TITLE

Arthroscopic lunocapitate fusion plus scaphoid resection in patients with midcarpal arthropathy. Comparison with open lc fusion results through literature review.

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This retrospective study was carried out with patients operated in the Traumaunit between 2015 and 2022

ABSTRACT

Background: **lunocapitate fusion has been shown to be a viable option for the treatment of carpal osteoarthritis, however, the literature on this fusion using an arthroscopic technique is scarce.**

Literature Review: **We searched for published studies on LC arthrodesis with both open and arthroscopic techniques that reported on imaging and functional results.**

Cases description: **17 patients (14 men and 3 women; mean age 43,6 years) with carpal arthropathy underwent arthroscopic surgery with radial styloidectomy, scaphoid exeresis and lunocapitate arthrodesis with percutaneous compression screws, between January of 2015 to January 2022. The average follow-up was 44 months. Consolidation of the arthrodesis was confirmed in 16 cases. Pseudoatrosis in 1 case, and one material migration and radial cartilage damage; this compilation was resolved with extraction of material, bone graft and repair of the injured cartilage. Acceptable functional results were achieved at 12 weeks postoperatively. Satisfactory radiological and functional results were achieved in 15 patients, compared to the current bibliography, after performing the arthroscopic lunocapitate arthrodesis.**

Clinical Relevance: **The purpose of this study is to provide data (functional and radiological) of patients with SLAC or SNAC wrists who have undergone arthroscopic Lunocapitate fusion and the postoperative results of their follow-up in our hospital. Also, the comparison of these results with the current bibliography.**

INTRODUCTION

Degenerative wrist arthropathy originated by carpal instability due to scapholunate dissociation (Scapho Lunate Advanced Collapse or SLAC), or a carpal collapse due to scaphoid non-union (Scaphoid Non-union Advanced Collapse or SNAC), SOAC, SMAC, SCAC is a pathology that, as it develops, is clinically characterized by presenting severe pain and functional disability in the patient. In this situation, surgical treatment is indicated. Mid carpal fusion is a therapeutic alternative for the treatment of these arthropathies (1). Its objective is the resolution of painful symptoms, preserving the mobility of healthy joints. The latter has been objectified in different studies, the mobility of the wrist is not exclusive to a single joint but rather the combination of movements of the radiocarpal and midcarpal joints (2,3). There are several options that appear when the midcarpal joint is already affected like the Four corner fusion (4CF) which fuses the lunate, triquetrum, capitate, and hamate or just the Lunocapitate or LC joint (1,4). Fusing fewer joints, greater soft tissue damage is avoided and therefore greater preservation of wrist movement is achieved (2). Furthermore, LC fusion requires less operative time, with an easier and more reproducible learning curve. Recent studies reaching the conclusion that LC fusion can restore function and almost eliminate pain in wrists operated with this technique, with funcional results and complications similar to those described in previous studies of 4CF (4,10).

The above mentioned procedures were described in the literature to be performed as open surgery and are commonly carried out in this way; this requires extensive dissection and soft tissue damage, including the joint capsule and the dorsal carpal ligaments, to expose the surgical site. This could lead to iatrogenic joint stiffness, in addition to that already generated by carpal fusion. This is why in recent years it has been proposed to perform these techniques by arthroscopic surgery to try to minimize some of the complications that occur in the open procedures (5). The wide intra-articular exposure of the wrist under the arthroscopic view allows a correct diagnosis of the structures involved in the arthropathy and, depending on what is observed, the surgeon can decide on one of several forms of partial fusion of the wrist (6). In combination with a percutaneous fixation technique, arthroscopic partial wrist fusion can potentially generate a better functional outcome by preserving (with minimal surgical damage) supporting ligaments and capsular structures and achieving maximum movement for each type fusion because the effect of extra-articular adhesion associated with open surgery can be minimized. The lower aggressiveness of the procedure also reduces the inflammatory response of the tissues and postoperative pain, which favors rehabilitation. There is also a cosmetic benefit with a minimal surgical scar.

However, the literature on the outcome of arthroscopic lunocapitate fusion is scarce. Our objective is to compare the results obtained with our arthroscopic technique, contrasting them with those previously published.

CASE REPORT

The patients underwent arthroscopic lunocapitate arthrodesis with retrograde percutaneous compressive screws, with exeresis of the scaphoid and radial styloidectomy. They were operated on by the same surgeon between 2015 and 2022.

The visual analogue scale (VAS) was used, which is a unidimensional measure of pain intensity (pre and post procedure), the range of flexion and extension of the wrist (pre and post surgery) and the Mayo wrist score (Table 1) were also measured.

	AGE	SEX	PRE OP FLEX- EXT RANGE	POST OP FLEX- EXT RANGE	POST OP MAYO WRIST SCORE	PREOP EVA	POST OP EVA	TIEMPO MEDIO / F-UP
1	52	M	100	70	70	6	1	84
2	58	M	80	60	80	7	2	70
3	55	M	55	55	75	9	3	70
4	69	M	60	60	70	6	2	56
5	47	M	40	50	70	7	0	60
6	38	M	60	60	85	8	2	64
7	32	M	80	60	70	7	0	48
8	54	F	50	60	80	5	0	24
9	32	M	40	40	75	6	0	36
10	44	F	70	60	90	7	0	55
11	52	M	60	60	80	6	0	67
12	45	F	50	70	80	8	2	42
13	42	M	65	60	85	7	0	38
14	39	M	65	65	90	6	0	8
15	60	M	45	55	75	8	2	14
16	66	M	70	85	80	7	0	8
17	42	M	60	40	45	8	7	6

Tabla 1. Functional results and fusion consolidation.

Case of favorable evolution:

Malunion + material migration case:

Material failure:

DISCUSSION

The LC fusion and the arthroscopic approach are gaining more and more followers, in the bibliography there are works on the subject; but in these the surgery was by open technique (2, 3), we did not find any with a series only of LC by arthroscopic approach. There are reports of 4CF comparing open vs arthroscopic (5), or case series of two columns and LC (6), in this way.

The limitations of our study are related to the number of patients, the variation in their follow-up time (from 6 to 84 months), that it is a retrospective study without a control group, and that the compression technique used was not the same. in all patients (with one or two screws).

Arthroscopic LC arthrodesis is a demanding technique (6). In our case series of arthroscopic lunocapitate fusion plus scaphoid resection in patients with midcarpal osteoarthritis, union was confirmed in 94% (16 of 17 wrists) of the patients, in an average of 1.5 months. These results are similar to those reported by Gaubier (8) and slightly lower than Hegazy or Dargai (7,10) in which all patients reported in their study achieved union. Our incidence of consolidation was higher than other previously reported series using the open technique (3, 9). In all these studies, compressive screws were used as means of osteosynthesis.

Regarding the Mayo Wrist Score that assesses pain, the active flexion/extension arc (in comparison with the contralateral side), grip strength (in comparison with the contralateral side), and the ability to return to regular employment or activities; we obtained an average result of 76.5, higher than others previously published (3.9) but lower than Hegazy and Dargay (7, 10) who reported an average of 82.

We also observed in the other publications cited an improvement in the average wrist flexion-extension arc in the postoperative period (from 1.1° to 19.9°) when in our study it decreased by 2.4°. We found no superiority in terms of postop VAS score compared to the other studies (Table 2).

Despite being a technically demanding approach, Limited tissue exposure, less damage to capsular structures including dorsal carpal ligaments, smaller incisions and better aesthetic results are potential benefits over open approach. (6)

Based on the above, we believe that lunocapitate arthrodesis for the treatment of midcarpal arthropathy, performed arthroscopically, is an option to consider once the technique has been mastered.

	n	Union rate	Preop flex-ext	Postop flex-ext	MAYO	Preop VAS	Postop VAS	Average Follow-up	Non union	Material migration
Lopez Osornio	17	94%	61,8°	59,4°	76,5	6,9	1,23	44 months	1 (6%)	1 (6%)
Goubier	13	92,30%	59°	64°	not reported	7,3	1,25	29 months	1 (7,7 %)	not reported
Hegazy	12	100%	74,1°	75,2°	82,8	5,8	0,75	37,4 months	not reported	not reported
Yao	10	80%	61°	72,5°	70	5	1,1	44,5 months	2	2
Dargai	10	100%	60,6°	80,5°	82,4	5	1	122 months	not reported	not reported
Abdelaziz	15	87%	59,6°	70,1°	74,3	not reported	not reported	25,2 months	2 (13%)	not reported

Table 2. Comparison of functional results and fusion consolidation

Conflicts of interest:

The author declare that he doesn´t have conflicts of interest related to the subject matter or materials discussed in this article.

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