



Differences in Inflammation, Radiological and Clinical Outcomes between Short Arm Cast and Long Arm Cast in Intraarticular Distal Radius Fractures

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Abstract

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BACKGROUND: Distal radius fractures are the most common upper extremity fractures with a prevalence of 20% of all limb fractures. According to the distal radius fracture guidelines by the American Academy of orthopedic surgeons, conservative therapy can be used in the management of distal radius fractures that are well reduced.

AIM: The purpose of this study was to compare conservative therapy of short arm cast (SAC) and long arm cast (LAC) in the management of intraarticular distal radius fractures.

METHODS: A prospective cohort observational study with consecutive sampling was conducted on 24 intraarticular distal fracture patients who underwent SAC and LAC procedures. The parameters measured were Interleukin-6 (IL-6) score, ulnar variance (UV), dorsal tilt (DT), articular step-off (SO), radiological union score system (RUSS), and patient-rated wrist evaluation (PRWE) score.

RESULTS: The dominance of patients was males aged 46 years, with an average IL-6 levels at 0–24 was 1139.23 ± 266.82 SAC and 1082.64 ± 255.85 LAC, and IL-6 levels at 48 h was 102.98 ± 39.31 SAC and 118.38 ± 39.15 LAC; 2 patients with SAC and 1 patient with LAC obtained unacceptable reduction at week 2 based on UV, DT, SO which did not differ significantly from each follow-up; RUSS 6.08 ± 0.76 SAC and 5.71 ± 0.61 LAC; and PRWE 73.23 ± 4.42 SAC and 71.86 ± 4.07 LAC. Based on statistical analysis, there were insignificant differences in IL-6, UV, DT, SO, RUSS, and PRWE levels between the SAC and LAC groups ($p > 0.05$).

CONCLUSION: Conservative therapy with SAC may be an option for immobilization of distal radius fracture similar to LAC.

Introduction

Distal radius fractures are one of the most common types of upper limb fractures and are the most commonly treated fractures in emergency departments worldwide. Conservative treatment with a short arm cast (SAC) and long arm cast (LAC) has been reported to be equivalent to operative therapy for the management of distal radius fracture. So far, there are no specific guidelines that state which one is better between SAC or LAC for the treatment of distal radius fractures [1].

Conservative treatment with SAC or LAC offers effective fracture management at a lower cost than operative therapy. According to Kim and Park SAC can maintain the same effective reduction as LAC, and can also limit rotational movements in the arm which are generally more dominant in LAC [2]. In addition, SAC immobilization is considered to have the advantage of providing comfort by freeing the elbow joint, thereby reducing the risk of joint stiffness. This treatment is important to study given the high prevalence of distal

radius fractures reaching 20% of all limb fractures. In the United States, the annual incidence is estimated at 16.2/10,000 population [3], [4].

According to the clinical management guidelines for distal radius fractures by the American Academy of orthopedic surgeons in 2010, operative fixation is recommended as a treatment for distal radius fractures with intraarticular displacement. In contrast, in the same guideline, there are other recommendations that address cast immobilization as the definitive treatment for patients with unstable but adequately reduced distal radius fractures [5]. Research by Leung *et al.* reported a clinical improvement of Modified Green and O'Brien Scoring up to 80% within 2 years after conservative cast immobilization in patients with intraarticular distal radius fractures. However, this study also reported a rate of re-displacement of up to 28% after cast immobilization which resulted in the need for further action in the form of operative fixation in 65% of cases. A randomized controlled trial study by Dib *et al.* comparing SAC and LAC immobilization in 280 patients with distal radius fractures showed that

the SAC procedure was as effective as LAC with equal reduction failure rates in both groups (mean rate of reduction failure radial length 1.59 mm/1.63 mm, radial inclination 2.83°/2.54°, and volar tilt 4.11°/3.52°). The use of SAC was reported to be as effective as LAC in maintaining distal radius fracture reduction [6].

The management of cast immobilization in intra-articular distal radius fractures is still very controversial. There were limited data regarding the type of cast immobilization for the treatment of intraarticular distal radius fractures. The aim of study is to compare the effectiveness of fracture immobilization with SAC and LAC in patients with distal radius intraarticular fractures based on clinical outcomes with patient-rated wrist evaluation (PRWE) scores, radiological outcomes with radiological union score system (RUSS), fracture reduction with parameters of ulnar variance (UV), dorsal tilt (DT), articular step-off (SO) on plain radiological photographs; and inflammatory outcome with Interleukin-6 (IL-6) serum.

Materials and Methods

This research was an analytic observational study with a prospective cohort design. Sample selection was carried out using the randomized consecutive sampling method in patients with intraarticular distal radius fractures with conservative therapy at Prof. Dr. I.G.N.G. Ngoerah Hospital, from June 2022 until October 2022. We divided the samples into two groups, namely SAC and LAC. There were 15 samples in each group. The ethical clearance of this study was granted by the Research Ethics Commission at the Faculty of Medicine of Udayana University/Prof. Dr. I.G.N.G. Ngoerah Hospital Denpasar. All subjects were given an explanation regarding the purpose of the study and were asked to fill out a written informed consent before the procedure.

We included patients with well-reduced fractures of the distal radius intraarticular (UV <2 mm, DT <10°, SO <2 mm), underwent SAC or LAC, age 40–70 years old, and agree to participate in this study by signing an informed consent form. We excluded patients with open fractures of the distal radius; patients with a history of other joint inflammation due to inflammation, autoimmune, inflammatory systemic disease, or other chronic diseases; patients with cancer or infection in any part of the body (for example the respiratory tract, digestive tract, urinary tract or skin); and history of taking immunosuppressive drugs. The outcomes assessed in this study were PRWE, RUSS, fracture reduction scores (radiologically using UV, DT, and SO calculations), and IL-6 levels.

Before immobilization, X-rays were performed on the study subjects. The study subjects were made unaware of the treatment performed (single blind). The patient underwent a hematome block procedure

to reduce pain during closed reduction using 2 mL lidocaine. After obtaining a fracture reduction that meets the criteria by installing SAC or LAC, we performed another X-ray (week 0) and blood collection for IL-6 examination. Fracture reduction was assessed based on 3 radiological parameters, namely UV, DT, and SO which were evaluated at 0, 2, and 6 weeks. Radiological examination at week 2 aims to assess loss of reduction. If a loss of reduction is found, the casting will be corrected with a skin-tight cast using the same type of casting. The PRWE score and RUSS score were assessed 6 weeks after the SAC or LAC installation was performed. Assessment of IL-6 levels was carried out twice with blood sampling, namely within 24 h before SAC or LAC insertion, and a second collection after 48 h of SAC or LAC insertion.

All statistical analyzes were performed using the SPSS for Windows software program (Version 22; IBM Corp, Armonk, NY, USA). The distribution of the research data was analyzed using the Shapiro-Wilk test. The PRWE, RUSS and IL-6 levels were compared between the SAC and LAC groups using unpaired t-test. To assess the decrease in IL-6 levels before and after the procedure, we performed a paired t-test. The loss of reduction event between groups was analyzed using the Chi-square test, while the loss of reduction parameter between groups was analyzed using the Mann-Whitney test. The significance level (α) of this study was set at a probability value of <0.05.

Results

The demographic characteristics of the patients are listed in Table 1. The mean age of the patients in this study sample was 46.6 ± 11.37 years SAC and 47.13 ± 8.57 years LAC. The sex ratio was 2:1, with male predominance in both groups (66.7%). On IL-6 examination at 0–24 h, the average was 1139.23 ± 266.82 SAC and 1082.64 ± 255.85 LAC. Meanwhile, on the IL-6 examination at 48 h, it was found that the average IL-6 level decreased to 102.98 ± 39.31 SAC and 118.38 ± 39.15 LAC.

Table 1: The characteristics of the research subjects

Variables	SAC		LAC	
	n (%)	Mean ± SD	n (%)	Mean ± SD
Age		46.6 ± 11.37		47.13 ± 8.57
Male	10 (66.7)		10 (66.7)	
Female	5 (33.3)		5 (33.3)	
IL-6 24 h		1139.23 ± 266.82		1082.64 ± 255.85
IL-6 48 h		102.98 ± 39.31		118.38 ± 39.15
Loss of reduction	2 (13.3)		1 (6.7)	
RUSS		6.08 ± 0.76		5.71 ± 0.61
PRWE		73.23 ± 4.42		71.86 ± 4.07

*SAC: Short arm cast, LAC: Long arm cast, SD: Standard deviation, IL-6: Interleukin-6, RUSS: Radiologic union score system, PRWE: Patient rated wrist evaluation.

At the 2nd week of follow-up, 3 patients experienced loss of reduction, divided into 2 (13.3%) patients in the SAC group and 1 (6.7%) patient in the LAC group. At the 6th week of follow-up, the mean RUSS score was 6.13 ± 0.74 SAC and 5.80 ± 0.67 LAC. While clinically, the average PRWE score was

73.23 ± 4.42 SAC and 72.40 ± 4.45 LAC. On radiological measurements at week 2, patients with loss of reduction were 13.3% in the SAC group and 6.7% in the LA group.

In this study, all patients had improvement of fracture conditions based on 3 parameters (UV, DT and SO) in week 0, 2nd week and 6th week (Table 2).

Table 2: Loss of reduction characteristics based on UV, DT, SO

Week	UV		DT		SO	
	SAC (n = 15)	LAC (n = 15)	SAC (n = 15)	LAC (n = 15)	SAC (n = 15)	LAC (n = 15)
0	-0.21 ± 0.52	-0.26 ± 0.42	3.73 ± 1.44	4.47 ± 2.62	0.32 ± 0.18	0.37 ± 0.27
2	-0.06 ± 0.67	0.21 ± 0.96	4.67 ± 2.91	4.73 ± 1.98	0.43 ± 0.54	0.36 ± 0.18
6	-0.05 ± 0.23	0.07 ± 0.38	4.77 ± 1.48	5.36 ± 2.50	0.34 ± 0.09	0.44 ± 0.26

*UV: Ulnar variance; DT: Dorsal tilt; SO: Articular step-off, SAC: Short arm cast, LAC: Long arm cast.

Unpaired t-test analysis of inflammatory, radiological and clinical outcomes using IL-6 level examination, the RUSS, and PRWE scores showed no significant difference (p > 0.05) between immobilization with SAC and LAC on intraarticular fracture of the distal radius. These results indicate that the level of effectiveness of SAC is quite balanced with LAC (Table 3).

Table 3: Unpaired t-test between SAC and LAC

Variables	SAC	LAC	p-value
IL-6 0-24 h	1139.23 ± 266.82	1082.64 ± 255.85	0.558
IL-6 48 h	102.98 ± 39.32	118.38 ± 39.155	0.291
Delta IL-6	1036.24 ± 284.45	964.25 ± 265.27	0.479
RUSS	6.08 ± 0.76	5.71 ± 0.61	0.536
PRWE	73.23 ± 4.42	71.86 ± 4.07	0.409

*SAC: Short arm cast, LAC: Long arm cast, IL-6: Interleukin-6, RUSS: Radiologic union score, PRWE: Patient-rated wrist evaluation.

Continuing to examine the inflammatory outcome of IL-6 levels, although no significant difference was found between the two groups, the paired t-analysis test on IL-6 levels before and after the procedure showed a significant reduction in both groups. IL-6 has been shown to be able to describe the inflammatory process that takes place during bone healing from the initial phase with a significant decrease (Table 4).

Table 4: Paired t-test of IL-6 serum level before and after the procedure

Groups	0-24 h	48 h	p-value
SAC	1139.23 ± 266.82	102.98 ± 39.32	0.543
LAC	1082.64 ± 255.85	118.38 ± 39.155	

*SAC: Short arm cast, LAC: Long arm cast.

In this study, 3 patients experienced loss of reduction in the 2nd week after the procedure, consisting of 2 (13.3%) patients in the SAC group and 1 (6.7%) patient in the LAC group. The difference in the comparison of patients who experienced the loss of reduction was considered insignificant between the two groups with a p > 0.05. Based on relative risk calculations, it was found that the risk of intra-articular distal radius fracture patients experiencing loss of reduction was 2 times in the SAC group compared to the LAC group (Table 5).

Table 5: Chi-square test of loss of reduction event in 2nd week between SAC and LAC group

Groups	Loss of reduction		p-value	RR (95% CI)
	(+) (%)	(-) (%)		
SAC	2 (13.3)	13 (86.7)	0.543	2 (0.202-19.775)
LAC	1 (6.7)	14 (93.3)		

*SAC: Short arm cast, LAC: Long arm cast.

In the loss of reduction examination, the three radiological parameters were compared between the

Table 6: Mann-Whitney test of loss of reduction parameters in the SAC and LAC groups in weeks 0, 2, and 6

Loss of reduction		SAC	LAC	p-value
UV	Week-0	-0.21 ± 0.52	-0.26 ± 0.42	0.578
		3.73 ± 1.44	4.47 ± 2.62	0.781
		0.32 ± 0.18	0.37 ± 0.27	>0.05
DT	Week-2	-0.06 ± 0.67	0.21 ± 0.96	0.924
		4.67 ± 2.91	4.73 ± 1.98	0.386
		0.43 ± 0.54	0.36 ± 0.18	0.501
SO	Week-6	-0.05 ± 0.23	0.07 ± 0.38	0.714
		4.77 ± 1.48	5.36 ± 2.50	0.593
		0.34 ± 0.09	0.44 ± 0.26	0.161

*UV: Ulnar variance, DT: Dorsal tilt, SO: Articular step-off, SAC: Short arm cast, LAC: long arm cast.

SAC and LAC groups at weeks 0, 2, and 6. Based on the Mann-Whitney analysis test, there were no significant differences in the parameters of UV, DT, and SO at weeks 0, 2, and 6 between the SAC and LAC groups (Table 6).

Furthermore, based on the examination period, the loss of reduction parameters using UV, DT, and SO in each SAC and LAC group were compared between the 0th and 2nd week of follow-up. Based on the Wilcoxon test, there were no significant differences in all parameters (Table 7).

Table 7: Wilcoxon test of loss of reduction parameters in the SAC and LAC groups in weeks 0 and 2

Loss of reduction	Week 0	Week 2	p-value	
SAC	UV	-0.21 ± 0.52	-0.06 ± 0.67	0.655
	DT	3.73 ± 1.44	4.67 ± 2.91	0.215
	SO	0.32 ± 0.18	0.43 ± 0.54	0.655
LAC	UV	-0.26 ± 0.42	0.21 ± 0.96	0.655
	DT	4.47 ± 2.62	4.73 ± 1.98	0.620
	SO	0.37 ± 0.27	0.36 ± 0.18	0.157

*UV: Ulnar variance, DT: Dorsal tilt, SO: Articular step-off, SAC: Short arm cast, LAC: long arm cast.

Similarly, at the next follow-up, the parameters of loss of reduction using UV, DT, and SO in each SAC and LAC group were compared between the 0th and 6th weeks of follow-up. Based on the Wilcoxon test, there were no significant differences between all parameters in both SAC and LAC groups (Table 8).

Table 8: Wilcoxon test of loss of reduction parameters in the SAC and LAC groups in weeks 0 and 6

Loss of reduction	Week-0	Week-6	p-value	
SAC	UV	-0.21 ± 0.52	-0.05 ± 0.23	>0.05
	DT	3.73 ± 1.44	4.77 ± 1.48	0.140
	SO	0.32 ± 0.18	0.34 ± 0.09	0.317
LAC	UV	-0.26 ± 0.42	0.07 ± 0.38	0.564
	DT	4.47 ± 2.62	5.36 ± 2.50	0.084
	SO	0.37 ± 0.27	0.44 ± 0.26	0.083

*UV: Ulnar variance, DT: Dorsal tilt, SO: Articular step-off, SAC: Short arm cast, LAC: long arm cast.

Discussion

General characteristics of research subjects

In this study, the characteristics of patients with intraarticular distal radius fractures were dominated by male patients with an average age of 46.6 and 47.13 years. This profile is in accordance with the

characteristics of distal radius fracture patients in the literature which generally occur in two groups, namely: men aged under 50 years, and women aged more than 50 years. Distal radius fracture patients in males are more commonly found at a young age. Likewise, in Obert *et al.*'s systematic review study of 381 patients, it was shown that the prevalence of distal radius fractures in young men was caused by high-energy trauma [7].

PRWE and RUSS scores are widely used scores to assess the clinical outcome of patients with distal radius fractures. In this study, patients with distal radius fractures who were managed conservatively had mean PRWE scores of 73.23 ± 4.42 SAC and 71.86 ± 4.07 LAC, and RUSS scores of 6.08 ± 0.76 SAC and 5.71 ± 0.61 LAC. In the study by Putra *et al.*, the average PRWE score was 79.55 ± 3.33 , and RUSS 4.00 ± 1.18 . On the RUSS score, the findings of this study have better results with an average score of 6 ± 0.72 . These results indicate conservative therapy either SAC or LAC in this study which was evaluated based on radiological examination showing good reduction [8].

Association between IL-6 Levels in distal radius fracture patients with conservative treatment of SAC and LAC

In this study, we compared IL-6 levels at 0–24 h before and 48 h after SAC and LAC procedure in 24 patients with uncomplicated distal intra-articular fractures. The results of unpaired t-test analysis found no significant difference between IL-6 levels in SAC and LAC. IL-6 is a pleiotropic functional growth and differentiation cytokine with context-dependent inflammatory and anti-inflammatory properties. These cytokines play important regulatory roles in innate and adaptive immunity, hematopoiesis, and bone, muscle, and metabolic homeostasis. IL-6 is produced upon stimulation by most nucleated cells, including monocytes, macrophages, endothelial cells, fibroblasts (primary source), T cells, B cells, granulocytes, mast cells, myocytes, osteoblasts, osteoclasts, osteocytes, chondrocytes, glial cells, and keratinocytes [9].

Pro-inflammatory cytokines including IL1, IL6, and TNF α are important signaling during the early stages of fracture. In addition, TNF α increases in the late repair phase, and several pro-inflammatory cytokines (eg, IL1, IL6, TNF α) are highly expressed in the remodeling phase. In the final stage of bone healing, bone is restored to its original structure, shape, and mechanical properties through remodeling. The balance between osteoblastic and osteoclastic activity that results in bone deposition and bone resorption plays an important role during the remodeling stage. Several pro-inflammatory cytokines (eg, IL1, IL6, and TNF α) are highly expressed during this stage [10].

So far, no studies have directly compared IL-6 cytokine in patients with SAC versus LAC but several previous studies support this finding. Based

on a study on rats by Wallace *et al.*, it was found that IL-6 was increased in the initial phase of fracture, then significantly reduced at 2 weeks after fracture, and increased again at 6 weeks after fracture. This trend was found both in mice that were given treatment in the form of ablation of the fracture and mice that were not given treatment for the fracture. This significant decrease in IL-6 levels is in accordance with the results of this study. Other studies have also found that global IL-6 inhibition does not affect fracture healing caused by trauma and explains that IL-6 production remains abundant with different signaling pathways in helping fracture healing [11]. This proves that IL-6 is related to bone healing and is not related to the type of treatment given to treat fractures.

Association of loss of reduction in distal radius fracture patients with conservative treatment of SAC and LAC

The results of this study revealed no significant difference in the loss of reduction outcome between groups. Based on the RR value, the risk of loss of reduction were two times in the SAC group compared to the LAC. Loss of reduction is one of the risks that can occur with conservative management. Loss of reduction was assessed using the parameters ulnar variation, DT, and SO. In these three parameters which were measured at weeks 0, 2, and 6, there was no significant difference between the SAC and LAC groups. These results are in accordance with the study by Park *et al.*, which showed no significant results in comparing SAC and LAC therapy in patients with distal radius fractures in the geriatric population. In detail, in that study, the radiological parameters used had an average score that was quite balanced in both groups, namely: volar tilt ($8.1 \pm 11.5^\circ$ vs. $8.6 \pm 5.3^\circ$), radial inclination ($19.3 \pm 4.6^\circ$ vs. $19.5 \pm 3.8^\circ$), and radial length (8.7 ± 2.4 mm vs. 9.2 ± 2 mm) post reduction [5].

Study by Kachooei *et al.* showed no significant differences in the parameters of radial inclination, DT and radial shortening in the SAC and LAC groups. In that study, there was a comparison of differences in the parameters of radial inclination, DT, and radial shortening which were relatively the same based on the amount and percentage. These results are also supported by the presence of joint stability that is maintained by the use of SAC [1].

One of the disadvantages of using SAC and LAC immobilization is the loss of reduction that occurs during the use of the casting. In the first 1–2 weeks of using the casting, the tissue swelling around the pinched fracture on the inside of the casting will begin to subside. This condition indirectly provides an opportunity for loss of reduction due to changes in fixation by casting [12]. This is not supported by the results of this study, where the results of radiological parameter calculations showed that the stability of the

wrist joint was maintained with the number of patients experiencing a fairly low loss of reduction, below 15% (13.3% in the SAC group and 6.7% in the LAC group).

Another concern in using SAC compared to LAC is the stability of the joint that can be maintained during the immobilization period by casting. According to the study of Kim *et al.*, SAC can maintain reduction and limit rotational movement of the arm. The limitation of active forearm rotation that can be obtained with the use of SAC was found to be positively correlated with the length of the cast used. When SAC is used to limit wrist movement and forearm rotation, this study suggests better stability to keep the arm from pronated rotation and supination of the arm by extending the cast proximally, with one condition: it does not cause other complications such as pressure on the forearm, antecubital fossa, where skin breakdown can occur [2].

In the long term, cast immobilization has a risk of developing post-traumatic arthritis. This was proven by Lameijer *et al.* who reported that non-osteoporotic patients had a relatively high prevalence of post-traumatic arthritis after experiencing distal radius fractures, despite the relatively short follow-up time of cast immobilization. This condition is consistent with the fact that patients using LAC have a higher incidence of post-traumatic arthritis. In addition, regardless of the type of AO/OTA fracture experienced, patients with post-traumatic arthritis had a very large range of motion or less, but no changes in grip strength measurements. Non-osteoporotic patients who experience distal radius fractures experience a decrease in general function and dissatisfaction, which is affected by reduced active range of motion [13].

Association of RUSS in distal radius intraarticular fracture patients with conservative therapy of SAC and LAC

The results of our study revealed that the RUSS score between SAC (6.08 ± 0.76) and LAC (5.71 ± 0.61) did not differ significantly. This is in line with a prospective randomized multicenter study by Park *et al.* that compares SAC and LAC for the treatment of stable distal radius fractures in patients older than 55 years. Park *et al.* found that there were no significant differences in radiological parameters (unions) between groups except for volar tilt. However, the mean disability score attributable to cast immobilization and the incidence rate of shoulder pain were significantly higher in patients with LAC. He concluded that SAC was as effective as LAC for stable distal radius fractures in the elderly [2].

Another study by Caruso *et al.* also found similar results, that there was no statistically significant difference between the two cast types in terms of RI, RH, UV, or PT. There was no statistically significant difference in clinical outcome between patients who showed acceptable radiographic parameters at follow-up and those who did not [14].

There was no significant difference in the outcome of several immobilization techniques, including SAC and LAC. In addition, a prospective randomized trial study on 100 patients who received SAC and LAC therapy by Kachooei, et.al also found that there was no significant difference in joint stability in SAC and LAC. In their study, they recommend that the use of SAC with higher costs and satisfaction rates is preferable to LAC [1].

Association of PRWE in distal radius intraarticular fracture patients with conservative SAC and LAC treatment

This observational study found no significant difference in PRWE outcomes between SAC (73.23 ± 4.42) and LAC (71.86 ± 4.07). Jung *et al.* assessed the comparison of the functional outcomes using SAC in the semisupinated position and LAC in the neutral position. In this clinical study, both groups showed improvement in all parameters with significant differences in grip strength, visual analog scale score for pain, modified Mayo Wrist Score, Disability of the arm, shoulder, and hand (DASH) score, and PRWE. Overall, there was no significant difference in postoperative outcomes between LAC and SAC [4].

Another study by Okamura *et al.*, aimed to compare SAC and LAC at the end of 24 weeks follow-up using DASH, evaluation of radiographic parameters, VAS, PRWE, functional evaluation, and the incidence of adverse events. There was no statistically significant difference between the two groups at any of the follow-up assessments other than DASH. The PRWE was similar between groups [15].

Strengths and weaknesses of the study

There are several advantages of this study. This study is the first study to compare SAC and LAC based on PRWE and RUSS outcomes in Indonesia and is the first study to compare SAC and LAC based on the level of IL-6 serum. The study population is also specific in the distal radius intraarticular fracture without complications. However, there are various limitations of this study. The number of samples in this study was limited to 30 samples so that the sub-group and multivariate analysis to evaluate confounding variables could not be carried out. In addition, the length of follow-up in this study was short and still can be extended.

Conclusion

In conclusion, there was no difference between SAC and LAC immobilization for distal radius intraarticular

fracture in terms of serum IL-6 level, UV, DT, SO, RUSS, and PRWE. We recommend that SAC immobilization can be a therapeutic option for handling intra-articular distal radius fractures in addition to LAC. Further study can be developed with a longer follow-up and sub-group or multivariate analysis to control the confounding variables which may affect the outcome of the study.

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Ethical Approval

The research protocol for Ethical Clearance from the Research Ethics Commission at the Faculty of Medicine, Universitas Udayana/Prof. Dr. I.G.N.G. Ngoerah Hospital was submitted before the research is carried out. Subjects who met the study criteria were given an explanation of the purpose of the study and were asked to fill out written informed consent.

Credit Author Statement

MAY: Conceptualization, Methodology, Software, Formal analysis, Investigation, Resources, Data Curation, Writing original draft preparation, Visualization, Project administration. KSK: Conceptualization, Validation, Review and editing, Supervision. MBK: Conceptualization, Validation, Review and editing, Supervision.

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