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Osteosynthesis of the Displaced Fractures of the Distal Radius Treated with New-Clip® Plate: Case Study in the Basse Terre Hospital

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Abstract

Background and Objectives: The distal radius fracture (DRF) is a major public health problem in northern countries. Its frequency is constantly increasing. The locked anterior plate with its well-established biomechanical properties, offers a reliable alternative. The aim of this study was to evaluate the radiological, the functional results and to determine the factors of poor postoperative prognosis of DRF treated with Newclip radial plates®. **Methodology**: This prospective cohort study evaluates the radiological and functional outcames of displaced radius fractures (DRFs) in patients ≥50 years old treated with Newclip® (locked anterior plates) at the Basse-Terre Hospital in Guadeloupe from 2022 to 2024. The patients were categorized into those with epiphyseal involvement (E1 - E4) and without epiphyseal involvement (E0) based on Laulan's MEU classification. Radiological parameters (distal radio-ulnar index (DRUI), radial inclination frant view (IRF), radial inclination sagittal view (IRS) were assessed pre and post-operatively. Functional recovery was evaluated at 12 months using the QuickDash questionnaire. **Results**: Falls were the most common cause of fracture. Post-operatively, SRI was the least restored parameter. Poor prognostic factor for SRI improvement included posterior commimution and unstable fractures. Factors associated with higher QuickDash scores included unstable factures, unrestored DRUI, low plate position, metaphyseal features, and ulnar features. **Conclusion**: The anterior locking plate osteosynthesis is reliable treatment option with excellent functional outcomes.

Keywords

Fracture, Distal Radius, Surgical Treatment, Newclip® Plate, Basse Terre

1. Introduction

Distal radius fractures (DRFs) are the most common fracture injuries, along with proximal femur fractures (which they precede by about ten years) and metacarpal fractures [1]. They are the most associated with osteoporosis, along with those of the spine and proximal femur [2].

Fowler reports that DRFs represent 10% to 25% of all fractures [3]. Cummings *et al.* in their work on the risks of fractures and coronary heart disease in women note that a 50-year-old white woman has a 16% risk of suffering a hip fracture, a 15% risk of suffering a DRF, and a 32% risk of suffering a vertebral fracture during her remaining life [4].

Figl *et al.* project an inflation of more than 50% of FRD by 2030 due to population ageing, making FRD a major public health problem [5]. A Congolese DR study ranks this fracture in second position after that of the humeral diaphysis [6].

The DRFs include several types of lesions with different therapeutic modalities and late functional repercussions. Improved knowledge of these lesions is leading to treatment moving towards the search for a reduction that is as anatomical as possible, contained by means that provide sufficient stability to allow early mobilization of the wrist [7] [8].

Several authors have noted an increase in specific surgical treatment adapted to the type of fracture: pinning, external fixator, dorsal plate or anterior plate supplanting traditional orthopedic treatment [2] [3]. Indeed, 45% of fractures of the distal end of the radius are unstable, and require surgical management, the modalities of which remain, however, without consensus to date. The locked anterior plate, which has well-established biomechanical properties, is currently enjoying some popularity and would be a reliable alternative [9] [10].

The aim of this study was to evaluate the subjective functional and immediate postoperative radiological results, and to determine the poor prognostic factors in a prospective series of patients with displaced distal radius fractures treated with the Newclip® locked anterior plate.

2. Material and Methods

Nature, context and period of the study

This prospective cohort study evaluates the radiological and functional outcames of displaced radius fractures (DRFs) in patients ≥50 years old treated with Newclip® (locked antererior plates at the Basse-Terre Hospital in Guadeloupe from 2022 to 2024.

Study population and selection criteria

The patients was categorized into those with epiphyseal involvement (E1-E4) and without epiphyseal involvement (E0) based on Laulan's MEU classification. Radiological parameters (distal radio-ulnar index (DRUI), radial inclination frant view (IRF), radial inclination sagittal view (IRS) were assessed pre and post-operatively. Functional recovery was evaluated at 12 months using the QuickDash questionnaire.

Inclusion criteria

Patient inclusion took place from 2022 to 2024. Inclusion criteria were all acute fractures (fracture less than 4 weeks old) displaced distal radius, requiring surgical reduction and stabilization with a Newclip® locking plate. Patients should be 50 years of age or older and have been informed in advance of the use of the data for scientific purposes. Functional assessment should be conducted at 12 months by telephone, a return of the questionnaire by email was also an option. Verbal consent was obtained each time. Surgical indications were made by 4 hospital practitioners and they were the main operators in most cases.

Exclusion criteria

Exclusion criteria were difficult-to-use radiological images, fractures and patients who did not complete the QuickDash questionnaire following death or non-response by telephone.

Study parameters

The study parameters were sociodemographic (age, sex, place of residence and circumstance of occurrence); clinical (existence of a diagnosis of FRD; the affected side (right and/or left); preoperative neurological status); Lafontaine instability criteria; radiological (preoperative and postoperative data). Preoperative radiological data were evaluated on computer by an independent evaluator. These data were made with the DRUI, the IRF, the IRS, the existence or not of a posterior comminution; the degree of metaphyseal involvement, the degree of epiphyseal involvement and the possible involvement of the ulna. Carpal involvement was not evaluated. In the postoperative period, all immediate and early complications had to be noted as well as the attitude taken following this complication. Postoperative radiological data were also evaluated on computer by the same evaluator.

Surgical procedure

The surgical procedure was performed under locoregional anesthesia (LRA) alone or general anesthesia (GA) at the request of some patients. In other cases, LRA was supplemented by GA. The operation was performed under a pneumatic tourniquet at the root of the limb, an anterior Henry approach was performed. The plate had to respect the watershed line each time. The reduction of the fracture site was performed by external maneuvers before the plate was placed. The plate was fixed under scopic control (face and profile) to ensure good reduction. The wound was sutured in two planes (subcutaneous and skin), the pronator square was not brought together. The suction drain was optional.

Post-operative protocol

Additional immobilization with a plaster splint was mandatory for a period of 3 weeks. Discharge was authorized as soon as the anesthesia was lifted. Each patient was discharged with analgesic treatment adapted to levels 1 and/or 2. The dressings were done by a state-certified nurse at home. A consultation appointment was scheduled at 3 weeks. Physiotherapy was authorized as soon as the splint was removed. It consisted of gentle passive and active mobilization, physiotherapy for analgesic purposes associated with massage and drainage.

Data source and measurements

Data was collected using a pre-established form containing the study parameters. Data was entered into Excel 2013 and then transferred to SPSS (Statistical package for the social sciences) version 27 and R 5.5. The radiological analysis was performed directly on digitised images using PACS (Picture Archiving and Communication Systems) software. A non-probability sampling was used.

Statistical analyses

It was carried out with the SPSS software version 27 and R 5.5. To compare the quantitative and qualitative values, we used as tests of statistical analyses:

- The Student t test, for the comparison of quantitative variable means.
- The chi-2 test comparison of qualitative variables.
- The ANCOVA analysis of variance test, for the comparison of inter- and intragroup effects.
- Finally, the analysis of regressions and correlations.
- The significance level was set at $p < 0.05$.

Ethical consideration

This study had received permission from the Head of Department. We did not need authorization from the Committee for the Protection of Persons because the research was non-interventional.

The data were processed anonymously in accordance with the Declaration of Helsinki.

3. Results

A total of 61 patients was initially included, 8patients (13% of the initial sample) were excluded. We retained 53 patients. The majority were women: 33 women (62.3%). Among our patients, 10 (18.9%) were tourists. The 62 - 67 age group predominated, 30.2% (n = 16). Falls were the most frequent circumstance of occurrence in our study, n = 48 (90.5) (Table 1). Our results showed that the left side was the most affected n = 31(58.5%). Fractures were unstable in 66% n = 35. The distribution of patients according to epiphyseal damage showed that 28 (52.8%) had no epiphyseal damage, compared with 25 (47.2%).

Table 1. Evaluation of preoperative radiological indices.

Variables	Disturbed (frequency N = 53)	Mild	Moderate	Severe	Exaggerated	Median (extreme)
Preoperative IRUD	41 (77.5%)	27 (50.9%)	-	14 (26.6%)	-	2.4 (−2 and 8)
Preoperative IRF	41 (77.4%)	16 (39%)	13 (31.7%)	8 (19.5%)	4 (9.7%)	16 (5 and 36)
Preoperative IRS	40 (75.5%)	7 (17.5%)	3 (7.5%)	9 (22.5%)	21 (52.5%)	16 (−35 and 4)

The preoperative assessment of the DRUI (Table 2) revealed that: the DRUI was disturbed in 41 patients (77.5%), with a median of 2.4 (−2 to 8). The FRI was also disturbed in 77.5% n = 41 with a median of 16 (5 - 36). The IRS was disturbed

in 75% n = 40 with a median of 16 (−35 to 44). The DRUI was severely impaired in the E0 group n = 23 and this disruption was often mild (<3 mm) in both E0 groups 69.6% (n = 16) and 61.1% (n = 11) for the E1-E4 group; p = 0.571.

The FRI was disturbed in 23 patients in the E0 group and this disturbance was largely mild (≤5˚) p = 0.571. The IRS was disturbed in 22 patients in the E0 group, and this disturbance was largely exaggerated (>25˚): E0 14 (63.6); E1 - E4 7 (39.9) p = 0.933.

Table 2. Evaluation of postoperative radiological indices and distribution of the degree of loss in the two groups.

1. DRUI							
postoperative	Frequency	%					
not recovered	6	11.30%	Degree of loss n = 6	E0	E1-E4	Total	
			Slight	3 (50%)	3 (50%)	6	
	34	64.20%	Severe	0 (0%)	0 (0%)	0	
Recovered	13	24.50%					
normal at beginning	53	100%					
Total							
2. IRF							
	E0	E1-E4	Degree of loss n = 12	E0	E1-E4	Total	P
not recovered	8 (28.6%)	4 (16%)	Slight	6 (50%)	3 (50%)	9	0.002
			moderate	1 (8.3%)	1 (8.3%)	2	
			Severe	1 (8.3%)	0	1	
	15(53.6%)	14 (56%)	Total	8 (66.7%)	4 (33.3%)	12 (100%)	
Recovered	5 (17.9%)	7 (28%)					
normal at beginning	28 (100%)	25 (100%)					
Total							
3. IRS							
	E0	E1-E4	Degree of loss n = 30	E0	E1-E4	Total	p
not recovered	15 (53.5%)	15 (60%)	Slight	5 (16.6%)	5 (16.6%)	10 (30.3%)	0.007
			moderate	4 (13.3%)	2 (6.6%)	6	
			Severe	6 (20%)	8 (26.7%)	14	
	8 (28.6%)	7 (28%)	Total	15 (49.9%)	15 (49.9%)	30 (100%)	
Recovered	5 (17.9%)	3 (12%)					
normal at beginning							

Post-operative results (Table 3) showed an absence of DRUI correction in 11.3% (n = 6). This lack of correction was slight (<3 mm) in both groups, with equal proportions. Only 11 patients, or 21%, had their FRI uncorrected. The loss was milder (<5˚) in 17% (p = 0.002).

Table 3. Analysis of Quick Dash score variant.

Group of patients	N	median	extreme	Lower limit	Higher limit	minima	maxima
E0	28	13.56	0-57	8.4	18.73	0	57
E1-E4	25	221.96	0-80	14.26	29.55	0	80
Total	53	17.5	0-80	12.99	22.01	0	80
Varience homogeneity test							
Quick dash 1 year	Levenede stat	dd1	dd12	Sig			
based on average	15 (53.6%)						
Based on median	5 (17.9%)	1	51	0.012			
Based on median with adjusted ddl	0.036	1	37.677	0.851			
based on troncated mean	0.094	1	51	0.76			
ANCOVA							
	Sum of squares	dd1	mean square	F	Sig		
Intergroups	919.477	1	919.477				
intragroups	13017.643	51	255.248	3.602	0.03		
Total	13937.12	52					

The IRS was not restored in 53.5% (n = 30), in almost equal proportions in both groups.

In terms of poor prognostic factors, patients over 50 years of age were 1.003 times more likely to experience no postoperative improvement in FRI. Patients with epiphyseal features were 6.204 times more likely to have an unimproved FRI. Patients with unstable fractures were 1.518 times more likely to have unimproved FRI. The variables selected explained 92% of the phenomenon and were globally significant (Table 4).

Table 4. Explanation for the lack of improvement in IRF.

Non Coef.	Amelioration of IRF	St. Err	t-value	p value	95% Conf	Interval	Sig
Age	1.003	0.037	0.09	0.03	0.934	1.078	**
patient's sex							
female	0.953	0.728	−0.06	0.005	0.213	4.262	***
patient group							
E1-E4	6.204	5.452	2.08	0.038	1.108	34/733	**
posterior communition							
yes	5.085	6.552	1.26	0.007	0.407	63.532	***
Lafontaine criteria							
Unstable fracture	1.518	1.94	0.33	0.044	0.124	18.571	**
Constant	0.129	0.317	−0.71	0.076	0	35.725	*
Mean dependent var		**0.421**			0.5		
Pseudo r-squared	**0.92**	**Number of**	**obs**		38		
Chi-square	**7.36**	**Prob > chi²**			0/095		
Akaike crit. (AIC)	**56.368**	**Bayesan**	**crit (BIC)**		66.193		

***p < 0.01, **p < 0.05, *p < 0.1.

Regarding the IRS, patients with posterior comminution were 3.16 more likely to experience no improvement in IRS. Those with unstable fractures were 2.453 more likely to get IRS. The selected variables explained 81% of the phenomenon and were globally significant (Table 5).

Table 5. Explanation for the lack of improvement in IRS.

No Amelioration of IRS	Coef.	St. Err	t-value	P value	95% Conf	Interval	Sig
Age	1.323	0.084	2.01	0	0.121	1.164	***
patient's sex:							
female	2.607	1.308	2.84	0.004	0.421	5.004	***
patient group							
E1-E2-E3-E4	2.508	2.054	4.04	0.069	659	4.809	*
posterior communition							
yes	3.135	3.092	3.07	0.035	0.201	3.879	**
Lafontaine criteria							
Unstable fracture	2.453	2.001	2.01	0.027	0.101	8.23	**
Constant .508		0.493	7.05	0.001		4.118	***
Mean dependent var	**0.868**	**SD dependent**	**var**	**1.303**			
Pseudo r-squared	**0.81**	**number of**	**obs**	**38**			
Chi-square	**2.604**	**Prob > chi2**		**0.03**			
Akaike crit. (AIC)	**8.999**	**Bayesian cri**	**t. (BIC)**	**2.705**			

***p < 0.01, **p < 0.05, *p < 0.1.

Explanatory analysis of the QuickDash score

The median Quick Dash in the E0 group was low: 13.56 (0 - 57) compared with the Quick Dash in the E1 - E4 group: 21.91 (0 - 80). In bivariate analysis, we noted an association between Quick Dash, epiphyseal feature, ulnar feature and IRS p < 0.05%. In multivariate analysis, it is apparent that the unstable fracture, the unrestored postoperative DRUI, the low position of the plate in relation to the pronator squared line, the M1-M4 metaphyseal features, the existence of C1 - C4 ulnar features contributed positively to the Quick Dash score, and this contribution was significant at the 5% threshold (Table 6).

Table 6. Quickdash poor prognosis factors.

Score dash	Coef.	St. Err	t-value	p value	95% Conf	Interval	Sig
Patient's sex							
Masculine	−793	4.788	−0.17	0.069	10,463	8878	*
State of DRUI	0						
post op				.			
not healed	8.559	7.312	−1.17	49	3326	16209	**
Position of the plate under	3262	4.916	−0.66	0.011	2.19	4.665	**

Continued

State of IRF post-op							
not healed	6157	5.367	1.15	8	0.4681	6995	***
State of IRS post-op							
not healed	7976	4.59	1.74	0.09	0.1293	7246	*
Ulnar feature: C1 - C4	6683	4.739	−1.41	0.006	5.253	12888	***
Metaphysal feature							
M3	10.289	6.833	1.51	4	−3.511	24.09	**
M4	8702	5217	1.67	0.003	−1834	19 237	***
Lafontaine criteria							
Unstable fracture Group	1213	5.09	0.24	13	−65	1492	**
E-E4	7728	4633	1.67	3	−1629	17084	***
Constant	11257	9726	1.16	254	−8386	30.9	
Mean dependent var	**17702**	**SD dependent**	**var**	**16452**			
R-squared	**0.773**	**number of**	**obs**	**53**			
F-test	**7.541**	**Prob > F**		**0.002**			

4. Discussion

Strength of the study

This is a prospective study conducted in a university-oriented center.

The objectives determined for this study were achieved.

The number of patients included in this series (53 patients) is close to the large series encountered in the literature. The number of patients lost to follow-up was not significant.

Our series has integrated, in addition to the Laulan classification, the elements of Lafontaine instabilities.

It constitutes the first large cohort study carried out in the orthopedics department of the CHBT.

All patients benefited from the same plate placed using the same technique, limiting the biases caused by the installation of different materials.

They were all reassessed by the same assessor at 12 months with a low complication rate.

Our study has certain limitations:

- The variability of radiological measurements. These measurements are also very dependent on the quality of the X-ray images, which itself depends on the medical electroradiology manipulators and the patient's positioning possibilities. Nevertheless, precise measurements were made, leaving no room for a simple visual estimation.
- Another limitation lies in the fact that the surgical procedure was performed by a team of 4 practitioners with different experiences, which can modify the results.

- This series did not evaluate wrist movements or grip strength.
- The study also did not assess patient satisfaction

Our cohort

As previously stated, DRFs are the most common fracture lesions along with proximal femur fractures (which they precede by about ten years) [1]. Our sample revealed an annual frequency of 27 anterior locked plate osteosyntheses. The data in the literature in our possession note a significant use of this procedure in the treatment of FRD. Huttinen [2] found that between 1998 and 2008, the use of surgical treatment in the treatment of FRD had doubled the reasons for this trend have remained unclear. They also found an increase in the use of internal fixation compared to other techniques, which more than doubled over an 11-year period.

Bjarke *et al*., without determining the exact annual frequency of the use of plates in the management of DRFs, noted in their study that the use of plates had become the first choice since 2007 with good clinical and radiological results. The same authors noted that its use reached a rate of 9% in 2018 [11].

Koval, for his part, noted in his study a decrease in broaching in favor of plates due to the high rate of complications following broaching [12].

Our study population reveals that the age group of 62 - 67 years was the most preponderant with 30.2% (n = 16). The mean age is 64.89 ± 10.21 years (p = 0.004). This mean is close to that found by Jakub (64 ± 17.9 years) in his study devoted to the quality of life after a FRD [13]. It is slightly lower than that found by Mayank *et al* (71.1 ± 8.89) [14]. and to that found by Maxence *et al.* (72 years). The average age of the women was higher than that of the men: 67.35 ± 11.9. This is in line with several series published in the literature (Chen *et al* 2015, Stenley 2016) [10] [15]. When both groups were considered, the epiphyseal feature was observed in patients aged over 60 years 44.2% (n = 23) and female.

In terms of distribution, DRFs are distributed as a function of age, which is bimodal. There is a first peak due to high-energy trauma in young individuals (5 - 24 years) with good bone quality. The second peak occurs mainly after the age of 50. It follows low-energy trauma in a population composed mainly of postmenopausal women with osteoporotic bone [10] [15]. The bone density in the latter population is often reduced. The association between DRFs and bone mineral density in postmenopausal women is well established [16].

Our results also showed that falls were the most frequent circumstance of occurrence n = 48 (90.5%). The falls found in our series meet the series of several authors [17]-[19].

With regard to radiological parameters, our series evaluated 3 radiological parameters. Herzberg and Dumontier have provided a simple way to understand the DRFs, allowing to identify and therefore treat all the injuries without forgetting any. This is a list of essential elements whose anatomy must be restored, because it is linked to the functional prognosis. These are the IRS, the FRI, the joint impaction (IA) and the shortening of the radius (by metaphyseal compression) as well as the intracarpal and distal radio-ulnar joint (DRUJ) lesions contemporary

with the trauma [20].

Our preoperative results showed a disturbance of the IRS in 76% of cases. Post-operatively, the IRS was the least restored index in half the cases. This lack of reduction was 60% in the E1-E4 group and 53% in the E0 group (p = 0.819). This poor post-operative result corresponds to that of the series by Mignemi *et al*, in a retrospective series of 185 patients, these authors found disappointing radiological results after DRFs osteosynthesis. In fact, a normal IRS (11 degrees) was restored in only 48% of cases [21]. Jeudy *et al*., in evaluating their prospective series of 41 DRFs treated with locking anterior plates, noted losses of angular reduction for glenoid anteversion occurring mainly in the first post-operative weeks. Most of them were minimal, of the order of a few degrees, and mainly concerned posterior displacement fractures [22].

In our series, the loss of inclination was slight at 16.9% (n = 5), moderate at 14.3% (n = 4) and severe at 21.4% (n = 6) for the E0 group. For the E1-E4 group, slight loss accounted for 20% (n = 5), moderate for 8% (n = 2) and severe for 32% (n = 8) (p = 0.758). Fowler *et al*, on the other hand, in a prospective series published in 2013 on 37 patients with an average age of 57 years, found at the end of 14 months of follow-up no statistically significant difference with regard to IRS [3]. Our work also highlighted two poor prognostic factors: posterior comminution and the existence of at least three of Lafontaine's criteria. We believe that posterior communication remains an important element to consider when restoring IRS. Other authors propose the placement of a graft [23].

The absence of IRS restoration is described as the parameter with the greatest functional impact in particular the increase in pressures at the level of the dorsal surface of the radioulnar joint and the styloid, increase in pressures on the scaphoid as well as midcarpal instability as soon as the radial glenoid is horizontalized [24]-[26].

Our study found an association between Quick Dash score and absence of SRI restoration, and the difference was statistically significant p = 0.027. Karnezis in his work did not find a significant correlation between loss of SRI and the PRWE subscore [27].

Preoperatively, 82.1% of patients in the E0 group and 77.4% in the E1-E4 group had a disturbed FRI. Postoperatively, only 11 patients (21%) had their FRI uncorrected. The results of our series are close to those of Jeudy *et al.* [22], and better than those of Mignemi *et al.* [21], whose results were very disappointing: normal FRI (22 degrees) was restored in only 43% of patients. Jeudy *et al.* [22] report that most losses in their series were minimal. In our series, loss was slight in 17%, moderate in 3.8% and severe in 1%.

Few clinical studies have focused on FRI. Jenkins showed that loss of 7˚ resulted in a decrease in flexion [28]. In our series, we found no correlation between Quick Dash score and absence of FRI/H recovery p = 0.169. This observation is in line with the study by Garland *et al*, who demonstrated that an abnormal radial angle does not affect the final functional outcome after DRF [25]. Karnezis [27] found

no correlation between radial angle loss and PREW score. However, in the literature we have, we did not find any factors that could explain postoperative RFI loss. In our study, age over 50, the existence of an epiphyseal line and unstable fractures were identified as unfavourable factors.

Concerning DRUI, the preoperative result revealed that it was disturbed in 82.1% (n = 23) of the E0 group and in 72% (n = 18) of the E1-E2 group. The postoperative result was marked by an absence of correction in 11.3% of cases, n = 6, and this loss was less than 3 mm in all cases. This result is better than that of Jeudy *et al.* who, in their prospective series of 41 DRFs treated with locking anterior plate, noted loss of reduction, with a change in DRUI in 29% of cases [22]. The result of Mignemi *et al.* [21] was still very poor, with loss of DRUI observed in 47%.

Normal DRUI is either negative or neutral, while a positive index indicates radial shortening. Radial shortening, secondary to metaphyseal comminution, is the second most important arthrogenic factor after joint impingement, it can cause several repercussions, in particular an increase in pressure on the scaphoid fossa of the radius with an impact on the distal radioulnar joint, importance of the change in pressure distribution as soon as the radius presents a shortening of more than 2.5 mm compared to the ulna [29] [30].

McQueen reported that a shortening of the radius of more than 2 mm significantly led to a worsening of symptoms and a decrease in strength [31].

The assessment of the DASH score at 12 months in both patient groups revealed a low median of 13.56 (extreme 0 - 57) for E0 patients and a slightly high median of 21.91 (0 - 89) for E1-E4 patients (p = 0.26).

The results of our series are in line with those of several other studies of anterior locking plates with a 12-month follow-up [27] [28]. Our average is slightly higher than that found by Antonio *et al.* These authors analysed the DASH score in a group of 501 patients, including 133 surgically treated patients. They found a low Quick Dash average in both groups at one-year follow-up (7.5), and older age was the only factor for the poor outcome [29]. In our study, we found 4 poor prognostic factors: the existence of at least three Lafontaine criteria, the low position of the plate in relation to the pronator quadratus line, the M3 metaphyseal feature, the loss of DRUI.

5. Conclusion

DRFs of the radius are on the increase. Their treatment has undergone major changes over the last 20 years, with a tendency towards surgery. This fracture is closely linked to osteoporosis. Despite the controversy and lack of consensus in the treatment of these fractures, anterior locking plate osteosynthesis has recently gained in popularity. Its extension to fractures previously eligible for pinning has been noted. Anterior locking plate osteosynthesis thus represents a reliable therapeutic alternative with an excellent functional outcome, which appears to be earlier than after pinning. Nevertheless, the risk of loss of reduction has also been

observed by other authors at different times. In our study, loss of reduction was observed immediately post-operatively, and poor prognostic factors were identified.

Authors' Contributions

Cizemba Johnny: substantial contribution to design, configuration, data acquisition. Dumontier Christian and Albini Hugues: substantial contribution to the conception and direction of the work. All the authors have read and approved the final version of the manuscript.

Conflicts of Interest

We declare no conflict of interest.

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