ± 0.6 ,

compared with the patients treated nonsurgically (0.6 ± 0.9 and 0.5 ± 0.7 ; $p = 0.298$ and 0.662 , respectively) (Tables 1 and 2). One patient (Patient 4, Table 1) reported slight discomfort and considered his short-term result at 7 years in 1991 only fair. During the mean followup of 23 years, the same patient had painful snapping develop, which still persisted to a slight degree. However, in a questionnaire survey at 30 years, at age 80 years, his VAS pain at rest, at night, and during exertion was 0 of 10.

Crepitus was variable in both groups at final followup, with no apparent difference between the groups in terms of its frequency, but in the nonsurgical group, crepitus was more severe. Crepitus was not consistently associated with pain at final followup in either group, whereas at initial presentation, the crepitus had been painful in both groups (Table 3). Six of 12 patients in the surgically treated group and all seven clinically examined patients treated nonsurgically had crepitus at the latest clinical followup. However, only one of six patients with crepitus in the surgical group reported having pain, however four of six patients with crepitus treated nonsurgically reported pain ($p = 0.004$) (Table 3). Crepitus was slight in most patients treated surgically, but severe in most patients treated nonsurgically (Tables 1 and 2).

All patients in both groups had returned to work after surgery, or after the first consultation in the nonsurgically treated group. The postoperative sick leave averaged 2 months (range, 1–8 months). Eight patients continued in their previous jobs and four moved to a lighter work. In the patients treated nonsurgically, four continued the same work, four moved to lighter work, and one took on more strenuous work.

Discussion

A snapping scapula is uncommon, but in patients whom it affects, it can produce severe shoulder pain and dysfunction. Although many patients can be treated nonsurgically, some remain so severely symptomatic that they wish to undergo surgery; these patients can be treated with resection of the medial upper corner of the scapula, among numerous other possible surgical approaches [1, 12, 14, 18]. Although there have been numerous studies regarding surgical treatment of a painful snapping scapula [2, 6, 7, 10, 11, 13, 15, 20], to our knowledge, there are none that have evaluated patients at long term. We found that at a minimum of 16 years followup, patients treated surgically report little pain, some crepitus (although it usually is painless), and a consistent ability to return to work. However, we found that patients treated nonsurgically achieved results that were not distinguishable from the surgically treated group in this small series. Although the patients

Table 3. Statistical comparisons between the surgical and nonsurgical groups

Variable	Number of patients	Mean* age $\pm$ SD; years (range)	Sex M/F	Mean followup $\pm$ SD; years (range)	VAS** $\pm$ SD pain at rest	VAS** $\pm$ SD pain at night	VAS** $\pm$ SD pain at exertion	Discomfort at work VAS** $\pm$ SD	Discomfort at leisure VAS** $\pm$ SD	Crepitus resolved objectively (%)	Grades [†] 1 + 2 of objective crepitus (%)	Back to work (%)
Surgical group	12	27.2 $\pm$ 10.5 (13–46)	6/6	27.7 $\pm$ 5.6 (23–43)	0	0	0.8 $\pm$ 1.3	0.2 $\pm$ 0.4	0.3 $\pm$ 0.6	50	92	100
Nonsurgical group	9	21.7 $\pm$ 6.1 (12–31)	2/7	22.8 $\pm$ 5.1 (17–33)	1.0 $\pm$ 1.6	0.3 $\pm$ 0.6	1.5 $\pm$ 1.6	0.6 $\pm$ 0.9	0.5 $\pm$ 0.7	0	29	100
p value		0.277		0.054	0.174	0.248	0.357	0.298	0.662		0.004	

* At symptom onset; **VAS 0–10; [†]1 = none, 2 = slight, 3 = marked, 4 = severe.

treated nonsurgically generally had a milder presentation, our findings preclude us from strongly endorsing surgery for this condition.

We acknowledge limitations in our study. Most importantly, because we have no baseline pain data, it is difficult to know how much these patients improved. As would be expected for a study that includes patients treated during a four-decade period, some patients were lost to followup. Only nine of 15 of our patients treated surgically participated in the final clinical followup; however, three others reported good pain relief in a questionnaire, and of the other three, two had died therefore only one patient was unaccounted for. In general, patients who are lost to followup should not be assumed to be doing as well as those accounted for, since those who are lost to followup may have had a reoperation or worsening in clinical status that would not be captured in the analysis. For that reason, the surgical results here should be considered a best-case estimate. Although we are sure we have captured all of our surgical study patients (by review of surgical logs), we do not have data for all of our patients treated nonsurgically. In our system, these patients were not tracked as rigorously. In addition, when patients were seen initially or at followup, we obtained no validated functional scores, like a Constant-Murley score, because these were not in common use 20 or more years ago. We consider that in evaluation of scapulocostal syndrome, pain and scapulocostal crepitation are decisive, because ROM and strength of the shoulder generally remain normal in patients with a snapping scapula. In addition, our material is so small that statistical analyses were limited.

Pain disappeared in all of our patients who were operated on after open resection of the superomedial corner of the scapula. Our results were similar to those of Lehtinen et al. [10], Lesprit et al. [11], and Nicholson and Duckworth [18] with respect to pain (Table 4). After arthroscopic resection [19] and after endoscopic bursectomy and miniopen resection [12], pain scores were a little higher than those of our patients. Several authors have reported similar clinical outcomes after arthroscopic techniques when compared with open or miniopen approaches [10, 12], and the trend in surgical management of a snapping scapula seems to be moving toward arthroscopy, including bursectomy and/or resection of the scapula [2, 12, 13, 17, 19, 20]. However, to our knowledge, those approaches have not been validated at long term; results of those approaches should be compared with our results at 16 to 27 years. Only a few short-term studies mention outcome comparison between surgical and conservative treatment for painful snapping scapula. Lesprit et al. [11] treated 10 patients without a subscapular mass conservatively. In five patients, pain disappeared completely, but tactile and acoustic phenomena persisted. The other five

Table 4. Literature on outcome after open or arthroscopic resection for painful snapping scapula

Study	Number of patients	Mean age; years (range)	Sex M/F	Time to surgery; years (range)	Mean followup; years (range)	Open/arthroscopic	VAS	Clicking resolved (%)	Back to work (%)	WORC	ASES	Quick DASH	Simple Shoulder Test
Blond and Rechter [2]	20	40 (19–68)	7/13	4.0 (0.3–20)	2.9 (2–5)	0/20				86.4			
Lehtinen et al. [10]	14	41 (20–69)	4/10		3.0 (2–5)	12/2							
Millett et al. [17]	21	33 (19–58)	12/9	2.0 (0.2–12)	2.5	0/21	5.0				73	35	
Pavlik et al. [19]	10	45 (16–40)	6/4	4 (1–12)	1.0 (1.0–3.2)	0/10	2.1	20	90				
Lien et al. [12]	12	22 (18–27)	11/1	4.1 (1–8)	3.1 (2–5)	0/12	2.3		100		83.3		10.1
Lesprit et al. [11]	5		4/1	3.6 (0.7–5.8)	2.5 (1–4.4)	5/0							
Merolla et al. [14]	10	24 (SD 4.6)	5/5	3.0 (0.7–4)	2.0 (1.9–2.1)					84.4	Constant-Murley score 84.9		10.6
Nicholson and Duckworth [18]	5	34 (26–47)	2/3		2.5 (2–6)	5/0	1.0		87		90.8		11
Current study	12	27 (13–46)	6/6	3.6 (2–7)	27 (23–43)	12/0	0.8	50	100				

WORC = Western Ontario rotator cuff index; ASES = American Shoulder and Elbow Surgeons Score; QuickDASH = Quick Disabilities of the Arm, Shoulder and Hand.

patients had an open scapular resection. After a mean followup of 2 years, pain and snapping were completely relieved in four patients and incompletely in one. To our knowledge, our study is the first to show that a painful snapping scapula seems to improve on its own within 10 to 15 years in nearly all patients. Given that the patients treated nonsurgically all experienced near-complete relief of pain with time, the message is that surgery might be a last resort for patients who need not tolerate severe pain for numerous years. Numerous authors have found surgical outcomes to be more favorable when diagnostic or therapeutic injections result in symptomatic relief [7, 10, 18].

Crepitus generally resolved in both groups, but not consistently; however, when it persisted, it was not always painful. Many patients with crepitus, treated surgically or nonsurgically, have no pain. Our results were similar to those of Lesprit et al. [11] after open resection with respect to crepitus, to those of Lien et al. [12] after endoscopic bursectomy with miniopen partial scapulectomy, or to those of Pavlik et al. [19] after arthroscopic resection.

All patients in our series who were treated surgically returned to work, and some did heavy labor; however, the same was true for patients treated nonsurgically. After scapulothoracic bursectomy for snapping scapula, 10 of 13 employed patients returned to full-duty activity, three had work restrictions permitting only lighter work [18], and all four professional baseball pitchers who underwent open bursectomy at the inferomedial angle of their dominant scapulae were able to return to pitching at the professional level [23]. Because our patients treated nonsurgically all returned to work as well, the message is that surgery should be a last resort for the most-desperate patients.

The key question is whether this procedure should be performed in any form, and if so, in which patients. We found that carefully selected patients who undergo this procedure appear to experience sustained relief of painful crepitus 16 to 27 years after treatment. However, so do patients treated nonsurgically, although some of them reported ongoing pain for a period of years, whereas the patients treated surgically reported relief (and returned to work) within months. As the decision to treat these patients surgically was somewhat subjective (baseline VAS pain scores or patient-reported functional scales were not available at that time), and patients treated nonsurgically did so well, we cannot conclude that surgery is better than nonsurgical treatment. Multicenter comparative studies with carefully applied indications will be needed to compare surgical and nonsurgical approaches for the patient with a snapping scapula.

Acknowledgments We thank Leena Ristolainen PT, ScD (Research Institute Orton, Invalid Foundation) for statistical help and Carol Norris PhD (Kielipalvelut, Language Services, Helsinki University) for language revision.

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