Arthroscopic Resection Arthroplasty of the Radial Column for SLAC Wrist

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Abstract

Background Symptomatic advanced scapholunate advanced collapse (SLAC) wrists are typically treated with extensive open procedures, including but not limited to scaphoidectomy plus four-corner fusion (4CF) and proximal row carpectomy (PRC). Although a minimally invasive arthroscopic option would be desirable, no convincing reports exist in the literature. The purpose of this paper is to describe a new surgical technique and outcomes on 14 patients who underwent arthroscopic resection arthroplasty of the radial column (ARARC) for arthroscopic stage II through stage IIIB SLAC wrists and to describe an arthroscopic staging classification of the radiocarpal joint for patients with SLAC wrist.

Patients and Methods Data were collected prospectively on 17 patients presenting with radiographic stage I through III SLAC wrist who underwent ARARC in lieu of scaphoidectomy and 4CF or PRC. Fourteen patients (12 men and 2 women) subject to 1-year follow-up were included. The average age was 57 years (range 41 to 78). The mean follow-up was 24 months (range 12 to 61). Arthroscopic resection arthroplasty of the radial column is described for varying stages of arthritic changes of the radioscaphoid joint. Midcarpal resection was not performed.

Results The mean Disabilities of the Arm, Shoulder, and Hand (DASH) score was 66 preoperatively and 28 at final follow-up. The mean satisfaction (0 = not satisfied, 5 = completely satisfied) at final follow-up was 4.5 (range 3 to 5). The pain level (on 0–10 scale) improved from 6.6 to 1.3. The total arc of motion changed from 124° preoperatively to 142° postoperatively following an ARARC. Grip was 16 kg preoperatively and 18 kg postoperatively. Radiographic stages typically underestimated arthroscopic staging. Although four of our patients appeared to be radiographic stage I, all were found to have arthritis involving some or all of the radioscaphoid articulation at the time of arthroscopy.

Clinical Relevance Pain relief is rapid and remains consistent over time following ARARC. ARARC may be a viable surgical option for patients with SLAC wrist who desire a minimally invasive procedure. Radiographic stages underestimate the degree of arthritic change. Accurate staging requires arthroscopy. The indications and long-term outcome are not well defined; continued surveillance is warranted.

Level of Evidence Level IV, Therapeutic study

Keywords

- arthritis
- arthroplasty
- arthroscopic
- arthroscopy
- minimally invasive
- resection
- scapholunate advanced collapse
- SLAC
- wrist

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Scapholunate advanced collapse (SLAC) wrist is a common wrist arthritic condition resulting from abnormal biomechanics following scapholunate ligament instability and the resulting abnormal biomechanics and cartilage wear. Watson and Ballet first described SLAC wrists and the radiographic stages of progression in 1984.[1] The first stage involves the radial styloid, the second stage involves the radioscaphoid fossa, and the third stage involves the capitolunate joint.[1] Stage IV SLAC is a very uncommon finding of pancarpal arthritis. While SLAC wrist is considered the final stage of scapholunate ligament rupture,[2,3] not all SLAC wrists are symptomatic and therefore some do not require surgical treatment.[4] Symptomatic cases of radiographic stage II and III SLAC wrists requiring surgery are typically treated with extensive open salvage procedures including but not limited to a scaphoidectomy plus four-corner fusion (4CF)[5,6] and proximal row carpectomy (PRC).[7] Another potential treatment option for stage I SLAC, open radial styloidectomy as first described by Barnard in 1948[8] for treatment of scaphoid nonunion, is not typically used for SLAC stage II and III because it does not address the periscaphoid osteoarthritis (OA).

A cadaver study published in 1991 evaluating the effect of open radial styloidectomy on radiocarpal ligament disruption raised concerns about this procedure.[9] Nakamura et al followed with a second cadaver study and found ligament laxity after 6- and 10-mm radial styloidectomies and recommended limiting styloidectomy to no more than 3 to 4 mm.[10] No additional significant clinical reports were published until the recent interest in arthroscopic radial styloidectomy.[11–13] Although a few reports of minimally invasive arthroscopic treatment of SLAC wrist stage I exist,[11,12,14–16] clinical data are lacking.

The purpose of this paper is to describe a new surgical technique and outcomes on 14 patients who underwent arthroscopic resection arthroplasty of the radial column (ARARC) for arthroscopic stage II through IIIB SLAC wrists and to describe an arthroscopic staging classification of the radiocarpal joint for patients with SLAC wrist.

Patients and Methods

Institutional review board approved the study protocol and human participant protections, which conformed to the ethical guidelines of the 1975 Declaration of Helsinki. Necessary and appropriate consent was obtained from each patient. Data were collected prospectively on 17 patients who elected to undergo ARARC between August 2008 and December 2012 in lieu of a scaphoidectomy plus 4CF or PRC. All patients failed conservative treatment, including splinting, nonsteroidal anti-inflammatory drugs, and cortisone injections. Indications for ARARC included severe disabling pain over the radial styloid due to arthroscopic stage II through stage IIIB SLAC wrist in patients who desired a minimally invasive procedure rather than traditional treatment of PRC or scaphoidectomy plus 4CF. Although some patients had radiographic changes at the midcarpal joint, patients with clinically significant midcarpal symptoms were not offered the procedure. Arthroscopic resection arthroplasty of the midcarpal joint was not performed in any of these cases.

Patient Demographics

Of the 17 patients prospectively enrolled, 14 who were subject to and had a minimum of 1-year follow-up were included for evaluation. No patients were lost to follow-up. The average age was 57 years (range 41 to 78). There were 12 men and 2 women. Average follow-up was 24 months (range 12 to 61). Occupations included seven nonmanual laborers (six retired, one supervisor) and seven manual laborers (one janitor, one farmer, one correction officer, one painter, three general laborers). The dominant hand was involved in six cases. Tourniquet time averaged 35 minutes (range 22 to 49). Two cases involved worker's compensation claims.

Subjective and objective data were collected preoperatively and at postoperative intervals of 1, 3, 6, and 12 months and annually thereafter by an occupational hand therapist. Data collected at each time interval included bilateral wrist flexion, extension, radial deviation, ulnar deviation, pronation, and supination using a handheld goniometer. The Disabilities of Arm, Shoulder, and Hand (DASH) questionnaire (0–100, higher score = greater disability),[17] a numeric rating scale (NRS) for pain (0–10; 0 = no pain, 10 = worst possible pain), and bilateral JAMAR five-stage grip strength (Sammons Preston, Bolingbrook, Illinois) were obtained. Grip strength was measured with the elbow flexed 90° and the shoulder abducted to the patient's side using the JAMAR Dynamometer 5-stage system (Sammons Preston, Inc., Bolingbrook, IL). Patients ranked satisfaction (0–5; 0 = not at all satisfied, 5 = completely satisfied) at each postoperative interval. Three patients who had not returned for the 2-year follow-up were contacted by phone to obtain DASH, pain, and satisfaction data.

Preoperative radiographs were reviewed to assess lunate type[18] and radiographic staging.[1] Radiographic staging was compared with arthroscopic stage. A new arthroscopic classification system was created based on intraoperative findings of the radiocarpal joint. Radiographs were measured to determine the amount of bone resected, scapholunate angle, radiolunate angle, lunocapitate angle, capitate to triquetral distance,[19] ulnar translation of lunate on radius, radial translation of capitate on lunate, and capitate shortening as indicated by radiocapitate distance (►**Fig. 1a, b**). Measurements were taken with a ruler from standard posteroanterior (PA) radiographs, PA fist, and lateral wrist views without correction for magnification. Ulnar translation was measured on PA wrist radiographs as the distance from the ulnar border of the radius to the ulnar border of the lunate. Radial translation of the capitate on the lunate was measured on PA wrist radiographs as the distance from the ulnar border of the capitate to the ulnar border of the lunate.

Arthroscopic Staging of Radiocarpal Arthrosis for SLAC Wrists

Arthroscopic stage I is characterized by focal degenerative changes confined to the tip of the radial styloid (3 to 4 mm)

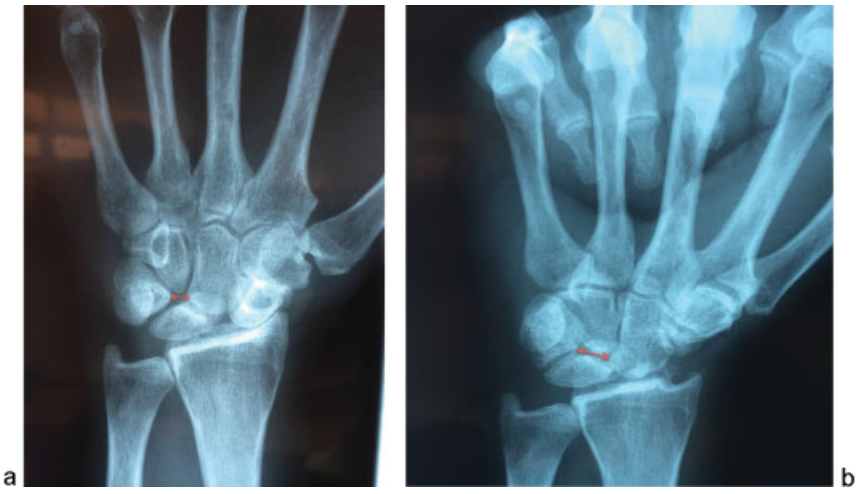

Fig. 1 (**a**) Preoperative PA radiograph showing triquetral-capitate interval (patient ID #7). (**b**) Three-year post-operative PA fist view showing widening of the triquetral-capitate interval (patient ID #7). Note that there is no ulnar translation of the lunate but rather radial translation of the distal row on the proximal row.

(►**Table 1**). These patients typically have abundant synovitis over the involved styloid region, which may obscure a portion of the reactive bony process. Arthroscopic stage II has degenerative changes of the radial styloid and a portion of the scaphoid fossa. Arthroscopic stage IIB has stage II changes plus corresponding arthritic change (kissing lesions) of the scaphoid. Arthroscopic stage III has loss of cartilage of the entire scaphoid fossa. Arthroscopic stage IIIB has stage III changes plus corresponding changes of the scaphoid. Degenerative changes identified at surgery were frequently more severe than radiographs suggested (►**Table 2**).

Surgical Technique

- Draw location of the planned primary portals on patient's wrist and place surgeon's initials with a permanent marker in the preoperative holding area.
- Inform patient of possible alternative portals and potential need for conversion to an open procedure as well as the possible need for future open salvage procedures if the minimally invasive procedure fails.
- Use general, regional, or wide-awake anesthesia[20] based on patient preference and medical needs.
- Place the patient supine on operating table with a tourniquet placed on the brachium.
- Tape the brachium to hand table.
- Apply finger-trap traction of 5 kg to index and long fingers with a traction tower.
- Perform standard radiocarpal and midcarpal arthroscopy using standard 3–4, 4–5, 6R, 6U, 1–2, volar flexor carpi radialis (FCR) portal, and midcarpal portals as indicated.
- Localize portals with 18 gauge needles.
- Make skin incisions with a No. 15 scalpel just through the dermis.
- Perform blunt dissection with a hemostat to enter joint.

Arthroscopy

- Perform arthroscopy with a 2.7-mm, 30° arthroscope.
- Execute synovectomy and resection of torn scapholunate ligament with a 3.5-mm aggressive shaver (cutter by Stryker Endoscopy, San Jose, CA).

Table 1 Arthroscopic classification of radiocarpal arthrosis for scapholunate advanced collapse (SLAC) wrist and comparison to radiographic stage

Arthroscopic stage	Corresponding radiographic stage	Description
Stage I	0 or I	Focal degenerative changes confined to the tip of the radial styloid (3 to 4 mm); abundant synovitis is typically present over the involved styloid region, which may obscure a portion of the reactive bony process
Stage II	I	Degenerative changes of the radial styloid and a portion of the scaphoid fossa
Stage IIB	I or II	Stage II changes plus corresponding arthritic change (kissing lesions) of the scaphoid
Stage III	II or III	Loss of cartilage of the entire scaphoid fossa
Stage IIIB	II or III	Stage III changes plus corresponding changes of the scaphoid

Table 2 Radiographic parameters of patients with SLAC wrists who underwent ARARC

Imaging analyses	Patient ID														Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Arthritic stage															
Arthroscopic	3	3B	2B	2	3B	3B	3B	3B	2B	3B	3B	3B	3B	3B	—
Radiographic															
Preoperative	2	2	1+	1	3	2+	2+	2	1	2	2+	2	1	2	—
Postoperative	2	3	3	1	3	3	3	3	2	2	3	2	3	3	—
Amount of resection															
Radial (mm)	11	18	12	9	18	17	10	20	12	16	14	20	15	20	15.1
Scaphoid (mm)	0	14	10	0	16	14	10	19	10	12	13	15	12	15	11.4
Lunate type	1	1	2	2	2	2	2	2	2	1	2	2	1	1	—
Scapholunate Angle (°)	68	80	55	75	55	76	78	70	50	95	75	65	90	90	71.9
Radiolunate angle (°)															
Preoperative	20	22	—	15	10	15	20	20	22	40	20	8	25	25	20.2
Postoperative	35	24	20	15	—	15	28	30	25	38	32	20	30	30	26.3
Lunocapitate angle (°)															
Preoperative	10	10	—	8	12	0	15	25	0	15	12	5	10	15	10.5
Postoperative	35	15	20	8	—	0	18	20	10	12	15	8	15	12	12.8
Capitate to triquetral distance (mm)															
Preoperative	2	4	7	5	10	5	4	6	5	4	5	5	6	9	5.5
Postoperative	2	5	7	5	11	8	5	7	7	5	8	6	8	12	6.9
Ulnar translation of lunate on radius (mm)*															
Preoperative	7	6	6	5	11	5	6	6	6	5	6	7	7	10	6.6
Postoperative	7	6	6	5	12	5	6	6	6	5	6	7	7	10	6.7
Radial translation of capitate on lunate (mm)															
Preoperative	0	3	2	0	10	2	0	5	0	1	2	4	3	7	2.8
Postoperative (PA)	0	5	3	0	11	4	5	6	4	5	7	5	7	10	5.1
Postoperative (fist)	0	—	4	0	—	8	7	6	—	6	9	6	9	11	6.0
Capitate to radius distance (mm)															
Preoperative	10	10	10	9	4	5	4	7	10	6	6	8	5	6	7.1
Postoperative (PA)	9	5	7	9	2	4	2	7	10	5	4	7	1	3	5.4
Postoperative (fist)	3	7	8	6	—	8	7	8	—	3	3	7	0	2	5.2

Note: + indicates sclerosis without significant joint narrowing.
Normal S-L angle: 30–60°; questionable abnormal 60–80°; abnormal >80°.
Capitolunate angle: normal <30°; abnormal >30°.
SLAC wrist radiographic Stages: (I) styloid–scaphoid degenerative joint disease (DJD); (II) DJD of the scaphoid facet; (III) capitolunate DJD.
*Measured from ulnar side of lunate to ulnar side of radius.

- Use radiofrequency ablator (Serfas 3.5-mm, Stryker) to denervate the arthritic portion of the joint to be resected volarly, radially, and dorsally. Include sensory contributions from the anterior interosseous nerve, lateral antebrachial cutaneous nerve, posterior interosseous nerve, palmar cutaneous branch of the median nerve, deep branch of the ulnar nerve, and superficial branch of the radial nerve.[21,22]
- Place a 4-mm 12-flute barrel burr (Stryker Endoscopy, San Jose, CA) into the 1–2 portal for bone resection, using the 3–4 or 4–5 portal for initial viewing.
- Move scope as needed between the 4–5, 3–4, and 1–2 portals to enhance visualization from various perspectives.
- Use volar FCR portal infrequently as needed for better visualization of dorsal aspect of the joint.

Resection

- Resection begins with the burr perched on the radial edge of the styloid to ensure that a ridge of bone is not left behind. Synovium and capsule tissue are removed to define the margin of bone clearly prior to starting bony resection.
- Resect styloid to a depth of ~4 mm.
- Remove a trough of bone, then oscillate the burr volarly and dorsally using a windshield-wiper motion, advancing from the radial to the ulnar side until the entire abnormal portion of the radius is removed.
- Resect arthritic portion of the scaphoid. Take care to protect capsular ligaments by carefully burring away cortical bone until the volar wall becomes pliable, up to but not through the soft tissue envelope.
- Resect entire radial column up to healthy-appearing cartilage on the radius.
- For arthroscopic stage III SLAC wrists, resect entire radial styloid and scaphoid fossa up to but not including the lunate fossa.
- For arthroscopic stage II SLAC wrists, resect the radial styloid to healthy cartilage.
- Junctions of arthritic and intact cartilage for stages II and IIB typically have an area of thinned, abnormal cartilage, which is also resected. This does not occur in stage III cases, where the transition to the lunate fossa is an abrupt change to normal cartilage starting at the ridge separating the scaphoid and lunate fossae.
- Use fluoroscopy to ensure an adequate amount of bone resection.

Note that the term "radial column" is used to describe the location of the arthroscopic resection arthroplasty because varying amounts of joint surface of the radius and scaphoid were resected depending upon the amount of arthritis found at time of arthroscopy. For instance, stage IIIB patients had complete arthroscopic resection arthroplasties of both sides of the radioscaphoid articulation, whereas stage II cases had only partial resection of the scaphoid fossa and none of the scaphoid.

Completion

- Release traction at the end to ensure resolution of impingement of the proximal pole of the scaphoid on the radius.
- Plug portals to prevent leakage.
- Infiltrate ~40 mL of 0.25% bupivacaine with epinephrine or 1% lidocaine with epinephrine into resected joint (if not contraindicated).
- Close portals with adhesive strip skin closures and place the patient in a well-padded volar splint with compressive Ace bandage.

Postoperative Care

- Instruct patients to ice and elevate the extremity for 48 hours and as needed thereafter for swelling.
- Splint the wrist for 7–10 days.
- Thereafter, place patients in a removable splint and encourage range of motion.

Use is allowed as tolerated. Formal therapy is utilized as needed for patients requiring more supervision.

Results

Radiographic Evaluation

Preoperative radiographic staging of SLAC wrist is shown in ►**Table 2**.[1] The extent of arthritis was frequently worse at the time of arthroscopy than preoperative radiographs suggested. The staging system was modified to include a " + " designation, indicating sclerosis without significant joint space narrowing; all four cases in the intermediate stage increased at least one stage at final follow-up (►**Table 2**). Two patients had resection of only the proximal (radius) side of the joint and 12 had resection of both sides of the joint. In no case was the lunate fossa resected. The mean radial to ulnar distance of the radial styloid and scaphoid fossa of the radius resected was 14 mm (range 9 to 20). No patients had any measureable ulnar translation of the carpus from pre- to postoperative radiographic evaluation. Radial translation of the capitate on the lunate occurred in eight patients (mean = 2.8 mm preoperatively, 5.1 mm postoperatively in PA radiographs, and 6.0 mm on postoperative fist view). Capitotriquetral distance increased in five of 14 patients (►**Table 2**; ►**Fig. 1a, b**). Seven of the patients demonstrated progressive collapse with proximal migration of the capitate on follow-up films; there were no correlating clinical symptoms.

Short-Term Outcomes

Pain relief was dramatic and rapid and remained consistent over time (►**Fig. 2**). Mean pain at 1 year was twice as high for patients ages 64 and under (1.77, range 0 to 5) compared with patients 65 and older (0.80, range 0 to 2). For the nine patients with 2-year follow-up, the mean pain scores at 2 years for these two groups were 0.17 (range 0 to 1) and zero respectively. Mean DASH was 66 preoperatively and 64, 40, 47, 44, and 28 at 1, 3, 6, 12, and 24 months respectively. Mean satisfaction was 4.5 (range 3 to 5) at final follow-up.

Pre- and 2-year postoperative outcomes of grip and ranges of motion following ARARC are shown in ►**Table 3**. Median grip was 66% of the contralateral (nonoperated) side at final

Fig. 2 Patient-rated pain preoperatively and following arthroscopic resection arthroplasty of the radial column.

Table 3 Outcomes following ARARC

	Grip (kg)	Wrist flexion	Wrist extension	Radial deviation	Ulnar deviation	Prono-supination arc
Preop ($n = 14$)- median	16	39	50	14	21	160
(IQR*)	(14–28)	(23–47)	(45–55)	(10–17)	(11–25)	(142–161)
Final follow-up ($n = 11$) median	18	49	53	15	25	158
(IQR)	(14–33)	(33–53)	(51–60)	(12–16)	(19–27)	(144–171)
Change pre- to postop	2	10	3	1	4	–2

*IQR, Interquartile range.

follow-up. Flexion and extension were 80% and 85% of the contralateral (nonoperated) side respectively at final follow-up.

Revisions, Failures and Complications

There were no infections; however, two patients had serous drainage from a portal postoperatively and were placed on 1 week of oral antibiotics prophylactically without further sequela. Three patients (21%) failed due to persistent pain; each failed case had a type I lunate. Diagnostic imaging of two of the failures are shown in ►**Figs. 3a–d** and **4**. Cineradiography of one failed case showed the lunate to be locked into a dorsal intercalated segment (DISI) deformity, with all motion occurring at the midcarpal joint. Postoperative computed tomography (CT) scan conducted on one failed case demonstrated radioscaphoid impingement due to insufficient bone resection (►**Fig. 4**). Preoperative characteristics potentially contributing to persistent postoperative pain and failure in one of the patients included: long-term narcotic use[23] and young age.

Discussion

Scapholunate instability can result in radial and dorsal subluxation of the proximal pole of the scaphoid on the radius.[24] This can lead to abnormal contact stresses resulting in radioscaphoid compartment arthritis. ARARC involves resection of not only the radial styloid but also the scaphoid fossa and corresponding arthritic scaphoid when involved and therefore the site of radioscaphoid impingement. Resecting this region relieves the radial-side pain in patients with SLAC wrist. Short-term analyses demonstrate that ARARC for arthroscopic stage II through IIIB SLAC wrists results in excellent range of motion, satisfaction, and pain control. Pain improved rapidly following ARARC and remained relatively constant over the 2-year follow-up period (►**Fig. 5a, b**).

A study by Bain and Watts of 31 patients treated with a scaphoidectomy plus 4CF reported similar outcome variables to ours with comparable follow-up times.[5] The change in total range of motion from pre- to 2 years postoperative was greater following an ARARC (18°) than with scaphoidectomy plus 4CF (–19°) with no clinically significant differences in grip strength.[5] Wyrick et al reported 115° total arc of motion following PRC for SLAC wrists at 4 years,[25] compared with 142° at 2 years following ARARC. Grip strength in their study was reported to be an average of 94% of the contralateral side,[25] compared with 66% in our study.

The concept of ARARC makes little sense. How can resecting and not replacing an arthritic joint render it painless? Resection of the subchondral bone could be compared with microfracture procedures, where penetration of subchondral bone is thought to release bone marrow and adult stem cells that potentially promote defect filling with granulation tissue and fibrocartilage.[26,27] Reestablishment of a joint surface following this technique has been reported in both clinical and animal studies.[28–32] Although the resulting joint surface is not normal hyaline cartilage, the formation of fibrocartilage provides a gliding surface and cushion for the joint.[29,33]

Animal studies have shown early motion after débridement of abnormal joint surface to enhance formation of hyaline cartilage.[30,34,35] Our patients were encouraged to start early motion following an ARARC, which may be an important part of the postoperative protocol. Techniques that promote the formation of fibrocartilage in the lower extremity have been criticized because fibrocartilage is thought to have a limited ability to withstand repetitive compressive forces. However, in non-weight-bearing joints of the upper extremity, most notably the carpometacarpal joint of the thumb, excellent clinical results have been reported following an arthroscopic resection arthroplasty.[36–40] We believe that pain relief is in part due to disrupting the sensory nerve pathway that transmits the pain signal to the brain. Although there are few studies[36] to credit arthroscopic denervation for pain relief, pain relief following open denervation has been reported by multiple authors in multiple joints.[41–46]

Radiographic Analysis

The arthroscopic stage determines the amount of bone resection required with ARARC and is frequently more advanced than the radiographic stage. The radiographic staging was modified to include an intermediate stage identified by " + " indicating sclerosis without joint space narrowing. All intermediate " + " cases were noted to advance at least one stage on follow-up X-rays. Although some radiographic progression and collapse were seen, there was no clinical correlation of symptoms. Rhee et al reported ulnar translation in SLAC wrist over time.[47] However, we observed radial translation of the midcarpal joint and an increasing capitate-to-

Fig. 3 (**a**) Preoperative PA fist radiograph showing radiographic stage 2 (patient ID #2). (**b**) Postoperative PA radiograph showing progression of the midcarpal arthritis (patient ID #2). (**c**) Postoperative CT scan at 2-year follow-up showing progression of midcarpal arthrosis, radial translation of distal row on proximal row with formation of pseudo type II lunate and impingement of hamate on the lunate (patient ID #2). (**d**) Postoperative CT scan at 2-year follow-up showing cystic change of capitate and dorsal aspect of radius with dorsal translation of capitate on lunate and volar translation of lunate in an extended position (patient ID 2).

Fig. 4 Postoperative CT scan of one of the cases requiring revision surgery (failure) showing insufficient bone resection and persistent impingement (patient ID #1).

triquetral distance, which gives the appearance of ulnar translation of the lunate. Bain and McGuire also reported increasing capitotriquetral distance.[48]

Our data suggests that patients with DISI deformity and type I lunate may not be good candidates for ARARC. All failures within our study had a type I lunate. Furthermore, we observed larger scapholunate angles in patients with type I lunates compared with those with type II (mean = 92° versus 60° respectively). Although larger capitotriquetral distance has been reported as a method to identify type II lunates,[19] our findings agree with those of Rhee et al,[47] who found that the capitolunate distance can widen, creating a pseudo type II lunate.

This article demonstrates that resecting both sides of the joint does not result in fusion when combined with early motion. The lack of long-term follow-up is a significant limitation of this study, and there was no control group. Caution should be exercised in interpreting these results, as the possibility for progressive deformity and potential need for late revision remain uncertain. Although the risks of late

Fig. 5 (**a**) Preoperative radiograph of 46-year-old male showing radiographic stage 2+ (patient ID #6). (**b**) Postoperative PA radiographic at 2 years following an arthroscopic resection arthroplasty of the radial column with excellent clinical outcomes that resulted in 0/10 pain and 5/5 satisfaction (patient ID #6).

failure are unknown, ARARC for SLAC wrist may be a viable option in patients who desire a minimally invasive option. Patients should be informed of the lack of long-term follow-up and the potential need for late revision surgery.

Ethical Review Committee Statement

Necessary and appropriate consent was obtained from each patient, and the study protocol conformed to the ethical guidelines of the 1975 Declaration of Helsinki as reflected by prior approval by the Genesis Health Systems institutional review committee.

Conflict of Interest

Each author certifies that he or she has no commercial associations (such as consultancies, stock ownership, equity interest, or patent/licensing arrangements) that might pose a conflict of interest in connection with this article.

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