

Supplementary article data

Surgical treatment of Neer type-II fractures of the distal clavicle

A meta-analysis

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Table 1. Search terms in each search engine

Search engine	Search
PubMed	("Fractures, Bone"[Mesh] OR fracture[all fields] OR fractures[all fields] OR "Fracture Fixation"[Mesh] OR "Fracture Healing"[Mesh]) AND ("Clavicle"[Mesh] OR clavicle[all fields] OR clavicles[all fields] OR clavicular[all fields] OR clavícula[all fields] OR clavículas[all fields] OR "collar bone"[All Fields] OR "collar bones"[All Fields]) AND ("lateral"[all fields] OR "distal"[all fields])
EMBASE	(clavicle fracture/ OR ((clavicle*.mp. OR clavícula*.mp. OR clavicle/ OR collar bone*.mp.) AND (fracture*.mp. OR exp fracture/ OR exp fracture fixation/ OR exp fracture healing/))) AND (lateral.mp. OR distal.mp.)
Web of Science	TS= (fracture OR fractures) AND TS= (clavicle* OR clavícula* OR "collar bone*" OR midclavicular) AND TS=(lateral OR distal)

Table 2A. Characteristics of the studies included, using hook-plate fixation

A	B	C	D	E	F	G	H	I	J	K	Complications
Bhangal et al. 2006	IV RS	2002–2005 UK	AO HP	13 (11)	NR 42 (24–65)	II	64 (20–108)	NR (10–12) 12/13	NR (12–104) 11/11	91.8 (83–95)	8% implant failure/ asymptomatic non-union
Kashii et al. 2006	IV RS	Sept 1999– Sept 2003 Japan	Acromio- clavicular titanium HP	34 (34)	28:6 40 (21–74)	II	50 (48–60)	16.4 (12–26) 34/34	21 (14–60) 34/34	JOA 98.3 (90–100)	3% plate displacement 3% acromion # and hook cut out 56% hook hole widening 38% upward migration 3% rotator cuff tear
Meda et al. 2006	IV PS	1998–2002 UK	Clavicular HP	16 (16)	13:4 52 (25–86)	II	171 (72–272)	7 (6–9) 16/16	24 (16–36) 13/16	97 (86–100)	6% superficial infection 19% impingement signs 16% radiolucent hook tips/plate removal
Muramatsu et al. 2007	IV PS	June 2003– Oct 2004 Japan	AO clavicle HP + K-wire	15 (15)	13:2 47 (20–71)	II	62 (32–96)	<16 15/15	18 (12–32) 12/15	89 (75–95)	87% hook migration into acromion
Renger et al. 2009	IV RS	Jan 2003– Dec 2006 Spain/ The Nether- lands	Clavicle HP	51 (44)	29:15 38 (18–66)	II	110 (56–192)	NR (16–56) 42/44	34 (8–132) 44/44	92.4 (74–100)	4.5% hypertrophic scar tissue 4.5% superficial wound infection 6.8% acromial osteolysis 4.5% pseudarthrosis 68% irritation by hook plate
Lee et al. 2010	IV PS	Jan 2008– Apr 2009 Korea	Arthroscopic- assisted LCP clavicular HP	23 (23)	19:4 43 (21–74)	II	52 (24–84)	17 (14–28) 23/23	20 (14–28) 23/23	91 (81–98)	17% acromial osteolysis 13% arthrosis of AC-joint 1 refracture

NR = Not reported; N/ A= Not applicable;

UCLA = University of California Los Angeles score;

ASES = American Shoulder and Elbow Surgeons self-report;

JOA = Japanese Orthopaedic Association;

A References

B Level of evidence. Retrospective (RS) or prospective (PS) study design

C Inclusion period and country

UK = United Kingdom;

USA = United States of America

D Treatment modalities: HP – hook plate

E Number of included patients (number in last follow up)

F Gender (at follow up): male:female, age (range)

G Neer type

H Mean duration of follow-up in weeks (range)

I Weeks to union (range), united number/total number

J Weeks to implant removal (range), removed number/total number

K Constant score (unless indicated otherwise)

Table 2B. Characteristics of the studies included, using some type of plate fixation

A	B	C	D	E	F	G	H	I	J	K	Complications
Kalamaras et al. 2008	IV RS	July 2004– May 2005 Australia	Distal radius locking plate. T-plates, L-plates and if necessary sutures	8 (7)	6:1 29 (16–41)	II	54 (40–76)	10 (6–18) 7/7	None removed	96 (96–100)	13% wound infection
Herrmann et al. 2009	IV RS	Oct 2006– Dec 2007 Germany	Locking T-plates and suture anchors	8 (7)	6:1 39 (26–55)	IIB	33 (16–64)	<6 (NR) 7/7	2 (24 and 44 weeks)	93.3 (82–99)	14% mild pain during strenuous activity 14% limited internal rotation
Yu et al. 2009	IV PS	NR China	Distal radius volar locking compression plate	6 (6)	4:2 37 (23–52)	II	17 (10–25)	8 (6–10) 6/6	None removed	97.5 (95–100)	None
Kaipel et al. 2010	IV PS	Jan 2006– June 2008 Switzerland	Double-plate fixation	11 (9)	5:4 48 (32–61)	II	63 (12–132)	12 (10–16) 9/9	NR (9–112) 3/11	90 (68–100)	22% screw migration 11% meteorosensitivity and local dysesthesia

For abbreviations, see Table 2A

Table 2C. Characteristics of the studies included, using some type of pin fixation

A	B	C	D	E	F	G	H	I	J	K	Complications
Fann et al. 2004	IV PS	1991–2001 Taiwan	Transacromial Knowles-pin	34 (32)	18:14 41 (18–83)	II	320 (48–528)	6.8 (4–12) 32/32	12 (4–24) 32/32	UCLA 24.5 (23–25)	3% acromioclavicular arthrosis
Scadden et al. 2005	IV RS	1996–2002 UK	AO/ASIF malleolar screw	10 (10)	8:2 29 (18–84)	II	6–12 Review/ teleph. 104–208	6.3 (6–12) 10/10	8–14 10/10	Oxford 21.4/60 (17–32)	None
Fazal et al. 2007	IV RS	Jan 1995– Dec 2003 UK	Temporary coracoclavicular screw	30 (30)	22:8 29 (21–53)	II	68 (56–96)	NR (6–10) 30/30	NR 30/30	11 ^a (9–12) 28/30	7% backing out of the CC-screw 3% superficial wound infection
Wang et al. 2008	IV RS	1993–2005 Taiwan	Transacromial extra-articular Knowles pin	25 (25)	15:10 35 (17–84)	IIA/ IIB/ V	204 (96–424)	NR (8–12) 23/25	37.6 (20–84) 25/25	93.9 (8–100)	4% infection 12% heterotrophic ossification 32% lateral pin-migration 9% delayed or non-union with pin loosening
Jou et al. 2011	IV RS	Aug 2005– July 2009 Taiwan	Knowles pin	11 (11)	5:6 42 (25–61)	II	61 (24–96)	12.5 (10–16) 11/11	14.4 (12–18) 11/11	UCLA 33.8 (30–35)	27% skin irritation due to pin prominence

^a Simple shoulder test questionnaire^b Craig classification

For abbreviations, see Table 2A

Table 2D. Characteristics of the studies included, using some type of suture anchoring

A	B	C	D	E	F	G	H	I	J	K	Complications
Webber et al. 2000	IV RS	Nov 1988– March 1995 UK	Dacron arterial graft	11 (11)	8:3 30 (17–46)	II	221 (96–432)	6.2 (3–8) 11/11	NR 2/15	98.9 (90–100)	7% superficial irritation due to plate fixation in revision surgery 7% low grade infection 7% sterile sinus
Othman et al. 2002	IV PS	NR UK	Vicryl tape	6 (6)	4:2 30 (24–33)	II	(6–8) and (36–48)	NR (6–8) 6/6	N/A	91.2 (85–100)	None
Rokito et al. 2002	III RS	1989–1997 USA	Coracoclavicu- lar stabilization with suture bands	14 (14)	8:6 36 (22–47)	II	239 (48–428)	NR (6–10) 14/14	N/A	88.1 (NR)	None
Bezer et al. 2005	IV RS	Feb 2001– Jan 2003 Turkey	K-wire fixation with suture anchoring	12 (10)	6:4 33 (20–45)	IIB	96 (48–144)	7.5 (6–9) 10/10	(6–9) 10/10	96.6 (90–100)	10% mild pain with strenuous work 10% pin tract infection and loosening
Badhe et al. 2007	IV RS	May 2003– May 2005 UK	Tension band suturing	10 (10)	8:2 41 (15–72)	II	70 (36–120)	9.2 (6–16) 10/10	N/A	93.9 (85–100)	None
Shin et al. 2009	IV PS	NR Korea	Two suture anchors and suture tension bands	19 (19)	14:5 43 (17–70)	IIB	104 (96–160)	19.2 (12–48) 16/19	N/A	94 (88–100)	11% clavicular erosion 11% limitation in forward flexion and internal rotation 11% mild discomfort with heavy labor 1 patient non-union with subsequent distal clavicle resection 2 patients delayed union

For abbreviations, see Table 2A