



Massive acromioclavicular ganglionic cyst treated with excision and allograft patch of acromioclavicular region

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Although acromioclavicular (AC) joint cysts are infrequent, when they do occur they are typically associated with full-thickness rotator cuff tears or AC joint degeneration, or both.^{4,7,8,10,11,13-18,20-22} AC joint cysts are also typically benign, being either ganglionic or synovial. Few reports have described the surgical management of massive AC ganglionic cysts.^{2,11,17,20} Some of these reports have advocated repairing the underlying rotator cuff tear because the recurrence rate of AC joint cysts might otherwise be high, regardless of whether they are ganglionic or synovial.^{11,17} However, humeral hemiarthroplasty^{7,8} or AC resection without hemiarthroplasty^{8,16-18} have been reported as being effective at reducing AC joint cyst recurrence when rotator cuff tear repair is not possible.

We present a case of an elderly patient in frail health who presented with a massive ganglionic cyst of the AC joint that was associated with end-stage rotator cuff-tear arthropathy. Excision of the cyst was recommended only after skin compromise or fistula formation was imminent. The rotator cuff tear could not be repaired, and no attempt was made to implant a glenohumeral endoprosthesis; this decision was influenced by the patient's tenuous cardiac status. The novel aspects of the treatment of this case include (1) an allograft patch, which was used to seal the surfaces of the resected bones and the base and margins of the remaining AC joint ligaments, and (2) the anterior deltoid was advanced to augment the excision site.

Case report

An 84-year-old right-hand dominant man (height, 1.65 m; weight, 74.4 kg; body mass index, 28.1 kg/m²), who was a retired architect, presented to our clinic in May 2009 with a massive AC joint cyst on the superior aspect of his left shoulder (Fig. 1). By direct measurements, the cyst was 8 cm in diameter and 6 cm in height. Examination with ultrasonography confirmed the cystic nature of the lesion. Rotator cuff-tear arthropathy was revealed by radiographs (Fig. 2), showing end-stage joint disease and an anterior acromial spur. AC joint arthritis was also prominent. The AC joint cyst had spontaneously appeared 2 months earlier and had progressively enlarged. He had no history of gout, inflammatory arthritis, or recent shoulder trauma or overuse.

The patient was well known to our clinic because 5 years earlier he had been considered for a hemiarthroplasty vs reversed arthroplasty for his left shoulder rotator cuff-tear arthropathy. At these previous visits, he had complained of pain that was typically moderate, and occasionally severe, when he attempted to reach higher than chest level. At that time, and currently, he had 80° of active and passive shoulder flexion. However, he did not undergo shoulder surgery because of poor general health, primarily resulting from coronary artery disease with atrial fibrillation, left ventricular dysfunction, and valvular disease (ejection fraction, 35%). His cardiac status had not improved by the time of this current visit.

Additional current medical problems included non-insulin-dependent diabetes, peripheral neuropathy, and gastroesophageal reflux disease. He was taking warfarin in addition to various other medications for his cardiac and other medical problems. Surgical history included prostatectomy and cataract surgeries for both eyes. The patient had quit smoking cigarettes many years ago and only occasionally drank alcoholic beverages.

In view of his tenuous cardiac status, nonoperative management of the AC cyst was strongly advocated by his cardiologist and primary-care physician. The senior author (J.G.S.) made several attempts to reduce the size of the cyst with aspirations and compression dressings. Each aspiration yielded 20 to 30 mL of

The institution approved the reporting of this case, all investigations were conducted in conformity with ethical principles of research, and informed consent for participation in the study was obtained.

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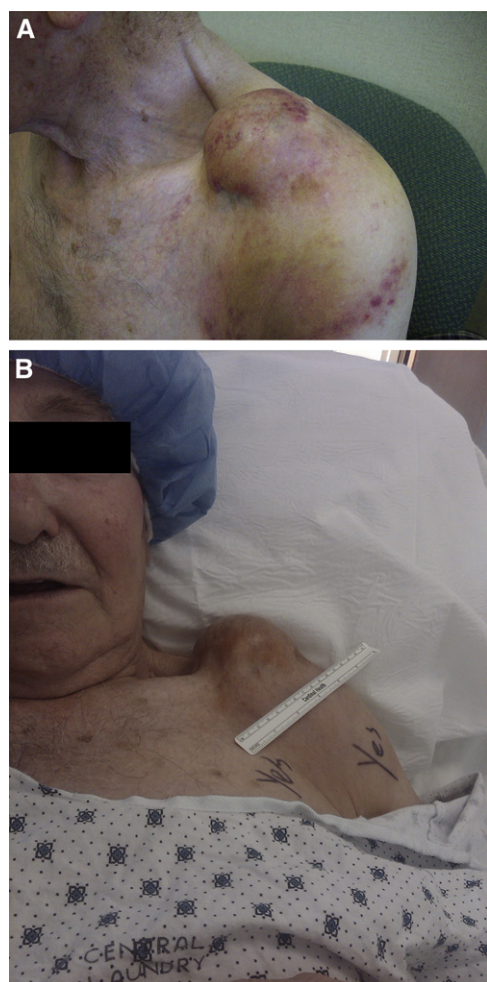


Figure 1 (A) Anterior-lateral and (B) anterior photographs show the acromioclavicular cyst on the patient's left shoulder.

gelatinous fluid that was consistent with a ganglion cyst. Microscopic analysis of fluid from the first aspirate showed that it was amorphous and without crystals or atypical cells, traits consistent with that of a ganglion cyst, thus reducing the concern for a juxta-articular myxomatous tumor.^{6,12}

After 1 year of observation and 3 aspirations, the patient ultimately became a candidate for surgical excision. This was prompted by several episodes of spontaneous drainage through the skin where needle aspirations had been done previously and also associated with a 2-cm enlargement of the cyst over the prior 3 months. The risk of a secondary infection was considered significant in addition to the increased probability that a fistula or ischemia of the overlying skin would develop.

Endoprosthetic replacement of the shoulder joint (eg, reversed glenohumeral replacement) was considered, but patient's cardiologist urged the surgeon (J.G.S.) to focus on excising the cyst to reduce systemic stress and blood loss by limiting surgical dissection and time.

General anesthesia was used, and the surgical approach was in accordance with the description of Nowak et al.¹⁷ An elongated elliptical portion (2 × 5 cm) of the overlying compromised skin (poor perfusion and thin) was removed. During excision of the cyst, the surgeon (J.G.S.) identified 2 potential sources of the cyst

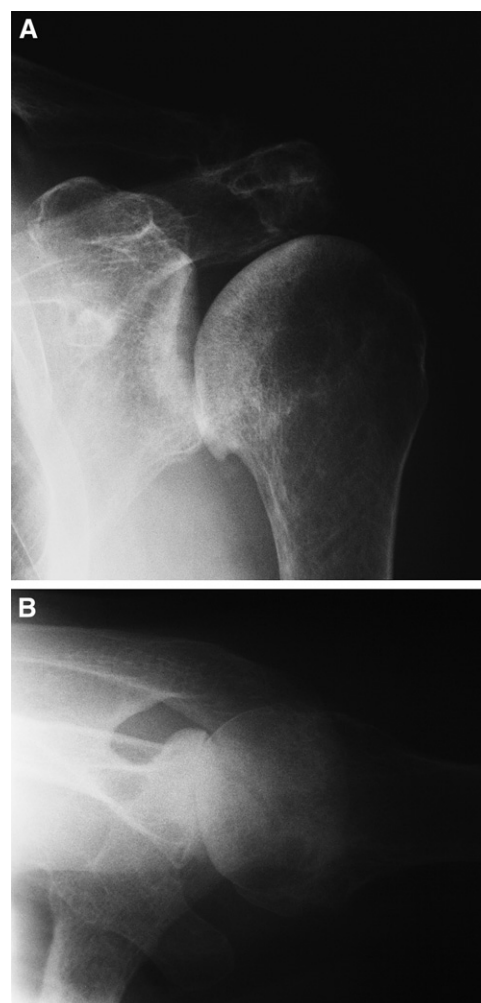


Figure 2 (A) Anterior and (B) axillary lateral radiographic views of the patient's left shoulder show arthritic changes, including loss of the glenohumeral joint space.

fluid: (1) 1 or 2 from the inferior-lateral aspect of the clavicle, which was severely arthritic, and (2) 1 through the inferior aspect of the AC joint into the glenohumeral joint. Consequently, the AC joint surfaces were resected and the articular aspects of the AC ligaments were débrided, leaving most of the AC ligaments intact. The deltoid was split laterally at the raphe between the anterior and middle portions, and the subacromial spur was resected. The rotator cuff was irreparable and was débrided.

To seal over the potential sources of cyst fluid, a 2- × 3-cm patch of allograft human dermis (GraftJacket Maximum Force, ~1.5 mm thick, Wright Medical Technology Inc, Arlington, TN, USA) was sutured to the remaining AC joint ligaments and through drill holes to the margins of the resected bone surfaces of the AC joint. The patch therefore coursed along the margins of the resected AC region and "lapped up" along the cut surfaces of the medial acromion and lateral clavicle. The patch, which was part of the preoperative plan, was also used to reduce the formation of a new synovial cyst by leakage of synovial fluid from the glenohumeral joint through the unrepaired rotator cuff tear. Studies have shown that this allograft material integrates well with surrounding fibrous connective tissue and bone.^{1,2,3}

Table I Selected cases of acromioclavicular cysts with some characteristics or issues similar to our patient

First author	Year	Pts (N)	Age (year)	AC resection and/or Acr	RCR and/or patched	Hemiarthroplasty w/o RCR	Allograft patch used (not for RCR)	Recurrence at ≥ 1 year	
Ganglion cysts									
Skedros	2011	1	84	Yes + Acr	No	No	Yes	No	
Nowak	2009	1	77	Yes + Acr	Yes	No	No	No	
Moratalla	2007	1	66	(No discussion of treatment)					
Montet	2004	1	80	No	No	No	No	N/A	
Marino	1998	1	66	Yes + Acr	Yes	No	No	No	
Segmuller	1997	1	63	Yes + Acr	No cuff tear	No	No	No	
Burns	1984	1	63	No	No cuff tear	No	No	No	
Synovial cysts									
Hiller	2010	4	73	No	No	No	No	No	
			90	Yes	No	No	No	No	
			76	Yes	No	No	No	No	
			76	Yes	No	Yes	No	No	
Murena	2009	1	81	Yes	No	No	No	No	
Mullett	2007	1	75	Yes	No	No	No	No	
Tshering	2005	9	57	Yes	No	No	No	?	
Vogel			60	Yes	No	No	No	?	
			68	No	No	No	No	?	
			64	Yes	No	No	No	?	
			71	Yes	No	No	No	?	
			68	Yes	No	No	No	?	
			68	Yes	No	Yes	No	?	
			68	Yes	No	No	No	?	
			86	No	No	No	No	?	
Selvi	2000	1	77	Acr	No	No	No	No	
Cvitanic	1999	1	69	Yes	No	No	No	?	
Le Huec	1996	3	72	Yes	No	No	No	No	
			68	Yes	No	No	No	No	
			61	Yes	No	No	No	No	
Lizaur	1995	1	58	Acr	Yes	No	No	No	
Utrilla									
Groh	1993	4	65	No	No	Yes	No	No	
			67	No	No	Yes	No	No	
			71	No	No	Yes	No	No	
			60	No	No	Yes	No	No	
Postacchini	1993	3	73	Acr	Yes	No	No	Yes	
			75	Yes + Acr	No	No	No	No	
			76	No	No	No	No	N/A	
Craig	1986	2	86	No	No	No	No	N/A	
			67	Yes + Acr	Yes	No	No	No	

?, unknown or not stated; AC, acromioclavicular; Acr, acromioplasty; N/A, not applicable, cyst not excised; RCR, rotator cuff repair.

Finally, the anterior deltoid was advanced over the superior aspect of the AC joint region. This resulted in a 1.5-cm overlap of the anterior with the middle deltoid, which increased the robustness of the deltoid repair over the AC joint region. This was done to reduce the chance that joint fluid would enter the subcutaneous tissues if the allograft patch failed to provide a sufficient seal³ and to reduce the chance that a synovial-cutaneous fistula would develop through the deltoid repair site.¹⁹ Similar to the case described by Nowak et al,¹⁷ the patient's skin was closed primarily, without difficulty, and without the services of a plastic surgeon.

Healing was uneventful. Active assisted motion was allowed at 6 weeks, and unrestricted shoulder use was allowed at 9 weeks. At the 16-month follow-up, the patient had no recurrence of the AC

joint cyst. Although he was very satisfied with the successful eradication of the cyst, the level of shoulder pain associated with his underlying rotator cuff-tear arthropathy was similar to his preoperative status. As a consequence, the patient continued to avoid attempts to lift higher than chest level.

Discussion

It was not unexpected that aspirations alone would have a high probability of failing to eradicate our patient's massive ganglionic AC joint cyst. For example, Cvitanic

et al⁵ and Hiller et al⁸ performed aspiration and corticosteroid injections of synovial AC cysts without success in avoiding recurrence of the lesion. By contrast, AC joint cysts have a low recurrence rate when the underlying rotator cuff-tear arthropathy is treated with rotator cuff tear repair, humeral hemiarthroplasty, or AC resection, or a combination (Table I). For example, Le Huec et al⁹ treated 3 patients with synovial AC joint cysts and massive rotator cuff tears with excision of the cyst, resection of the distal clavicle, and synovectomy of the upper portion of the pathologic humeral-acromial joint. The cysts did not recur, even though the rotator cuff tears were not repaired.

Some have speculated that in the presence of an irreparable cuff tear, resection of the distal aspect of the clavicle reduces the risk of recurrence by removing the pinch-valve effect.¹⁵⁻¹⁸ However, our review of the English literature revealed 1 patient with AC synovial cyst recurrence (5 cm diameter) at 1 year after surgery.¹⁸ This patient had a rotator cuff tear, and the cyst was communicating with the subacromial space through the AC joint space. Treatment included acromioplasty in addition to repair of a torn rotator cuff, which healed. In view of this patient with a cyst recurrence, we were concerned that the risk of recurrence in our patient would be too high without measures to supplement his poor-quality tissues. For this reason, and because of our patient's tenuous cardiac status, we sought to greatly reduce the risk of recurrence and reoperation by using an allograft patch in addition to AC resection and acromioplasty and by advancing the deltoid over the resected AC joint. To our knowledge, these are novel aspects in the surgical treatment of a massive ganglionic AC joint cyst.

Consideration was also given to applying an allograft patch to the torn rotator cuff tendon instead of, or in addition to, the floor and sides of the resected AC joint; however, this would have been much more difficult to do than patching the AC joint region and would have added potential surgical morbidity. Our decision to apply an allograft patch only to the AC region was also influenced by the results of a case reported by Lizaur Utrilla et al.¹⁰ These authors described a 58-year-old patient who had unsatisfactory functional results (but no recurrence of the cyst) after the treatment of a synovial AC joint cyst with excision of the cyst, acromioplasty, and closure of an associated irreparable rotator cuff tear using a dura mater allograft.

Conclusions

Excision of the AC cyst was recommended only after skin compromise or fistula formation was imminent. Novel aspects of this case include the use of an allograft patch to seal the surfaces of the resected bones and the

base and margins of the remaining AC joint ligaments, and advancement of the anterior deltoid to augment the excision site. The rotator cuff tear could not be repaired, and no attempt was made to implant a glenohumeral endoprosthesis; this decision was influenced by the patient's tenuous cardiac status. At 14 months of follow-up, our patient had no recurrence of the ganglionic AC joint cyst. Although he was very satisfied with the successful eradication of the cyst, his level of shoulder pain associated with the underlying rotator cuff-tear arthropathy was similar to his preoperative status. Consequently, the patient continued to avoid attempts to lift higher than chest level.

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