

Evidence-based guidelines for treating distal radius fractures



Norwegian Orthopaedic Association
Det Norske Ortopædiske Selskap

GRADE



Norsk Selskap for Kirurgi
Det Norske Kirurgiske Selskap

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Haukeland University Hospital



MOTIVATION BEHIND NEW GUIDELINES FOR THE TREATMENT OF DISTAL RADIUS FRACTURES IN ADULTS

The most common fracture

20% of all fractures in Norway

Incidence rates indicate that we have more than 15 000 of these fractures each year in Norway

Mean age for the women: 63 years

Mean age for the men: 47 years

Hove et al 1995 is a general

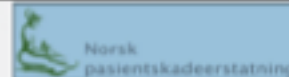
What was the problem?

To many patients ended up with a delayed operation or a malunited fracture.

Often because the anatomical position after reduction was considered satisfactory without considering whether the fracture may be unstable and (re-)dislocate.

Despite the growing emphasis on treatment of distal radius fractures, there was wide variation in practice..

Hove et al 1995 is a general

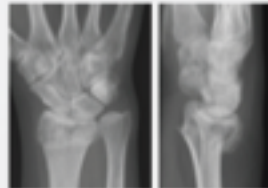


Patient compensation claim cases

- In Norway you will find one of the highest incidences of DRF (38 / 10,000)
- DRF is one of the most common diagnoses being considered by NPE considering incorrect treatment
- The number of complains have declined from 2006 to 2015 > 7.8% to <4.3%
- **Better treatment of DRF today?**

Distal radius fractures

More and more often therapists and patients asked the following questions:



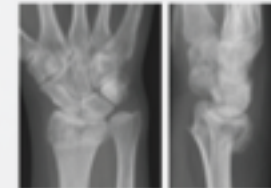
Distal radius fractures

More and more often therapists and patients asked the following questions:

What is the best treatment for me?

What risk do I run when choosing different treatment options?

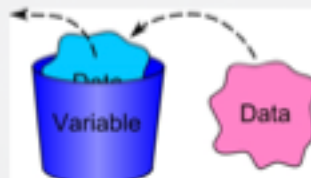
What to answer, and where are the answers found?



Distal radius fractures

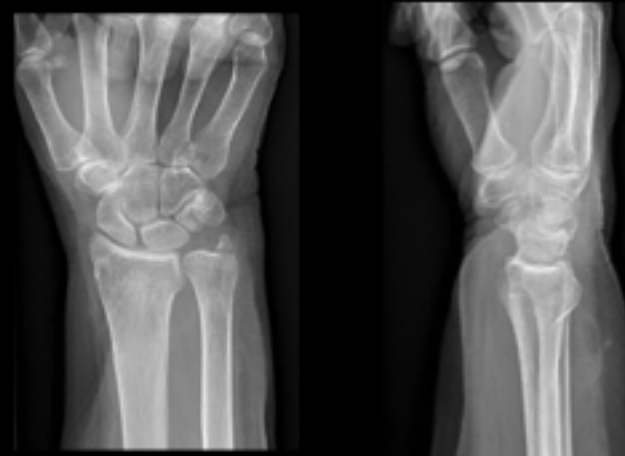
There are many variables !!

- Age
- Gender
- Profession, leisure activities
- Dominant / non-dominant hand
- Injury mechanism
- Bone quality
- Fracture type
- Additional damage
- Comorbidity
- Medications
- Functionally and mentally functioning



Distal radius fractures

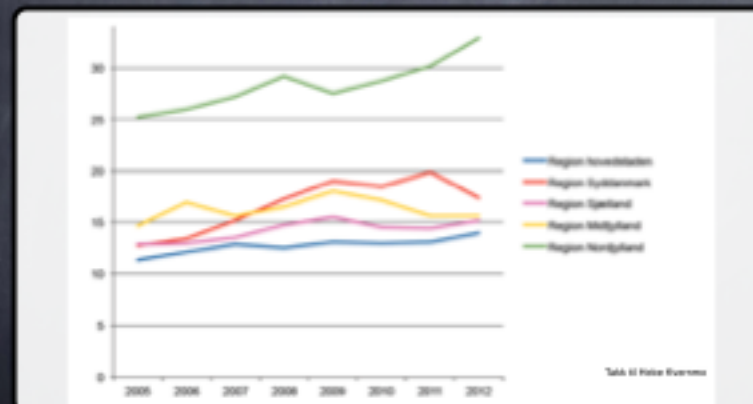
Female 73 year, active



Closed reduction and PoP



Regional differences with respect to "surgery willingness"



Distal radius fractures

Which treatment should be chosen?

- Plaster of Paris (PoP)
- Closed reduction and PoP +/-pinning
- Closed reduction and external fixation
- Closed reduction and external fixation + pinning
- Open reduction and plate and screws



Distal radius fractures

Why trustworthy guidelines?

Should:

- Serve as an aid in decision making
- Focus on effect measures important to the patients
- Facilitate cooperation with the patient when taking decisions
- Be easily accessible and useful for clinicians



Distal radius fractures



Guidelines for treatment of DRF in adultsn 2014

www.håndkirurgi.no

www.wristfractures.no

Distal radius fractures

5 steps to create guidelines using **GRADE**

- 1) Formulate a research - or PICO-Question
(define patient group, intervention, control, outcome)
- 2) Establish an evidence base
- 3) Quality appraisal
(what is your trust in the effect estimates?)
- 4) Process all information
(evaluate quality of the evidence, the balance between benefits and harms, patients values and preferences, and resource use)
- 5) Make a recommendation *(strong or weak)*

Distal radius fractures

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Behandling av håndleddsbrudd (distale radiusfrakturer) hos voksne

Rapport fra Kunnskapssenteret nr 2-2013
Systematisk oversikt

Kunnskapssenteret

Distal radius fractures

5 steps to create guidelines using **GRADE**

Tittel	Behandling av håndleddsbrudd (distale radiusfrakturer) hos voksne
English title	Treatment of distal radial fractures in adults
Institusjon	Nasjonalt kunnskapssenter for helsehjelp
Ansvarlig	Magne Nylenna, direktør
Forfattere	Katrine B. Fossum (prosjektleder), forsker, Kunnskapssenteret Helle D. Evensen, leder Norsk Ortopedisk Forening (NOF) 2006-2009, leder av konsensusgruppen for håndleddsbrudd, Leiv Hove, NOF konsensusgruppen, Torstein Ihleb, NOF konsensusgruppen, Magne Røkkum, NOF konsensusgruppen, Adalstein Odinsen, NOF konsensusgruppen, Eivind Skjold, NOF konsensusgruppen, Eivind Mellhus, NOF konsensusgruppen, John H. Williksen, NOF konsensusgruppen, Yngve Krullberg, NOF konsensusgruppen, Vidvaldur Finna, NOF konsensusgruppen, Inger N. Nordseth, forskningsleder, Kunnskapssenteret, Lene Jøvet, forsker, Kunnskapssenteret, Vigdis Løvstrøm, forsker, Kunnskapssenteret, Eystein Fure (prosjektansvarlig), seksjonsleder, Kunnskapssenteret

Distal radius fractures

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Distal radius fractures

Evidence basis

Pico-questions:	Guideline	Systematic reviews	RCT	Observational studies
Is conservative treatment better than pinning	0	1	1	-
Is conservative treatment better than ex fix?	0	1	2	-
Is conservative treatment better than volar locking plates?	0	0	1	-
Are volar locking plates better than ex fix?	0	1	1	-
Are volar locking plates better than pinning	0	0	5	-

Table 11. Evidence basis

Distal radius fractures

Instability assessment

$\geq 10^\circ$ dorsal angulation

Radial shortening ≥ 2 mm

Intra-articular step ≥ 2 mm or more

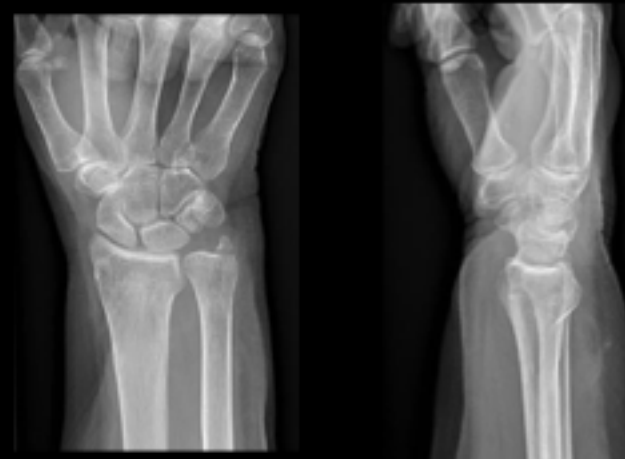
Dorsal comminution

Incongruence in DRUJ



Mackenney et al. 2006

Female 73 year, active



Closed reduction and PoP



12 days after reduction



5 weeks after reduction



Changing to surgery



www.wristfractures.no

Effektstyrmar	Nakkainfo	Reipni	Praktisk info	Adaptasjon	Ref	Kommentar (2)
Populægr		Intensjon	Kompetar			Utfall
Adult patients with unstable distal radius fractures, irrespective of age	vs	Percutaneous pinning	Conservative treatment			Function score, Pain, Complications, Anatomical end-result
Adult patients with unstable distal radius fractures, irrespective of age	vs	External fixation	Conservative treatment			Function score, Pain, Complications, Anatomical end-result
Adult patients > 55 years with unstable distal radius fractures	vs	Wrist locking plates	Conservative treatment			Patient reported outcome measures (DAS(VP95)), Pain (VAS) at rest and at activity

Hebe Dáiríe Kverrma, Leiv Magna Hove, Adalsteinn Odinson, Kátrine Björnebek Frønsdal, Ingrid Herboe, Yngvar Krukhaug

Non-operative treatment vs Pinning

Utfall	Styr til tilvísingarnar	Stærki Stærki	Reipni	Reipni	Reipni	Reipni
Functional grading for or post independent on length of follow-up	Medical Age > 55 or risk of fall (DAS(VP95) < 1.5)	55 (2.2)	272	115	207 (95%)	158 (2-NCT)
Functional grading for or post after 12 months follow-up	Medical Age > 55 or risk of fall (DAS(VP95) < 1.5)	55 (2.2)	452	142	310 (95%)	86 (2-NCT)
No observation (waiting surgical consultation)	Medical Age > 70 or risk of fall (DAS(VP95) < 1.5)	55 (2.2)	143	13	130 (95%)	266 (2-NCT)
Capital tunnel syndrome (median nerve compression) (neurophysiological)	Low Age > 55 or risk of fall (DAS(VP95) < 1.5)	55 (2.2)	54	25	29 (54%)	260 (2-NCT)
Complete regional pain syndrome	Low Age > 55 or risk of fall (DAS(VP95) < 1.5)	55 (2.2)	155	141	14 (9%)	158 (2-NCT)

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Issue	Key to Abbreviations	Issue Area	Non-operative Treatment	Pinning	Pinning with Compression Plating	Pinning with Locking Compression Plating
Functional grading for 1 year independent on length of bone operation	Medical Age at risk of fall (months) < 12	800 (2.21) 2000 (4.17) - 1.50	375 (4.13)	750 (4.13)	200 (3.86)	200 (3.86)
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Re-operation needing surgical correction	Medical Age at risk of fall (months) < 12	800 (2.21) 2000 (4.17) - 1.50	140 (4.13)	70 (4.13)	100 (3.86)	100 (3.86)
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Non-operative treatment vs Pinning

Issue	Key to Abbreviations	Issue Area	Non-operative Treatment	Pinning	Pinning vs Non-operative Treatment	Overall Evidence (Quality of Evidence)
Functional grading for 1 year independent on length of bone operation	Medical Age at risk of fall (odds ratio < 0.5)	95% CI 0.21 - 1.88	375 (95% CI 153 - 597)	726 (95% CI 503 - 949)	351 (95% CI 128 - 574)	100 (⊕-HCT)
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No observation (standing surgical condition)	Medical Age at risk of fall (odds ratio < 0.5) No standing on feet for 2 days (odds ratio < 0.5)	95% CI 0.26 - 1.21	143 (95% CI 71 - 215)	77 (95% CI 45 - 109)	66 (95% CI 34 - 98)	98 (⊕-HCT)
Capital turned (synthetic (chassis) nails compression) (osteoporosis)	Low Age at risk of fall (odds ratio < 0.5) No standing on feet for 2 days (odds ratio < 0.5)	95% CI 0.21 - 1.48	58 (95% CI 36 - 80)	29 (95% CI 7 - 51)	29 (95% CI 7 - 51)	98 (⊕-HCT)
Complete regional pain syndrome	Low Age at risk of fall (odds ratio < 0.5) No standing on feet for 2 days (odds ratio < 0.5)	95% CI 0.84 - 1.88	100 (95% CI 78 - 122)	141 (95% CI 119 - 163)	41 (95% CI 19 - 63)	100 (⊕-HCT)

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Preferences and Values

Benefits and harms

Wrist locking plate osteosynthesis results in better patient-reported outcome parameters and more rapid effects than percutaneous pinning, even though the difference in DASH scores is only borderline (clinically relevant after 3 months (9.3 points), while the minimal clinically important difference for DASH is defined as 10 points. After 6 and 12 months, the differences are only 6 and 3 points, respectively.

Quality of evidence

The quality of the documentation is generally low. The quality level of the evidence is downgraded because of lack of blinding and lack of evaluation of patient dropout. The return to work parameter is only reported in one study, which means that the evidence from this study is further downgraded because of risk of inadequate precision.

Preferences and values

Patient preferences are expected to be very largely unambiguous. Wrist locking plate osteosynthesis makes it possible to start functional retraining earlier, which is expected to be a high priority for most patients.

Unstable distal radius fractures

Recommendation

Operative vs conservative treatment of unstable DRF

Strong recommendation

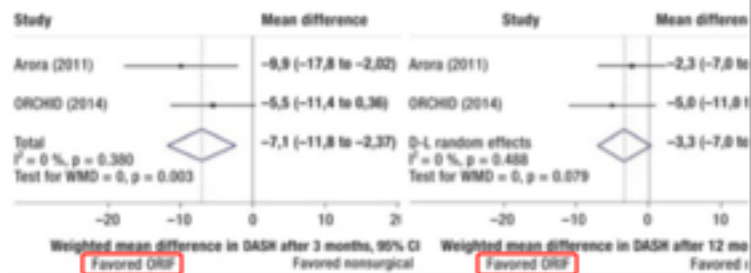
Benefits clearly outweigh the drawbacks/harms.

We recommend operative treatment of patients with unstable distal radius fractures in adult patients.

Restraint should be exhibited with respect to using operative treatment for patients with a low functional level. By low functional level is meant permanent inability to deal independently with day-to-day activities.

Distal radius fractures

Non-operative treatment vs plating of DRF in people over 65 years



Beri C, Stengel D, Gerhard K, Bruckner T, Study Group ORCHD. The Treatment of Displaced Intra-articular Distal Radius Fractures in Elderly Patients: A Randomized Multi-center Study (ORCHD) of Open Reduction and Wrist Locking Plate Fixation Versus Closed Reduction and Cast Immobilization. Deutsches Arzteblatt International 2014; 111(46):779-787. doi:10.3238/arztebl.2014.0779.

Distal radius fractures

Recommendation

Surgical vs conservative treatment of unstable DRF in people >65 years

Weak recommendation

It is less clear whether the benefits outweigh the drawbacks/harms.

We suggest operative treatment of patients with unstable distal radius fractures in adult patients > 65 years.

Restraint should be exhibited with respect to using operative treatment for patients with a low functional level. By low functional level is meant permanent inability to deal independently with day-to-day activities.

Distal radius fractures

Different surgical methods



Distal radius fractures

Ex Fix vs Volar Locking Plates

Label	View To Effectiveness	Result Effect	External Fixation	Volar Locking Plates	Forearm/Wrist Volar Locking Plates	Anatomical Institute (Shoulder, Göttingen)
COCRN after 3 months follow-up Meta-analysis and observational performed by the guideline group/The Norwegian Knowledge Centre	Medial		mean 27.1	mean 11.8	MD 15.3 Score (95% CI 13.3 Score - 17.3 Score)	188 (3 RCT)
COCRN after 6 months follow-up Meta-analysis and observational performed by the guideline group/The Norwegian Knowledge Centre	Medial		mean 19.2	mean 11.3	MD 7.9 Score (95% CI 6.9 Score - 8.9 Score)	179 (3 RCT)
COCRN after 1 year follow-up Meta-analysis and observational performed by the guideline group/The Norwegian Knowledge Centre	Medial		mean 19.9	mean 12.4	MD 7.5 Score (95% CI 6.5 Score - 7.5 Score)	171 (3 RCT)
Pain (VAS) at activity after 6 months follow-up Meta-analysis and observational performed by the guideline group/The Norwegian Knowledge Centre	Lab	1-panel study	mean 21	mean 10	MD 9 Score (95% CI 10 Score - 11 Score)	104 (1 RCT)

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Ex Fix vs Volar Locking Plates

Label	View To Differentiate	Result Effect	External Fixation	Volar Locking Plates	Forearm/Wrist Volar Locking Plates	Annot: Intraoperative (Shoulder) Dehiscence/Instability
COXIM after 3 months follow-up Meta-analysis and observational performed by the guideline group/The Norwegian Knowledge Centre	Medial		mean 27.1	mean 11.8	MD 15.3 Sems (95% CI 13.3 Sems - 17.1 Sems)	188 (3 RCT)
COXIM after 6 months follow-up Meta-analysis and observational performed by the guideline group/The Norwegian Knowledge Centre	Medial		mean 19.2	mean 11.2	MD 7.8 Sems (95% CI 6.0 Sems - 9.6 Sems)	170 (3 RCT)
COXIM after 1 year follow-up Meta-analysis and observational performed by the guideline group/The Norwegian Knowledge Centre	Medial	Small studies	mean 19.9	mean 12.4	MD 7.5 Sems (95% CI 5.5 Sems - 9.5 Sems)	171 (3 RCT)
Pain (VAS) at activity after 6 months follow-up Meta-analysis and observational performed by the guideline group/The Norwegian Knowledge Centre	Late	1 small study	mean 21	mean 16	MD 5 Sems (95% CI 3 Sems - 7 Sems)	104 (1 RCT)

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Ex Fix vs Volar Locking Plates

Label	Time To Effectiveness	Relative Effect	External Fixation	Volar Locking Plates	Forecasted Volar Locking Plates	Adjusted Incidence (Number, 95%CrI)
GD3M after 3 months follow-up Risk analysis and GRADE performed by the guideline group (The Norwegian Knowledge Centre)	Medial Risk analysis, no rating, few participants		mean 27.1	mean 11.8	MD 15.3 NNTs (95% CrI 12.9 NNTs - 17.1 NNTs)	188 (3 NCT)
GD3M after 6 months follow-up Risk analysis and GRADE performed by the guideline group (The Norwegian Knowledge Centre)	Medial Risk of bias: unclear with few participants		mean 19.2	mean 11.2	MD 7.8 NNTs (95% CrI 6.2 NNTs - 9.2 NNTs)	170 (3 NCT)
GD3M after 1 year follow-up Risk analysis and GRADE performed by the guideline group (The Norwegian Knowledge Centre)	Medial Small studies		mean 19.9	mean 12.4	MD 7.5 NNTs (95% CrI 6.1 NNTs - 8.9 NNTs)	171 (3 NCT)
Pain (VAS) at activity after 6 months follow-up Risk analysis and GRADE performed by the guideline group (The Norwegian Knowledge Centre)	Low Small study		mean 21	mean 15	MD 6 NNTs (95% CrI 4.9 NNTs - 7.1 NNTs)	136 (1 NCT)

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Ex Fix vs Volar Locking Plates

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Volar locking plates vs Ex fix

Weak recommendation

Options

Consider choosing volar locking plates rather than external fixation for adult patients irrespective of age who meet the indication for operation.

Restraint should be exhibited with respect to using surgery for patients with a low functional level. By low functional level is meant permanent inability to deal independently with day-to-day activities.

Distal radius fractures

Pinning vs Volar Locking Plates

Label	Time To Effectiveness	Relative Effect	Permanence Pinning	Volar Locking Plates	Forecasted Volar Locking Plates	Adjusted Incidence (Number, 95%CrI)
Total complications after 6 months - 1 year Risk analysis, few events (compensation)	Low	RR 0.24 (95% CrI 0.08 - 0.72)	262 per 1000 per 1000	63 per 1000 per 1000	198 NNTs per 1000 (95% CrI 148 NNTs - 248 NNTs)	206 (4 NCT)
Statistical complications after 6 months - 1 year Risk analysis, few events (compensation)	Very low	RR 0.19 (95% CrI 0.04 - 0.82)	108 per 1000 per 1000	21 per 1000 per 1000	87 NNTs per 1000 (95% CrI 48 NNTs - 124 NNTs)	140 (3 NCT)
Non-statistical complications after 1 year Risk analysis, few events (compensation)	Low	RR 0.58 (95% CrI 0.28 - 1.02)	124 per 1000 per 1000	72 per 1000 per 1000	52 NNTs per 1000 (95% CrI 32 NNTs - 82 NNTs)	176 (3 NCT)
Continuous Outcomes						
GD3M after 3 months Small studies	Medial	SMD 0.102	mean 28.7	mean 18.9	MD 9.8 NNTs (95% CrI 7.2 NNTs - 12.4 NNTs)	206 (4 NCT)
GD3M after 6 months Small studies	Low	SMD 0.102	mean 22	mean 15	MD 7 NNTs (95% CrI 5.1 NNTs - 8.9 NNTs)	188 (3 NCT)
GD3M after 12 months Only 1 study, few participants	Low	SMD 0.102	mean 18.3	mean 13.2	MD 5.1 NNTs (95% CrI 3.2 NNTs - 7.0 NNTs)	75 (3 NCT)

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Pinning vs Volar Locking Plates

Issue	Time To Effectiveness	Health Effect	Percutaneous Pinning	Volar Locking Plates	Fixed or Volar Locking Plates	Adult Indirectly Studies, Openings
Total complications after 6 months - 1 year	Low Pain participants, few events (complications)	RR 0.24 (95% CI 0.05 - 1.02)	282 per 1000	69 per 1000	108 Nerve per 1000 (95% CI 28 Nerve - 17 Nerve)	236 (2 RCT)
Recovery complications after 6 months - 1 year	Very low Pain participants, few events (complications)	RR 0.10 (95% CI 0.04 - 1.02)	108 per 1000	21 per 1000	87 Nerve per 1000 (95% CI 19 Nerve - 8 Nerve)	148 (2 RCT)
Wrist complications after 1 year	Low Pain participants, few events (complications)	RR 0.58 (95% CI 0.24 - 1.32)	134 per 1000	72 per 1000	52 Nerve per 1000 (95% CI 19 Nerve - 8 Nerve)	176 (2 RCT)
Distraction Outcomes						
GDH after 3 months	Medical Small studies	GDH 0-100	mean 28.7	mean 18.8	MD 9.8 Nerve (95% CI 13.8 Nerve - 5.8 Nerve)	236 (2 RCT)
GDH after 6 months	Low Small studies	GDH 0-100	mean 22	mean 15	MD 12 Nerve (95% CI 16.1 Nerve - 4.9 Nerve)	159 (2 RCT)
GDH after 12 months	Low Only 1 study for participants	GDH 0-100	mean 16.7	mean 13.2	MD 3.5 Nerve (95% CI 10 Nerve - 2.9 Nerve)	75 (2 RCT)

www.MedicallBibliography ; Peta Elinde Kvarnmo, Leif Magnus Reav, Róshelmi Ólafsson, Kárlína Eirnevald Þránsdóttir, Dagfríð Harboe, Yngvar Krathoug

Pinning vs Volar Locking Plates

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Weak recommendation

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Distal radius fractures

Thank You for Your Attention

