Прилози, Одд. биол. мед. науки, МАНУ, XXXII, 2, с. 231–246 (2011)
Contributions, Sec. Biol. Med. Sci., MASA, XXXII, 2, p. 231–246 (2011)
ISSN 0351–3254
УДК: 616.717.5-001.5

OUTCOME EVALUATION IN PATIENTS WITH DISTAL RADIUS FRACTURE

Kasapinova K, Kamiloski V

University Surgery Clinic, Sv. Naum Ohridski, Skopje, R. Macedonia

A b s t r a c t: *Introduction:* There are not enough scientific papers on the outcome of distal radius fractures evaluated by the patients themselves. There is disagreement over the degree of correlation between the radiological and functional outcome and the disability of the patients.

Aim: To analyse the correlation between the patient-rated outcome (disability) and radiological parameters of distal radius fractures, as well as the objective parameters of the wrist function (range of motion and grip strength)

Material and methods: This is a prospective randomized study of 64 patients with a distal radius fracture. To evaluate the disability a patient-rated wrist evaluation (PRWE) questionnaire was used. For radiographic assessment radial length, radial angle and dorsal angle were measured and graded according the Lidstrom method as modified by Sarmiento. The objective clinical parameters evaluated in this study are grip strength and range of movements. For a description of the association between these three outcome parameters a statistical correlation with the Spearman rank correlation was performed.

Results: The results of this study showed no significant correlation between the radiological outcome or the range of motion in the injured wrist with the PRWE pain and disability. Only the grip strength was a significant pain and disability predictor three and six months after injury.

Conclusion: Post-fracture rehabilitation and outcome assessment should extend beyond physical impairment and radiography to insure comprehensive treatment to individuals with a distal radius fracture.

Key words: distal radius fracture, disability, patient-rated outcome.

Introduction

Fractures of the distal radius are the most common fractures of all [1, 2]. 30% of the patients treated in the emergency centres have an injury to the wrist, and 5% of all diagnoses are distal radius fractures [3]. The risk for sustaining a distal radius fracture in the remaining life for a women aged 50 is estimated 16% in UK; 20,8% in Sweden; 13,3% in Australia and 16% in USA [4].

Impairments resulting from the distal radius fractures (limited range of motion, reduced grip strength, as well as radiographic abnormalities) do not always reflect the pain and disability of the injured wrist [5, 6, 7, 8, 9, 10]. This confirms the importance of the new outcome measurements in the form of questionnaires for patient self-evaluation of their own health status (in this case the status of their injured wrist) [11], such as Short Form 36 (SF–36) [7]; Disability of Arm, Shoulder and Hand Questionnaire (DASH) [7, 12]; Patient-rated Wrist Evaluation (PRWE) [13].

In 1814 Sir A.Colles published his famous paper where he first described distal radius fractures, and of their outcome he said: "one consolation only remains, that the limb will at some remote period again enjoy perfect freedom in all of its motions and be completely exempt from pain; the deformity, however will remain undiminished through life" [14]. This suggestion was not scientifically confirmed.

The qualitative study by A. Bialocerkowski in 2001 examines the disability in patients with a wrist injury [15]. Symptoms were present for 1–164 months (av. 19). It describes the activities that were performed with the difficulties, mostly work-associated (65%) and household duties (54%), as well as the compensatory mechanisms. But the difficulties were not quantified and how they change over time was not analysed. A large prospective study on 275 distal radius fracture patients was published in 2001 in Canada [16]. It evaluated the range of motion, grip strength as well as the disability with SF–36, PRWE and DASH during one year. The results obtained for the disability and the physical characteristics can be used as a data-base for comparative statistics in future studies and have a prognostic value. According to the study by J. B. Jupiter which analyzed patients aged over 60 years with unstable distal radius fracture there was a significant correlation between the self-evaluation (PRWE) and the functional outcome (Gartland and Werley), but there was no correlation of the PRWE and the radiological measurements [17]. In 2002 A. Tremayne examined the relationship between the wrist function impairment (grip strength and dorsal extension) and the activity limitation expressed with the hand dexterity examination. She found a strong correlation between the grip strength and dexterity, and a weaker one with extension [18]. The correlation between the radiological parameters, the fracture type and the articular congruity and the level of patient-rated dysfunction (PRWE) was investigated in the I.Karnezis study in 2005 [19]. It showed that radial shortening and the loss of palmar angle were associated

with prolonged wrist pain; the presence of articular "step-off" affects the range of wrist dorsiflexion and patient-rated wrist function after one year.

The treatment protocol of distal radius fractures is not yet standardized. There are many published randomized studies, but they show that even in similar fracture types and similar treatment protocols, the outcome varies significantly. There is disagreement on the degree of correlation between the radiological outcome and the clinical outcome. There are not enough scientific papers for the outcome of distal radius fractures evaluated by the patients and the quality of life after a fracture.

The aims of this study are:

1. To examine the association of the radiological parameters of distal radius fractures and the patient-rated wrist functional outcome (disability).

2. To analyze the correlation between the outcome of distal radius fractures presented by the objective parameters of the wrist function (range of motion and grip strength) and the functional outcome presented with the wrist self-evaluation results (disability).

Material and methods

Patients:

This clinical study was designed as a prospective randomized study of 64 patients with a distal radius fracture. Patients with an acute distal radius fracture aged over 16 years were included. Exclusion criteria were: fracture in patients with immature skeleton (epiphysis fusion not complete), additional wrist injury (carpal fracture, neurovascular injury), open fractures (except for Gustillo grade I), bilateral injury, repeated wrist injury, patients not able to comply.

Patients were evaluated three times: at their control visit 7–10 days after injury (baseline); again at three months following fracture (when immobilization or external fixation is taken off and the operative wounds have healed) and finally 6 months after injury. At each of these three visits patients completed the PRWE questionnaire and x-rays were taken. The objective wrist characteristics (ROM and grip strength) were measured three and six months after injury.

Outcome evaluation

1. Disability evaluation

To evaluate the disability Patient-rated Wrist Evaluation (PRWE) questionnaire was used [13]. The PRWE contains 15 items in two scales PAIN (5 items) and FUNCTION (function divided into a Specific Activities subscale with 6 items and a Usual Activities subscale with 4 items). Each item is scored on an 11-point scale (0–10) [20]. The scores of each individual item were provided with qualitative descriptors defined as: none (0), minimal (1–2), mild

(3–4), moderate (5–6), severe (7–8) or very severe (9–10). These descriptors were also extended to subscales and the total score.

2. Radiographic evaluation

Standard wrist radiographs (antero-posterior and lateral) were made immediately following injury (initial), 7–14 days after injury (baseline), and three and six months after injury, as well as one radiograph of the uninjured wrist. The following parameters were measured at each time point: radial length (mm), radial angle (degrees) and dorsal angle (degrees) [21].

The results of this measurement were scored and graded according the Lidstrom method [22] modified by Sarmiento [23], that is the Stewart score system that gives grades excellent (0), good (1–3), fair (4–6) and poor (7–12) [21].

3. Physical wrist characteristics evaluation

The objective clinical parameters evaluated in this study are grip strength and range of movements.

Grip strength. With a hand dynamometer bilateral measurements were made, three trials on each side, and a mean value was determined (according to the standardized Mathiowetz procedure) [24]. The grip strength is presented as the percentage of the value of the injured side of the value of the uninjured side (correction with the factor 1.07 for the non-dominant side) [8, 11, 25].

Range of movements in the wrist. Active dorsal extension and palmar flexion, pronation and supination, radial and ulnar deviation were measured with a goniometer according to the standardized volar/dorsal LaStayo technique [26] for flexion/extension, the Armstrong technique [27] for pronation/supination and the Norkin technique [16] for radial/ulnar deviation. The range of movements is scored on a 30-point scale in Table 1.

Table 1

Active range of movements in wrist scoring

SCORING OF THE ACTIVE RANGE OF MOVEMENTS IN THE WRIST						
	Extension	Flexion	Ulnar deviation	Radial deviation	Pronation	Supination
Max. Score	6	5	3	2	5	5
0	< 10°	< 10°	< 5°	< 5°	< 10°	< 10°
1	≥ 10°	≥ 10°	≥ 5°	≥ 5°	≥ 10°	≥ 10°
2	≥ 20°	≥ 20°	≥ 15°	≥ 15°	≥ 20°	≥ 20°
3	≥ 30°	≥ 30°	≥ 25°		≥ 40°	≥ 40°
4	≥ 40°	≥ 40°			≥ 60°	≥ 60°
5	≥ 50°	≥ 60°			≥ 70°	≥ 70°
6	≥ 70°					

Statistical analysis

All statistical analyses were performed with the SPSS Statistics 18 for Windows software package (SPSS Inc). The following measures were used [28, 29]: mean, standard deviation, minimal and maximal values; statistical correlation for description of the association between parameters with the Spearman rank correlation. A p value less than 0.05 was considered significant.

Results

The characteristics of the group of 64 examined patients with a distal radius fracture are given in Table 2.

Table 2

Characteristics of 64 distal radius fracture patients

Age	mean 55.5 y (17–80), SD 14.54
Sex	female 43 (67.2%) male 21 (32.8%)
Injured side	right 7 (42.2%) left 37 (57.8%)
Dominant side	right 63 (98.4%) left 1 (1.6%) dominant injured 26 (40.6%) nondominant injured 38 (59.4%)
Mechanism of injury	1. fall 47 (73.4%) 2. fall from height 15 (23.4%) 3. other 2 (3.2%)
Fracture type (AO classification)	extraarticular A – 27 (42.2%) partially articular B – 2 (3.1%) completely articular C – 35 (54.7%)
Intervention	1. immobilisation 14 (21.9%) 2. closed reduction + immobilization 33 (51.6%) 3. closed reduction + ex.fix.+ K-wires 9 (14%) 4. closed reduction + K-wires + imm 2 (3.1%) 5. open reduction + plate osteosynthesis 4 (6.2%) 6. open reduction + ex.fix. + internal fi 2 (3.1%)
Physical therapy	yes 42 (65.6%) no 22 (34.4%)

SD = Standard deviation

1. PRWE results

Table 3 shows the mean scores for the three subscales and the total PRWE score. The total PRWE score changes from mean severe pain and disability at baseline (mean score 64.5), through mild three months later (24.9), to minimal pain and disability after six months (10.2) (Table 3). The total pain and disability reported in the PRWE questionnaire presented with the number of patients is shown in Figure 1.

Table 3

Mean score for three subscales and total PRWE score at each of the three time points

PRWE	Baseline	3 months	6 months
Pain (50)	20.8	10.5	6.5
Specific activities (60)	54.6	18.3	5.3
Usual activities (40)	32.7	10.4	2.1
Total (100)	64.5	24.9	10.2

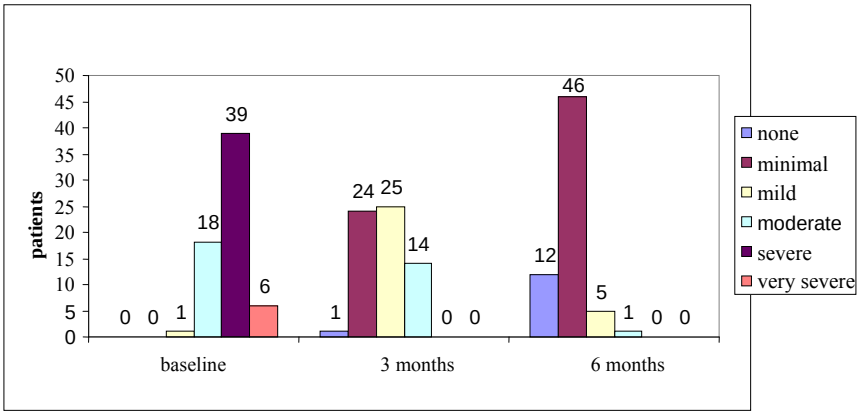

Figure 1 – Total PRWE score over six months

2. Radiological results

Mean values of all radiological parameters through the six months of evaluation are presented in Table 4. The values of the radiological parameters measured at each of the follow-up points are graded according the Stewart score system. These results are shown in Table 5, presented with the number of patients. On the initial radiographs the mean Stewart system score is 4.17 (mean grade fair), after the intervention the baseline mean score is 0.97 (mean grade

good), after three months 1.91 (mean grade good) and six months later 2.05 (mean grade good) (Table 6).

Table 4

Mean values of radiological parameters for whole group of patients over six months

	uninjured			initial			baseline			3 months			6 months		
	R	R	d	R	r	d	R	R	d	R	r	d	R	r	d
MEAN	12.86	26.03	-7.92	9.59	19.86	14.08	11.42	22.86	-2.2	10.47	21.27	1.58	10.34	21.05	2.19
SD	1.34	2.95	5.69	3.01	6.2	13.24	2.1	4.63	8.54	2.71	5.16	9.91	2.86	5.4	10.25

R – radial length (mm), r – radial angle(º), d – dorsal angle(º), SD – standard deviation

Table 5

Stewart score system results for examined patients over six months

	SS inicial	SS baseline	SS 3 months	SS 6 months
Excelent	4	33	25	24
Good	20	27	27	25
Fair	28	3	7	9
Poor	12	1	5	6

SS = Stewart score

Table 6

Mean values of the Stewart system scores over six months

	SS initial	SS baseline	SS 3 months	SS 6 months
MEAN	4.17	0.97	1.91	2.05
SD	2.76	1.4	2.31	2.46

MEAN = mean value, SD = standard deviation

3. Results of the measurement of the objective physical characteristics of the wrist

Mean value of the grip strength of the injured wrist three months after injury is 62.8% (SD 22.97, MIN 5, MAX 99) of the uninjured side strength, and 81.6% (SD 14.41, MIN 44, MAX 117) after six months.

The values of the movement measured in the injured wrist three and six months after injury as their mean values expressed in degrees are presented in Table 7. These values in degrees are then scored with the ROM scale (Table 1), and the scores are presented in Table 8. Three months after injury the mean range of movement is scored 21.8, and six months later 23,7 (Table 8).

Table 7

ROM values in injured wrist 3 and 6 months after injury, in degrees

	3 months						6 months					
	EXT	FL	UD	RD	PR	SUP	EXT	FL	UD	RD	PR	SUP
MEAN	53.6	46.9	34.9	25.1	84.8	56.6	61.7	53.5	38.8	30.6	87.7	67
SD	13.29	10.26	8.64	10.9	8.84	16.52	11.64	10.05	10.8	8.13	5.78	12.82

SD – standard deviation, EXT – dorsal extension, FL – palmar flexion, UD – ulnar deviation, RD – radial deviation, PR – pronation, SUP – supination

Table 8

ROM values in injured wrist 3 and 6 months after injury, in scores

	3 months							6 months						
	EXT	FL	UD	RD	PR	SUP	T	EXT	FL	UD	RD	PR	SUP	T
MEAN	4.5	3.8	2.9	1.8	4.9	3.8	21.8	5.2	4.2	2.9	2	5	4.4	23.7
SD	0.99	0.67	0.31	0.43	0.32	0.97	2.42	0.7	0.58	0.31	0.13	0.13	0.79	1.7

SD – standard deviation, EXT – dorsal extension, FL – palmar flexion, UD – ulnar deviation, RD – radial deviation, PR – pronation, SUP – supination, T – total score

4. Correlation analysis

1. Radiological outcome and the PRWE pain and disability correlation (Spearman)

There is **no** significant statistical correlation between:

– 3 months: Stewart score (SS) and the PRWE total, PRWE pain, PRWE specific activities, PRWE usual activities score;

– 6 months: Stewart score (SS) and the PRWE total, PRWE pain, PRWE specific activities, PRWE usual activities score;

– 6 months: final radial shortening and the PRWE total, PRWE pain, PRWE specific activities, PRWE usual activities score;

– 6 months: final dorsal angulation and the PRWE total, PRWE pain, PRWE specific activities, PRWE usual activities score;

– PRWE total 6 months and the initial radial shortening, initial radial angle reduction, initial dorsal angle, initial SS;

– PRWE total 6 months and the postreduction radial shortening, postreduction radial angle reduction, postreduction dorsal angle, postreduction baseline SS.

2. Objective physical characteristics of the wrist and the PRWE pain and disability correlation (Spearman)

There **is** significant statistical correlation between:

– 3 months: grip strength % and the PRWE total, PRWE pain, PRWE specific activities, PRWE usual activities score;

– 6 months: grip strength % and the PRWE total, PRWE pain, PRWE specific activities, PRWE usual activities score;

There is **no** significant statistical correlation between:

– 3 months: ROM score and the PRWE total, PRWE pain, PRWE specific activities, PRWE usual activities score;

– 6 months: ROM score and the PRWE total, PRWE pain, PRWE specific activities, PRWE usual activities score;

– 6 months: dorsal extension score.

3. Objective physical characteristics of the wrist and radiographic parameters correlation (Spearman)

There is **no** significant statistical correlation between:

– 6 months: grip strength % and the radial shortening;

– 6 months: grip strength % and the dorsal angle;

– 3 months: grip strength % and SS;

– 3 months: ROM score and SS;

– 6 months: grip strength % and SS;

– 6 months: ROM score and SS.

4. Objective physical characteristics correlation (Spearman)

There **is** significant statistical correlation between:

– 3 months: grip strength % and ROM score;

– 6 months: grip strength % and ROM score.

Discussion

1. Radiographic results analysis

The aim of this study is to examine the association between the radiological parameters (Stewart score system, radial shortening and dorsal angle) with: *first* the final outcome in the patients with a distal radius fracture presented with the results for the disability with the patient-rated wrist questionnaire (PRWE), *second*: the percentage of the grip strength of the injured side of the uninjured one as a objective characteristic of the wrist, and *third* the range of motion scores as another objective characteristic of the wrist joint. The results showed that:

– there is no statistically significant correlation the third or the sixth month between the radiological characteristics of the fracture and the patients'

disability presented with the pain (PRWE Pain subscale), difficulties doing tasks (PRWE Specific activities subscale) and problems experienced while involved in life situations (PRWE Usual activities subscale);

– there is no statistically significant correlation the third or the sixth month between the radiological characteristics of the fracture and the grip strength of the injured side, as well as the range of motion of the injured wrist;

– there is no statistically significant correlation between the total PRWE result at 6 months and the initial radial shortening, the initial dorsal angle and the initial Stewart scores that leads to the conclusion that the severity of the bone injury was not predictive of patient-rated outcome (disability) six months after injury;

– there is no statistically significant correlation between the total PRWE result at 6 months and the postreduction radial shortening, the postreduction dorsal angle and the postreduction Stewart scores, that leads to the conclusion that the adequacy of reduction was not predictive of patient-rated outcome (disability) six months after injury.

Distal radius fractures often result in malunion, especially if treated by closed reduction and immobilization [30]. There is increasing concern that failure to restore accurate extra-articular alignment may result in persistent pain, restricted movement of the wrist and forearm and weakness and disability due to malfunction of the radiocarpal and distal radio-ulnar joints. Intra-articular malunion may lead to post-traumatic radiocarpal osteoarthritis [31]. That is why there is a tendency for fractures of the distal radius occurring in young adults to be treated increasingly by open surgical techniques, partly because of the concern that failure to restore anatomical alignment may result in symptomatic posttraumatic osteoarthritis in future years. To examine this relationship, in 2008 Forward et al. performed a retrospective study of 106 patients with a distal radius fracture under the age of 40 years at the time of their injury. They carried out a clinical and radiological assessment at a mean follow-up of 38 years [32]. While there was radiological evidence of posttraumatic osteoarthritis after an intra-articular fracture in 68% of patients, the DASH scores for disability were not different from population norms (asymptomatic) and function (ROM, grip) was impaired less than 10%. No patient had required a salvage procedure. The authors conclude that imperfect reduction of these fractures may not result in symptomatic arthritis in the long term, and this should be considered when choosing from many treatment options available, primary or corrective. Similar results were published by Goldfarb 2006 [33]. He assessed the function and disability in patients 15 years after surgery of a displaced intraarticular fracture of the distal radius. Despite joint space narrowing and evidence of advanced arthrosis, patients maintained a high level of function at the long-term follow-up evaluation. The study made by Young in 2003 reviewed patients seven years after a distal radial

fracture. Despite a high level of radiographic malunion (50%), overall function, range of movement and activities of daily living were not limited [34].

The data published in these studies, as well as the results from this one, found no significant statistical correlation between the radiographic parameters and the patient-rated outcome (the disability). This leads to the conclusion that fracture healing and rehabilitation after a distal radial fracture should not be assessed only with a radiographic follow-up. A patient-rated disability evaluation should be mandatory. Only patients who have radiographic signs of malunion combined with a high level of disability (bad PRWE pain and functional score) and are not satisfied with their life quality should be considered for different therapeutic approach or salvage procedures.

2. Analysis of the results for the objective wrist characteristics

In recent years, wrist injuries evaluation is focused on assessment of the pain and disability from the patient's perspective (PRWE). That is why it is importatnt to examine how the objective characteristics' impairment contributes to the overall disability. There are not enough data published on the association between these characteristics and the functioning level rated with the self-evaluation questionnaires.

Karnezis in 2002 studied this association and published that the grip strength was a significant predictor for disability (the PRWE score), but the flexion/extension and forearm rotation were not [8]. Kamiloski in his study evaluated external fixation in patiens aged over 65 years with unstable distal radius fracture and found a significant correlation between the patient-rated outcome (PRWE) and the Gartland-Werley scoring system that included the grip strength, but no correlation between the PRWE and the radiological outcome (Stewart score) [35]. The 2003 Jupiter study of patients aged over 60 years had similar results [17]. In his 2005 prospective study of over 790 distal radius fracture patients MacDermid found a correlation between the objective variables score (grip strength, ROM and dexterity) and each of the PRWE subscales, three and 12 months after injury [5]. A similar study published by MacDermid in 2002 evaluated the factors that are predictors for pain and disability six months after a distal radius fracture and concluded that the physical impairments (grip strength, ROM, dexterity) are not significant pain and disability predictors, but these three factors are: educational level, compensatory status and the initial radial shortening [36]. Adams in 2003 found significantly worse function (DASH, PRWE) if restricted or absent wrist ROM was present [37].

The aim of this study is to examine the association between the objective physical characteristics of the injured wrist (grip strength, ROM) and the PRWE questionnaire results for the patients' disability evaluation, as well as the association between these two objective characteristics themselves:

– there is a statistically significant correlation at the third or the sixth month between the grip strength on the injured side and the patients' disability presented with the pain (PRWE Pain subscale), difficulties doing tasks (PRWE Specific activities subscale) and problems experienced while involved in life situations (PRWE Usual activities subscale);

– there is no statistically significant correlation at the third or the sixth month between the range of motion in the injured wrist and the patients' disability presented with the pain (PRWE Pain subscale), difficulties doing tasks (PRWE Specific activities subscale) and problems experienced while involved in life situations (PRWE Usual activities subscale);

– there is a statistically significant correlation at the third and the sixth month between the two objective characteristics: the grip strength and the range of movements in the injured wrist.

Conclusion

Post-fracture rehabilitation and outcome assessment should extend beyond physical impairment and radiography to ensure comprehensive treatment to individuals with a distal radius fracture.

Only patients who have radiographic signs of malunion combined with a high level of disability (bad PRWE pain and functional score) and are not satisfied with their quality of life after injury should be considered for a change in therapeutic approach or salvage procedures.

REFERENCES

1. Alffram PA, Bauer CHB. Epidemiology of fractures of the forearm. The Journal of Bone and Joint Surgery. 1962; 44A: 105–114.

2. Doczi J, Renner A. Epidemiology of distal radius fractures in Budapest: a retrospective study of 2241 cases in 1989. Acta Orthopaedica Scandinavica. 1994; 65: 432–433.

3. Larsen CF, Lauritsen J. Epidemiology of acute wrist trauma. International Journal of Epidemiology. 1993; 22: 911–916.

4. Johnell O, Kanis J. Epidemiology of osteoporotic fractures. Osteoporosis International. 2005; 16: S3–S7.

5. Harris JE, MacDermid JC, Roth J. The International Classification of Functioning as an explanatory model of health after distal radius fracture: a cohort study. Health and Quality of Life Outcomes. 2005; 3: 73.

6. Golghahn J, Angst F, Simmen BR. What counts: outcome assessment after distal radius fractures in aged patients. Journal of Orthopaedic Trauma. 2008; 22: S126–S130.

7. MacDermid JC, Richards RS, Donner A, Bellamy N, Roth JH. Responsiveness of the Short Form-36, Disability of the arm, shoulder and hand questionnaire, Patient-rated wrist evaluation, and Physical Impairment Measurements in evaluating recovery after a distal radius fracture. The Journal of Hand Surgery. 2000; 25A: 330–340.

8. Karnezis IA, Fragkiadakis EG. Association between objective clinical variables and patient-rated disability of the wrist. The Journal of Bone and Joint Surgery. 2002; 84B: 967–70.

9. Anzarut A, Johnson JA, Rowe BH, et al. Radiologic and patient-reported functional outcomes in an elderly cohort with conservatively treated distal radius fractures. The Journal of Hand Surgery. 2004; 29A: 1121–1127.

10. Browner BD, Jupiter JB, Levine AM, Trafton PG. Seletal trauma. Third edition. Philadelphia: Elsevier Science – Saunders. 2004.

11. Garratt A, Schmidt L, Mackintosh A, Fitzpatrick R. Quality of life measurement: bibliographic study of patient assessed health outcome measures. BMJ. 2002; 324: 1417.

12. Dias JJ, Rajan RA, Thompson JR. Which questionnaire is best? The reliability, validity and ease of use of the Patient evaluation measure, The disabilies of the arm, shoulder and hand and the Michigan hand outcome measure. The Journal of Hand Surgery. 2008; 33E: 9–17.

13. MacDermid JC, Turgeon T, Richards RS, Beadle M, Roth JH. Patient rating of wrist pain and disability: a reliable and valid measurement tool. Journal of Orthopaedic Trauma. 1998; 12: 577–586.

14. Colles A. On the fracture of carpal extremity of the radius. Edinburgh Medical and Surgical Journal. 1814; 10: 182.

15. Bialocerkowski AE. Difficulties associated with wrist disorders – a qualitative study. Clinical Rehabilitation. 2002; 16: 429–440.

16. MacDermid JC, Richards RS, Roth JH. Distal radius fracture: a prospective outcome study of 275 patients. Journal of Hand Therapy. 2001; 14(2): 154–169.

17. Jupiter JB, Ring D, Weitzel PP. Surgical treatment of redisplaced fractures of the distal radius in patients older than 60 years. The Journal of Hand Surgery. 2002; 27A: 714–723.

18. Tremayne A, Taylor N, McBurney H, Baskus K. Correlation of impairment and activity limitation after wrist fracture. Physiotherapy Research Intrenational. 2002; 7: 90–99.

19. Karnezis IA, Panagiotopoulos E, Tyllianakis M, Megas P, Lambiris E. Correlation between radiological parameters and patient-rated wrist dysfunction following fractures of the distal radius. Injury. 2005; 36: 1435–1439.

20. MacDermid JC, Roth JH, Richards RS. Pain and disability reported in the year following a distal radius fracture: A cohort study. BMC Musculoskeletal Disorders. 2003; 4: 24.

21. Stewart HD, Innes AR, Burke FB. Factor affecting the outcome of Colles' fracture: an anatomical and functional study. Injury. 1985; 5: 289–295.

22. Lidstrom A. Fractures of the distal end of the radius: a clinical and statistical study of end results. Acta Orthopaedica Scandinavica. 1959; 41: 1–118.

23. Sarmiento A, Zagorski JB, Sinclair WF. Functional bracing of Colles' fractures: a prospective study of immobilisation in supination versus pronation. Clinical Orthopaedics and Related Research. 1980; 146: 175.

24. Mathiowetz V, Weber K, Volland G, Kashman N. Reliability and validity of grip and pinch strength evaluations. The Journal of Hand Surgery. 1984; 9: 222–226.

25. Bradway JK, Amadio PC, Cooney WP. Open reduction and internal fixation of displaced, comminuted intra-articular fractures of the distal end of the radius. The Journal of Bone and Joint Surgery. 1989; 71A: 839–847.

26. LaStayo PC, Wheeler DL. Reliability of passive wrist flexion and extension goniometric measurements: a multicentar study. Physical Therapy. 1994; 74: 162–174.

27. Armstrong A, MacDermid J, Clinchalkar S. Reliability of ROM measurement in elbow and forearm. Journal of Shoulder and Elbow Surgery. 1998; 7: 573–80.

28. Petz B. Osnovne statisticke metode za nematematicare. Drugo izdanje. Zagreb: SNL, 1985.

29. Petrie A. Statistics in orthopaedic papers. The Journal of Bone and Joint Surgery. 2006; 88B: 1121–1136.

30. Jupiter JB, Fernandez DL. Complications following distal radial fractures. Instr Course Lect. 2002; 51: 203–219.

31. Knirk JL, Jupiter JB. Intraarticular fractures of the distal end of the radius in young adults. The Journal of Bone and Joint Surgery. 1986; 68A: 647–659.

32. Forward DP, Davis TR, Sithole JS. Do young patients with malunited fractures of the distal radius inevitably develop symptomatic posttraumatic osteoarthritis? The Journal of Bone and Joint Surgery. 2008; 90B: 629–637.

33. Goldfarb CA, Rudzki JR, Catalano LW, Hughes M, Borrelli JJ. Fifteen-year outcome of displaced intra-articular fractures of the distal radius. The Journal of Hand Surgery. 2006; 31A: 633–639.

34. Young CF, Nanu AM, Checketts RG. Seven-year outcome following Colles' type distal radial fracture. A comparison of two treatment methods. The Journal of Hand Surgery. 2003; 28B: 422–426.

35. Kamiloski V, Vuckov S, Kasapinova K. External fixation in patients with age over 65 years with distal radius fracture. Contributions. Section of biological and medical sciences. Macedonian Academy of Sciences and Arts. 2006; XXVII 2: 189–199.

36. MacDermid JC, Donner A, Richards RS, Roth JH. Patient versus injury factors as predictors of pain and disability six months after a distal radius fracture. Journal of Clinical Epidemiology. 2002; 55: 849–854.

37. Adams BD, Grosland NM, Murphy DM, McCullough M. Impact of impaired wrist motion on hand and upper-extremity performance. The Journal of Hand Surgery. 2003; 28A: 898–903.

Резиме

ПРОЦЕНА НА ИСХОДОТ КАЈ ПАЦИЕНТИТЕ СО ФРАКТУРА НА ДИСТАЛНИОТ КРАЈ НА РАДИУСОТ

Касапинова К., Камилоски В.

Универзитетска клиника за хируршки болести „Св. Наум Охридски“, Скопје, Р. Македонија

Вовед: Недостасуваат научни трудови за исходот на фрактурите на дисталниот крај на радиусот проценет од страна на самите пациенти. Постои несогласување на степенот на корелација на радиолошкиот и функционалниот исход со онеспособеноста кај овие пациенти.

Цел: Да се евалуира корелацијата на исходот проценет од страна на пациентите (онеспособеноста) со радиолошките параметри на фрактурите на дисталниот радиус, како и со објективните параметри на функцијата на рачниот зглоб (опсег на движења и сила на стисок).

Материјали и методи: Трудот е проспективна рандомизирана студија на 64 пациенти со фрактура на дисталниот крај на радиусот. За евалуација на онеспособеноста е користен прашалникот „Процена на рачниот зглоб од страна на пациентот“ (PRWE). За радиографска процена се мерени радијалната должина, радијалниот агол и дорзалниот агол, а потоа се бодувани според методот на Лидстром модифициран од Сармиенто. Објективните клинички параметри оценувани во студијава се силата на стисокот и опсегот на движења во рачниот зглоб. За да се истражи меѓусебната асоцијација на овие три мерки на исходот е користена Spearman-овата корелација на рангови.

Резултати: Според резултатите добиени од студијава не постои статистички значајна корелација на радиолошкиот исход, како ни на опсегот на движења во повредениот рачен зглоб со болката и онеспособеноста според PRWE. Само силата на стисок е значаен претскажувач на болката и онеспособеноста и на третиот и на шестиот месец од повредата.

Заклучок: Рехабилитацијата на пациентите по повредата и проценатa на исходот не смеат да се базираат само на засегнатоста на физичките параметри и рендгенографиите, туку и на процена на онеспособеноста. Само така ќе се обезбеди сеопфатен третман на пациентите со фрактура на дисталниот крај на радиусот.

Клучни зборови: фрактура на дисталниот радиус, онеспособеност, исход проценет од пациентот.

Corresponding Author:

Ass.d-r Katerina Kasapinova Mr. Sci
University Surgery Clinic, Sv. Naum Ohridski
ul. 11 Oktomvri 53, Skopje
R. Macedonia
Mob. +389 76 405555

E-mail: kasapinovakaterina@yahoo.com