CHAPTER IV

RESULTS

Dermographic and baseline data

A total number of 790 patients were identified from database at Rajavithi Hospital, after 59 patients were excluded because of being performed an open reduction and application of internal or external fixators, there were 731 patients left for computerized linear system sampling. Altogether of 356 patients were selected, 294 patients who did not meet the inclusion criteria or had one of any of exclusion criteria were excluded from the study. There were 62 patients with 63 Colles' fractures included into the study.

Of 62 subjects (14 males and 48 females), 63 Colles' fractures were included in this study. the gender distribution for subjects was 21% males and 79%females. The average age was 53.51±18.02 years old, ranges from 15 to 82 years old. The average age of male patients was 43.07 years old and the average age of female patients was 56.49 years old. The mean of dorsal tilt angle before reduction was 14.79± 11.82 degrees ranges from -13to 40 degrees, which had no statistically significant difference between male and female patients. The mean of dorsal tilt angle after reduction was -0.70 ± 8.18 degrees, ranges from -19 to 13 degrees, which had no statistically significant difference between male and female patients. The mean of dorsal tilt angle at the end of immobilization was 8.71 ± 10.70 degrees, ranges from 21 to 33 degrees, which had no statistically significant difference between male and female patients. Of the total number of 63 Colles' fractures treated, 50 fractures (79%) increased their dorsal tilt angle. The mean of redisplacement of dorsal tilt angle was 9.41 ± 9.96 degrees, ranges from -8 to 43 degrees. The mean of radioulnar index before reduction was 2.32 ± 2.89 mm, ranges from-1.6 to 9.2 mm, which had no statistically significant difference between male and female patients. The mean of radioulnar index after reduction was 1.34 ± 2.14 mm, ranges from -2.5 to 8.45 mm., which had no statistically significant difference between male and female patients. The mean of radioulnar index at the end

of immobilization was 3.13 ± 3.05mm ranging from -1.9 to 13 mm, which had no statistically significant difference between male and female patients. (Table 3)

Table 3 Baseline characteristic(independent sample t-test)

	Female	Male	p - value
Age	56.49	43.07	0.13
Age group			
less than 60 years	26	9	
60 years or more	23	5	
Number/percent	49 / 78%	14 / 22%	
Dorsal tilt angle; before reduction,degree	14.76	14.93	0.852
Mean = 14.79	40	32	
Maximum	-13	-7	
minimum			
Dorsal tilt angle;after reduction, degree	-0.20	-2.43	0.767
Mean = -0.70	13	13	
Maximum	-19	-15	
Minimum			
Dorsal tilt angle; end of immobilization, degree	8.27	10.29	0.231
Mean = 8.71	30	33	
Maximum	-21	-16	
Minimum			
Dorsal cortical defect size, degree			
Mean = 19.73	21.31	14.21	0.516
Maximum	55	37	
Minimum	0	0	

Radioulnar index; before reduction,			
mm.	2.27	2.48	0.813
Mean = 2.32	9;2	9.05	
Maximum	-0.8	-1.6	
Minimum			
Radioulnar index; after reduction,			
mm.	-0.20	-2.34	0.373
Mean = 1.34	8.45	5.3	
Maximum	-2.5	-1.6	
Minimum			
Radioulnar index; end of			
immobilization, mm.	3.30	2.53	0.431
Mean = 3.13	13	9.8	
Maximum	-8	-1.6	
Minimum			

According to quality of reduction, there were statistically significant differences between means of before and after reduction of both dorsal tilt angle and radioulnar index.(Table 4)

Table 4 Radiographic parameters concerning before and after reduction
(paired t-test)

Radiographic parameters	Before reduction	After reduction	p-value
Dorsal tilt angle (degrees)	14.79	-0.70	< 0.000
Radioulnar index (mm.)	2.32	1.34	< 0.000

According to redisplacement of Colles' fractures immobilized in short arm casts, there were statistically significant differences between means of after reduction and end of immobilization of both dorsal tilt angle and radioulnar index.(Table 5)

Table 5 Radiographic parameters concerning after reduction and end of immobilization

(paired t-test)

Radiographic parameters	After reduction	End of immobilization	p-value
Dorsal tilt angle (degrees)	-0.70	8.71	< 0.000
Radioulnar index (mm.)	1.34	3.13	< 0.000

Table 6 shows relationship between Radiographic parameters and age group of the patient.

There was a statistically significant difference of mean of dorsal tilt angle at the end of immobilization between two age groups, less than 60 years, or 60 years old or more. There were also statistically significant differences of means of radioulnar index of all three intervals, before and after reduction and at the end of immobilization between two age groups.

Table 6 Radiographic parameters concerning age group of the patients

(Mann Whitney U test)

Radiographic parameters	Age less than 60	Age 60 or more	p-value
Dorsal tilt angle (degrees)			
before reduction	13.37	16.57	0.561
after reduction	-1.40	0.18	0.286
end of immobilization	5	13.36	0.004
Dorsal cortical defect size (degrees)	17.49	22.54	0.118
Radioulnar index (mm.)			

before reduction	1.30	3.60	0.001
after reduction	0.59	2.28	0.003
end of immobilization	1.96	4.60	0.001
Number /percent	35 / 55.5 %	28 / 44.5 %	

Table 7 shows both Measured and calculated redisplacement of dorsal tilt angle at the end of immobilization. Means and standard deviations were used to calculate sample size of 12 patients for validating data set.

Table 7 Means of the redisplacement angle at the end of immobilization

	Measured angle; Training data set	Calculated angle; Training data set
Mean	9.41	8.22
Max.	43	20.27
Min.	-8	-2.61
variance	99.311	23.256
Standard deviation	9.965	4.822

Table 8 shows relationship between redisplacement of dorsal tilt angle and patients' gender. There was no statistically significant difference of means of redisplacement of dorsal tilt angle at the end of immobilization between male and female patients.

Table 8 Redisplacement of dorsal tilt angle and patients' gender (Mann Whitney U test)

Patients' gender	female	male	p-value
Redisplacement angle (degrees)	12.71	8.47	0.568

Table 9 shows relationship between redisplacement of dorsal tilt angle and age group of the patients. There was a statistically significant difference of means of redisplacement of dorsal tilt angle at the end of immobilization between two age groups.

Table 9 Redisplacement of dorsal tilt angle and age group of the patients (Mann Whitney U test)

Patients' age	Age less than 60	Age 60 or more	p-value
Redisplacement angle (degree)	6.14	13.18	0.012

Table 10 shows multiple coefficient correlation between redisplacement of dorsal tilt angle of Colles' fracture at the end of immobilization and size of dorsal cortical bone defect, radioulnar index difference, age and patients' gender.

The estimated size of dorsal cortical bone defect measured in degrees was 19.73 ± 14.50 degrees, range from 0 to 55 degrees. There was a statistically significant correlation between size of dorsal cortical bone defect, age, and gender of the patient and redisplacement of dorsal tilt angle of Colles' fracture.(multiple coefficient correlation $R = 0.508$, $p < 0.000$).

Table 10 Multiple coefficient of correlation

model	R	R square	Adjusted R square	Std. Error of the Estimation
1	.322[a]	.110	.096	9.476
2	.446[b]	.199	.172	9.068
3	.508[c]	.259	.221	8.797

a. Predictors (Constant), age of the patient

b. Predictors (Constant), age of the patient , gender of the patient

c. Predictors (Constant), age of the patient , gender of the patient , dorsal cortical

bone defect size

Table 11 shows results of the test and values of coefficient correlation between dependent variable: redisplacement of dorsal tilt angle of Colles' fracture at the end of immobilization and all predictors: size of dorsal cortical bone defect, radioulnar index different, patients' age and patients' gender.

Regarding to the coefficient of partial correlations, patients' age had the coefficient of partial correlation of 0.202 with redisplacement of dorsal tilt angle of Colles' fracture. The size of dorsal cortical bone defect had the coefficient of partial correlation of 0.177 with redisplacement of dorsal tilt angle of Colles' fracture. patients' gender had coefficient of partial correlation of -8.207 with redisplacement of dorsal tilt angle of Colles' fracture, where genders labeled in this study were male = 0, female =1. Radioulnar index different did not have the coefficient of partial correlation with redisplacement of dorsal tilt angle of Colles' fracture. And from the coefficient of partial correlation of three independent variables calculated from table 11, the constructed equation used to predict the redisplacement of dorsal tilt angle of Colles' fracture at the end of immobilization from size of dorsal cortical bone defect, and patients' age and gender was:

$$Y = 1.512 + 0.177\, x_1 + 0.202\, x_2 - 8.207\, x_3$$

Where y = redisplacement of dorsal tilt angle of Colles' fracture at the end of immobilization

x_1 = size of dorsal cortical bone defect

x_2 = patients' age

x_3 = patients' gender

Table 11 Coefficients[a]

Model	Unstandardized coefficients		Coefficients		
	B	Std. Error	Beta	t	Sig.
1 (Constant)	-.417	3.766		-.111	.912
patients' age	.184	.067	.332	2.752	.008
2 (Constant)	2.408	3.776		.657	.514
patients' age	.238	.067	.430	3.534	.001
gender of the patients	-7.433	2.892	-.313	-2.570	.013
3 (Constant)	1.512	3.690		.410	.684
patients' age	.202	.067	.365	2.997	.004
patients' gender	-8.207	2.828	-.345	-2.902	.005
bone defect size	.177	.081	.258	2.183	.033

a. Dependent variable: redisplacement of dorsal tilt angle

According to validating data set, from 12 Colles' fractures, mean of dorsal tilt angle after reduction was -2.17± 7.83 degrees ranging from -18 to 5 degrees, mean of dorsal tilt angle at the end of immobilization was 4.33±11.72 degrees ranging from -16 to 27 degrees. There was no statistically significant difference between male and female patients (table 12).

Table 12 Baseline characteristic; validating data set (Wilcoxon rank sum)

	Dorsal tilt angle; after reduction, degree	Dorsal tilt angle; end of immobilization degree	p-value
mean	-2.17	4.33	.002
maximum	5	27	
minimum	-18	-16	

Table 13 shows the difference between means of calculated and measured redisplacement of dorsal tilt angle of Colles' fracture at the end of immobilization. Mean of calculated redisplacement of dorsal tilt angle was 9.06 ± 7.56 degrees, ranging from -8.33 to 18.19 degrees. According to the result of paired t-test, there was no statistically significant difference between means of calculated and measured dorsal tilt angle of Colles' fracture at the end of immobilization.

Table 13 Means of dorsal tilt angle of Colles' fracture at the end of immobilization; validating data set (paired t-test)

	measured value; validating data set	Calculated value; validating data set	p-value
Mean	4.33	9.06	.086
Max.	27	18.19	
Min.	-16	-8.33	

Table 14 shows the correlation between measured and calculated dorsal tilt angle at the end of immobilization, there was a correlation between measured and calculated dorsal tilt angle at the end of immobilization.

Table 14 Correlation

	N	Correlation	p-value
measured dorsal tilt angle & calculated dorsal tilt angle	12	.673	.016