TABLE E-1 Demographic Data

	Opening-Wedge Cohort	Closing-Wedge Cohort	P Value
No. of patients	22	20	
Male:female ratio *(no. of patients)*	7:15	4:16	0.49
Age* *(yr)*	59 ± 16 (25 to 75)	58 ± 16 (19 to 79)	0.79
Type of malunion *(no. of cases)*			
Dorsal angular deformity	18	16	1
Volar angular deformity	4	4	
Time to operation* *(mo)*	8 ± 9 (2 to 36)	14 ± 21 (2 to 98)	0.20
Follow-up time* *(mo)*	36 ± 31 (12 to 101)	28 ± 19 (12 to 87)	0.32

*The values are given as the mean and the standard deviation, with the range in parentheses.

TABLE E-2 Implants Used for Osteotomies

Implant	Manufacturer	Number of Patients*
Opening-wedge cohort		
Radial corrective osteotomy		
Dorsal nonlocking Forte plates	Zimmer	5 (5)
3.5-mm volar nonlocking T plates	Synthes	2 (1)
Distal Window volar locking plates	Arata	12 (0)
Matrix SmartLock volar locking plates	Stryker	2 (1)
Hoffmann II Compact external fixator	Stryker	1
Ulnar shortening osteotomy		
3.5-mm Locking Compression Plates	Synthes	5 (5)
Closing-wedge cohort		
Radial corrective osteotomy		
3.5-mm volar nonlocking T plates	Synthes	12 (1)
LCP volar locking plates†	Synthes	8 (0)
Ulnar shortening osteotomy		
3.5-mm Locking Compression Plates	Synthes	20 (5)

*The number of implants removed is given in parentheses. Removal of an external fixator was not counted as implant removal. †LCP = Locking Compression Plate.

TABLE E-3 Demographic, Operative, Follow-up, and Radiographic Data for Patients Who Underwent Opening-Wedge Osteotomy

Case	Age *(yr)*	Sex	Time to Surgery *(mo)*	Type of Malunion	Operative Procedures			Duration of Follow-up *(mo)*	Time to Healing of Radial Osteotomy Site *(mo)*	Radiographic Evaluation					
					Fixation Technique	Void Filler*	Concomitant Ulnar Shortening Osteotomy			Volar Tilt *(deg)*		Radial Inclination *(deg)*		Ulnar Variance *(mm)*	
										Preop.	Postop.	Preop.	Postop.	Preop.	Postop.
1	50	F	4	Volar	Volar plate	TCP		12	3	27	13	26	31	6	1
2	79	F	12	Volar	Volar plate	TCP		12	3	20	10	20	20	5	5
3	62	F	7	Volar	Volar plate	Iliac bone		91	2	38	22	4	25	10	7
4	24	M	2	Volar	Volar plate	TCP		14	3	23	9	28	29	6	0
5	57	M	2	Dorsal	Volar plate	TCP		12	3	–32	5	15	25	6	3
6	73	F	2	Dorsal	Volar plate	TCP		12	3	–33	3	10	25	7	3
7	63	F	3	Dorsal	Volar plate	TCP		21	3	–25	3	23	25	5	1
8	57	F	3	Dorsal	Volar plate	TCP		14	3	–40	11	16	21	5	0
9	69	F	2	Dorsal	Volar plate	TCP		12	3	–30	3	7	20	10	0
10	60	F	36	Dorsal	Volar plate	TCP		12	3	–30	0	20	24	10	3
11	70	F	2	Dorsal	Volar plate	TCP		24	4	–25	10	21	26	9	4
12	56	M	4	Dorsal	Volar plate	TCP		24	5	–34	0	18	24	5	2
13	47	F	8	Dorsal	Volar plate	TCP		12	2	–11	–9	24	22	0	0
14	83	F	3	Dorsal	Volar plate	TCP		13	4	–29	5	8	20	5	1
15	69	F	3	Dorsal	External fixator	Iliac bone	Yes	38	2	–27	23	–17	25	7	4
16	42	M	10	Dorsal	Dorsal plate	Iliac bone		101	4	–39	–8	25	17	8	6
17	61	F	31	Dorsal	Dorsal plate	Iliac bone	Yes	95	5	–20	31	18	17	7	6
18	19	M	14	Dorsal	Volar plate	Iliac bone		77	2	–35	16	30	34	9	-1
19	60	M	4	Dorsal	Dorsal plate	Iliac bone	Yes	74	2	–25	9	30	23	9	3
20	65	F	3	Dorsal	Dorsal plate	Iliac bone		50	3	–35	15	2	14	9	5
21	72	F	3	Dorsal	Dorsal plate	Iliac bone	Yes	44	2	–19	18	18	29	7	0
22	67	M	8	Dorsal	Volar plate	Iliac bone	Yes	31	3	–11	1	19	25	7	3

*TCP = tricalcium phosphate bone substitute.

TABLE E-4 Range of Motion, Grip Strength, Pain, and Function for Patients Who Underwent Opening-Wedge Osteotomy

Case	Wrist Motion *(deg)*						Postoperative Grip Strength* *(kg)*	Pain-Rating Score		Postoperative Function *(points)*	
	Extension-Flexion Arc			Pronation-Supination Arc							
	Preop.	Postop.	Improvement	Preop.	Postop.	Improvement		Preop.	Postop.	DASH Score	Mayo Wrist Score
1	105	130	25	160	160	0	29 (85%)	Moderate	Mild	5	85
2	70	70	0	140	140	0	10 (100%)	Severe	None	6	85
3	68	95	27	100	155	55	15 (75%)	Mild	Mild	0	60
4	105	135	30	40	140	100	16 (59%)	Mild	Mild	10	80
5	50	115	65	110	160	50	27 (73%)	Severe	None	20	75
6	60	100	40	120	140	20	7 (39%)	Severe	None	34	70
7	90	115	25	160	160	0	15 (88%)	Severe	None	3	80
8	60	115	55	140	160	20	16 (64%)	Severe	None	11	75
9	30	130	100	10	170	160	12 (150%)	Severe	None	23	95
10	95	100	5	130	170	40	8 (80%)	Severe	None	12	80
11	80	90	10	120	160	40	16 (48%)	Moderate	None	10	65
12	65	110	45	140	160	20	34 (83%)	Moderate	Mild	23	75
13	90	85	–5	80	150	70	10 (40%)	Moderate	None	23	80
14	120	110	–10	130	170	40	10 (100%)	Severe	Mild	12	90
15	40	107	67	40	120	80	13 (69%)	Mild	Mild	14	70
16	85	120	35	120	150	30	36 (87%)	Moderate	None	4	80
17	90	110	20	170	160	–10	20 (87%)	Moderate	Mild	6	75
18	142	159	17	109	150	41	36 (84%)	Mild	Moderate	30	80
19	36	114	78	155	157	2	14 (110%)	Moderate	Mild	17	85
20	60	70	10	110	135	25	23 (105%)	Moderate	None	2	85
21	50	135	85	80	150	70	17 (113%)	Severe	None	0	100
22	40	65	25	105	105	0	9 (47%)	Severe	Moderate	44	55

*The percentage compared with the healthy side is given in parentheses.

TABLE E-5 Demographic, Operative, Follow-up, and Radiographic Data for Patients Who Underwent Simultaneous Radial Closing-Wedge and Ulnar Shortening Osteotomy

Case	Age *(yr)*	Sex	Time to Surgery *(mo)*	Type of Malunion	Duration of Follow-up *(mo)*	Time to Healing		Radiographic Evaluation *(deg)*					
						Radial Osteotomy *(mo)*	Ulnar Osteotomy *(mo)*	Volar Tilt *(deg)*		Radial Inclination *(deg)*		Ulnar Variance *(mm)*	
								Preop.	Postop.	Preop.	Postop.	Preop.	Postop.
23	50	F	6	Volar	24	2	3	32	3	20	21	5	–1
24	25	F	9	Volar	17	4	7	24	15	20	22	5	0
25	41	M	11	Volar	38	3	3	20	11	27	19	1	0
26	58	F	6	Volar	12	1	3	27	10	9	13	7	0
27	68	F	12	Dorsal	20	2	3	–22	8	16	22	7	0
28	71	F	2	Dorsal	13	3	3	–25	11	6	25	4	1
29	57	F	10	Dorsal	46	2	3	–12	8	14	32	8	0
30	69	F	3	Dorsal	87	2	3	–21	14	22	22	3	0
31	74	F	9	Dorsal	53	1	2	–25	14	20	20	7	0
32	70	F	13	Dorsal	47	1	2	–20	4	20	20	5	0
33	59	F	4	Dorsal	19	2	3	–20	15	14	16	5	2
34	75	M	21	Dorsal	34	2	4	–25	16	19	17	6	2
35	74	F	6	Dorsal	27	2	4	–21	3	6	8	6	0
36	33	F	98	Dorsal	17	2	2	–26	8	11	7	3	0
37	66	F	15	Dorsal	12	2	3	–15	15	30	23	6	0
38	56	F	9	Dorsal	21	2	3	–30	10	20	20	6	0
39	65	F	4	Dorsal	24	2	3	–20	19	29	28	7	0
40	72	F	7	Dorsal	18	2	3	–25	6	22	14	7	0
41	50	M	26	Dorsal	18	2	4	–5	15	2	8	8	0
42	27	M	14	Dorsal	14	2	3	–19	3	15	17	7	0

TABLE E-6 Range of Motion, Grip Strength, Pain, and Function for Patients Who Underwent Simultaneous Radial Closing-Wedge and Ulnar Shortening Osteotomy

Case	Wrist Motion *(deg)*						Postoperative Grip Strength* *(kg)*	Pain Rating Score		Postoperative Function *(points)*	
	Extension-Flexion Arc			Pronation-Supination Arc							
	Preop.	Postop.	Improvement	Preop.	Postop.	Improvement		Preop.	Postop.	DASH Score	Mayo Wrist Score
23	130	145	15	90	160	70	24 (95%)	Mild	None	2	90
24	175	170	–5	135	160	25	17 (93%)	Severe	Mild	24	90
25	125	180	55	175	180	5	25 (82%)	Mild	None	2	90
26	50	145	95	60	150	90	24 (80%)	Severe	None	3	90
27	50	165	115	110	155	45	26 (78%)	Severe	None	1	90
28	30	160	130	90	170	80	23 (70%)	Severe	None	8	85
29	70	145	75	150	150	0	17 (98%)	Severe	Mild	21	95
30	35	140	105	155	180	25	16 (81%)	Severe	Mild	21	85
31	100	155	55	160	180	20	15 (70%)	Severe	Moderate	10	70
32	110	160	50	160	150	–10	17 (85%)	Severe	None	2	90
33	110	175	65	155	175	20	17 (80%)	Severe	None	5	90
34	95	115	20	75	140	65	32 (73%)	Moderate	None	13	80
35	85	150	65	140	160	20	11 (73%)	Moderate	None	7	85
36	125	180	55	160	160	0	20 (83%)	Mild	None	8	90
37	120	150	30	120	140	20	14 (65%)	Severe	None	23	80
38	102	155	53	110	150	40	20 (99%)	Severe	Mild	22	85
39	50	140	90	105	140	35	13 (71%)	Moderate	None	15	85
40	110	140	30	150	160	10	7 (36%)	Severe	Mild	60	70
41	130	170	40	160	170	10	31 (78%)	Mild	None	16	90
42	90	140	50	100	160	60	37 (89%)	Moderate	None	1	90

*The percentage compared with the healthy side is given in parentheses.