

Supplementary data

Table 1. Interobserver reliability of distal radius fractures in literature (Cohen's kappa coefficient) based on conventional radiographs (CR) alone unless otherwise indicated

Study	Observers (n)	Cases (n)	Frykman	Fernández	Universal	AO (groups)	AO (sub-groups)	AO (type)	AO (other)
Andersen et al. (1996)	4	55	0.36			0.29	0.25	0.64	
Belloti et al. (2008)	5	98	0.24	0.34	0.39		0.27		
Flikkilä et al. (1998)	5	30							0.18 ^a
Flinkkilä et al. (1998)	5	30							0.16 (RCT)
Flikkilä et al. (1998)	5	30							0.23 ^b
									0.25 (RCT)
									0.48 ^c
									0.78 (RCT)
									0.37 ^d
Illarremendi et al. (1998)	6	200							
Jin et al. (2007)	5	43	0.36		0.36	0.27		0.46	
Kreder et al. (1996)	36	30				0.48	0.33	0.68	
Kucuk et al. (2013)	10	50	0.40	0.46	0.32	0.34			
Kural (2010)	9	32	0.22	0.24	0.23	0.10			
Naqvi et al. (2009)	6	25		0.27					
Oliveira Filho et al. (2004)	10	40	0.36		0.33		0.19		
Oskam et al. (2001)	2	124						0.65 ^e	
								(0.86) ^f	
Van Leerdam (2010)	2	585				0.41	0.33	0.60	
Sirpakarn et al. (2013)	3	98	0.28	0.41		0.34			
Yunes Filho et al. (2007) ^g	5	21			0.42	0.32	0.21	0.47	
					0.37 (CT)	0.21 (CT)	0.11 (CT)	0.34 (CT)	
Arealis et al. (2014)	5	26		0.43	0.27	0.30			
				0.40 (CT)	0.19 (CT)	0.30 (CT)			
Plant et al. (2015)	3	456				0.29	0.28	0.56	
Buijtenen et al. (2015)	6	54				0.48		0.49	
Distribution overall based on									
CR alone			0.24–0.40	0.27–0.46	0.33–0.42	0.10–0.48	0.19–0.33	0.46–0.68	
CT- scan alone			–	0.40–0.43	0.19–0.37 ^g	0.21–0.30 ^g	0.11	0.34	
CR + additional CT- scan			–	–	–	–	–	–	

CT: assessment based on CT scan alone

RCT: assessment based on CR + additional CT scan

^a AO simplified into 14 subgroups (A2.2–3; A3.1–3; C1.1–3; C2.1–3; C31.1–3)^b AO simplified into 5 groups (A2, A3, C1, C2, C3)^c AO simplified into 2 types (A, C)^d AO simplified into 5 groups (A, B, C1, C2, C3)^e AO type A, B, C and extra group D (= not to be attributed to any AO type)^f After consensus meeting^g Observers were residents

Table 2. Intraobserver reliability of classification systems in literature (Cohen's kappa coefficient)

Study	Observers (n)	Cases (n)	Frykman	Fernández	Universal	AO (groups)	AO (sub-groups)	AO (type)	AO (other)
Andersen et al. (1996)	4	55	0.40–0.61			0.35–0.45	0.23–0.38	0.58–0.70	
Belloti et al. (2008)	5	98	0.55	0.59	0.61		0.49		
Illarremendi et al. (1998)	6	200							0.57 ^a
Jin et al. (2007)	5	43	0.54			0.36		0.49	
Kreder et al. (1996)	36	30					0.25–0.42	0.67–0.86	
Kucuk et al. (2013)	10	50	0.60	0.60	0.49	0.50			
Kural et al. (2010)	9	32	0.31	0.47	0.62	0.31			
Naqvi et al. (2009)	6	25		0.29–0.48					
de Oliveira Filho et al. (2004)	10	40	0.55		0.54		0.38		
Ploegmakers et al. (2009)	45	5	0.26	0.42		0.52			
Siripakarn et al. (2013)	3	98	0.31	0.34		0.29			
Plant et al. (2015)						0.70		0.68	
van Buijtenen et al. (2015)						0.53	0.49	0.65	
Distribution overall based on									
CR alone			0.26–0.60	0.42–0.60	0.54–0.62	0.36–0.70	0.23–0.49	0.49–0.86	
CT scan alone			–	–	–	–	–	–	
CR + additional CT scan			–	–	–	–	–	–	

^a AO reduction into 5 groups (A, B, C1, C2, C3)

Table 8. Intraobserver reliability

Classification	CR		CR + CT scan		p
	Kappa	Agreement	Kappa	Agreement	
Frykman	0.49 (0.32–0.66)	Mod.	0.50 (0.35–0.74)	Mod.	0.8
Fernandez	0.45 (0.28–0.65)	Mod.	0.54 (0.27–0.90)	Mod.	0.6
Universal	0.40 (0.31–0.44)	Fair	0.32 (0.22–0.46)	Fair	0.4
AO groups	0.40 (0.36–0.44)	Fair	0.41 (0.31–0.50)	Mod.	0.9

CR: Conventional radiographs
 Mod.: Moderate
 Mean Kappa of the intraobserver reliability with the range of the 4 observers in parentheses. This is presented for readers to compare kappa values with the previous literature.

Table 9. Interobserver reliability

Classification	CR		CR + CT scan		p
	Kappa	Agreement	Kappa	Agreement	
Frykman	0.40 (0.32–0.48)	Fair	0.36 (0.29–0.42)	Fair	0.3
Fernandez	0.28 (0.09–0.46)	Fair	0.26 (0.16–0.36)	Fair	0.9
Universal	0.20 (0.15–0.25)	Slight	0.11 (0.05–0.17)	Slight	0.05
AO groups	0.26 (0.20–0.33)	Fair	0.28 (0.08–0.30)	Fair	0.2

CR: Conventional radiographs
 Mean Kappa of the interobserver reliability with 95 % CI (confidence interval) in parentheses. This is presented for readers to compare kappa values with the previous literature.

Andersen D J, Blair W F, Steyers C M, Jr, Adams B D, el-Khoury G Y, Brandser E A. Classification of distal radius fractures: An analysis of interobserver reliability and intraobserver reproducibility. *J Hand Surg Am* 1996; 21 (4): 574-82.

de Oliveira Filho O M, Belangero W D, Teles J B. Distal radius fractures: Consistency of the classifications. *Rev Assoc Med Bras* 2004; 50 (1): 55-61.

Illarremendi A, Gonzalez Della Valle A, Segal E, De Carli P, Maignon G, Gallucci G. Evaluation of simplified frykman and AO classifications of fractures of the distal radius. assessment of interobserver and intraobserver agreement. *Int Orthop* 1998; 22 (2): 111-5.

Jin W J, Jiang L S, Shen L, Lu H, Cui Y M, Zhou Q, Dai L Y. The interobserver and intraobserver reliability of the cooney classification of distal radius fractures between experienced orthopaedic surgeons. *J Hand Surg Eur Vol* 2007; 32 (5): 509-11.

Kreder H J, Hanel D P, McKee M, Jupiter J, McGillivray G, Swiontkowski M F. Consistency of AO fracture classification for the distal radius. *J Bone Joint Surg Br* 1996; 78 (5): 726-31.

Kucuk L, Kumbaraci M, Gunay H, Karapinar L, Ozdemir O. Reliability and reproducibility of classifications for distal radius fractures. *Acta Orthop Traumatol Turc* 2013; 47 (3): 153-7.

Naqvi S G, Reynolds T, Kitsis C. Interobserver reliability and intraobserver reproducibility of the fernandez classification for distal radius fractures. *J Hand Surg Eur Vol* 2009; 34 (4): 483-5.

Oskam J, Kingma J, Klasen H J. Interrater reliability for the basic categories of the AO/ASIF's system as a frame of reference for classifying distal radial fractures. *Percept Mot Skills* 2001; 92 (2): 589-94.

Plant C E, Hickson C, Hedley H, Parsons N R, Costa M L. Is it time to revisit the AO classification of fractures of the distal radius? inter- and intraobserver reliability of the AO classification. *Bone Joint J* 2015; 97-B (6): 818-23.

Ploegmakers J J, Mader K, Pennig D, Verheyen C C. Four distal radial fracture classification systems tested amongst a large panel of dutch trauma surgeons. *Injury* 2007; 38 (11): 1268-72.

Siripakarn Y, Niempoog S, Boontanapibul K. The comparative study of reliability and reproducibility of distal radius' fracture classification among: AO frykman and fernandez classification systems. *J Med Assoc Thai* 2013; 96 (1): 52-7.

van Buijtenen J M, van Tunen M L, Zuidema W P, Heilbron E A, de Haan J, de Vet H C, Derksen R J. Inter- and intra-observer agreement of the AO classification for operatively treated distal radius fractures. *Strategies Trauma Limb Reconstr* 2015; 10 (3): 155-9.

van Leerdam R H, Souer J S, Lindenhovius A L, Ring D C. Agreement between initial classification and subsequent reclassification of fractures of the distal radius in a prospective cohort study. *Hand (N Y)* 2010; 5 (1): 68-71.