Older's classification of Colles' fractures

Good intraobserver and interobserver reproducibility in 185 cases

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To evaluate the reliability of the Older classification, 4 observers classified 185 distal radius fractures twice with 1 month's interval. Both the intraobserver agreement and the interobserver agreement were high, with kappa values of 0.75 (0.69–0.79) and 0.69 (0.60–0.77), respectively. The agreement was especially high for type 1 and type 4 fractures. Older's method of classifying distal radius fractures can thus be recommended for clinical use.

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Different classifications of distal radius fractures have been suggested. The system of Older et al. (1965) focuses primarily on axial compression, and has proved superior to other classifications regarding the radiographic and the functional prognosis (Solgaard 1985 and 1988).

We assessed the reliability of Older's classification of Colles' fractures by determining the intraobserver and the interobserver variation. No such study has been published previously.

Patients and methods

The primary radiographs of 185 patients with Colles' fracture were chosen at random and evaluated by 1 senior orthopedic specialist and 3 orthopedic surgeons in training. All the observers were familiar with Older's classification, but reinstruction was provided. Each observer worked alone. The radiographs were reassessed after 1 month. Each observer determined the Older type according to the description published in 1965 by Older et al. and as modified by Solgaard (1985):

Type 1: Length of radial styloid ≥ 7 mm,
dorsal angulation ≤ 5°
Type 2: Length of radial styloid < 7 and ≥ 1 mm,
dorsal angulation > 5°
Type 3: Length of radial styloid ≤ 4 mm,
dorsal angulation > 5°,
slight dorsal comminution
Type 4: Length of radial styloid usually negative,
dorsal angulation > 5°,
comminution, often intraarticular involvement.

Chi-square tests were used in the trend analysis. The intraobserver and the interobserver variation of all 4 observers were evaluated using the weighted kappa value, which is the observed agreement (P_{ow}) corrected for the agreement that would be expected by chance (P_{cw}) (Siegel and Castellan 1988).

Results

The median frequency of a type 1 fracture was 26 (18–30) percent; type 2, 44 (40–50) percent; type 3, 19 (13–27) percent; and type 4, 11 (10–15) percent. Ninety-one fractures (26 type 1, 40 type 2, 12 type 3, 13 type 4) were classified identically by all the observers in the first assessment and 94 fractures (25 type 1, 46 type 2, 7 type 3, 16 type 4) in the second assessment. There was a trend towards assessing Older's types lower in the second assessment (Tables 1 and 2); the distinction was significant between Older's types 2 and 3 ($P = 0.002$).

The median intraobserver weighted kappa value was 0.75 (0.69–0.79); this was excellent (kappa > 0.75) for 3 of the observers and acceptable (kappa > 0.5 and < 0.75) for 1 observer (Table 3; Landis and Koch 1977). No difference was found between the experienced and the inexperienced observers.

The interobserver weighted kappa value was excellent in two and acceptable in 10 of the possible combinations (Table 3).

Discussion

At our hospital, we use Older's classification of distal

Table 1. Cross tabulations of the first and the second assessment of 4 observers (A–D) classifying 185 distal radius fractures according to Older

First assessment		Second assessment			
Type		1	2	3	4
1	A	44[a]	15	0	0
	B	28	8	0	0
	C	47	3	2	0
	D	30	6	0	0
2	A	4	71	5	0
	B	10	60	9	1
	C	11	77	6	1
	D	12	64	8	0
3	A	0	14	20	3
	B	1	20	31	2
	C	1	12	17	0
	D	0	10	23	3
4	A	0	0	1	22
	B	0	0	3	17
	C	0	0	4	19
	D	0	0	5	23

[a]Observer A classified 44 fractures as an Older type 1 in both the first and the second fracture assessment.

Table 2. Trend analysis for first vs second assessment

Type			
1st assessment	2nd assessment		
1	2	32[a]	0.6
2	1	37	
2	3	28	0.002
3	2	56	
3	4	8	0.3
4	3	13	

[a] The 4 observers classified 32 distal radius fractures (see Table 1: 15 + 8 + 3 + 6 = 32) as Older's type 1 in the first assessment and as Older's type 2 in the second assessment.

Table 3. Weighted kappa (k) analysis for intraobserver and interobserver agreement between groups. A1A2 means observer A (first assessment) vs observer A (second assessment) etc.

Intraobserver		Interobserver			
		1st assessment		2nd assessment	
	K		K		K
A1A2	0.79	A1B1	0.75	A2B2	0.70
B1B2	0.69	A1C1	0.64	A2C2	0.73
C1C2	0.77	A1D1	0.73	A2D2	0.77
D1D2	0.76	B1C1	0.74	B2C2	0.61
		B1D1	0.60	B2D2	0.68
		C1D1	0.66	C2D2	0.65

radius fractures to evaluate the need of reduction and to choose the initial treatment. In the Older type 1 fractures, we use no reduction and a plaster cast for 3 weeks without a further radiographic control examination. In Older's types 2 and 3 fractures, reduction is performed and a plaster cast is applied for 5 weeks. Radiographic evaluation after 10 to 14 days is performed to ascertain the need of rereduction or external fixation. In Older's type 4 fractures, external fixation is used primarily if one reduction attempt does not eliminate axial compression and dorsal angulation.

Therefore, our treatment of a distal radius fracture depends on the initial classification. In this study, we found excellent agreement in the classification of Older's types 1 and 4 fractures. There were some difficulties in differentiating between Older's types 2 and 3 fractures—but of no clinical consequence, because the initial treatment is the same in these cases. Frandsen et al. (1988) assessed the interobserver variation of Garden's classification of femoral neck fractures. They found 22 percent of the fractures identically classified. Our study showed 45 and 47 percent identically classified fractures in the first and the second assessment. The difference between these two studies can be explained by Older's use of simple quantifications, i.e., axial compression in millimeters and dorsal angulation in degrees.

We conclude that Older's classification of distal radius fractures is precise and reproducible, and can be recommended for use in emergency wards, and also to the inexperienced surgeon.

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