Key Hand & Wrist Evidence for the FRCS Tr & Orth

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Objectives

- Commonly examined conditions
- Classic and contemporary literature
- Interactive!!

Distal Radius Fractures

- 68 F
- Non-dominant hand
- Well controlled BP / Chol
- Plays tennis weekly (2-handed back hand)

- 75yr F, non-dom hand
- Multiple comorbidities
- Low demand

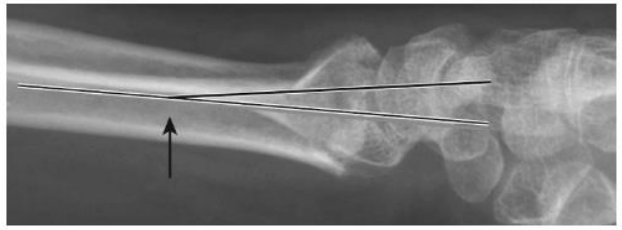
Decision-making…

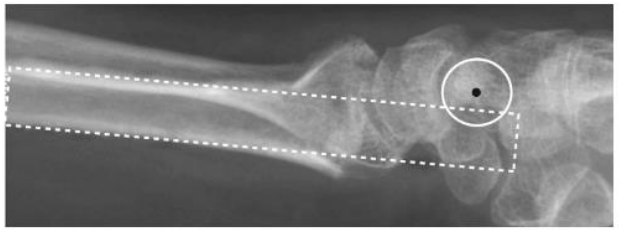
- Is the current position acceptable?
- Will it stay in this position?
- How should I fix this fracture?
- What rehab will I advise?

Is the position acceptable?

- **Intra-articular fractures of the distal end of the radius in young adults**
- Knirk JL, Jupiter JB, J Bone Joint Surg Am, 1986
  - Variety of Rx
  - Mean 6yr F/U
  - All pt with >2mm IA incongruity = OA (93% symptomatic)

- **What are the radiological predictors of functional outcome following fractures of the distal radius?**
- Ng CY, McQueen MM, J Bone Joint Surg Br, 2011
  - 2mm gap / step
  - 2mm radial shortening
  - Carpal malalignment





Is the fracture stable?

- **Stability assessment of distal radius fractures.**
- Lafontaine M, Hardy D, Delince P, Injury, 1989
  - Dorsal angulation >20 degrees
  - Dorsal Comminution
  - >60yr
  - Intra-articular
  - Ulnar fracture

3+ = suggested unstable

Is the fracture stable?

- **Stability assessment of distal radius fractures**
- Lafontaine M, Hardy D, Delince P, Injury, 1989
  - Dorsal angulation >20 degrees
  - Dorsal Comminution *(palmar /articular)*
  - >60yr
  - Intra-articular
  - Ulnar fracture
  - *Initial displacement >1cm*

3+ = suggested unstable

How should I manage this fracture?

- No entanox alone in A&E (IVRA / haem block)
- ? Benefit of MUA in >65yr
- # clinic 72hr
- Op;
  - 3/7 if intra-articular
  - 1/52 if extra-articular
- Non-op;
  - 0 / 1 / 2wk XR
  - 4wk total cast (splint if stable)

British Orthopaedic Association

BSSH
The British Society for Surgery of the Hand

BRITISH ORTHOPAEDIC ASSOCIATION AUDIT STANDARDS for TRAUMA DEC 2017

The Management of Distal Radial Fractures

Background and justification
Fractures of the distal radius are common and result from both high and low energy trauma. The aim of treatment is to optimise functional recovery rather than to achieve specific radiological parameters.

Inclusions
Skeletally mature patients with fractures involving the distal radius.

Standards for Practice

1. The mechanism of injury and clinical findings, including skin integrity, assessment of circulation and sensation, should be documented at presentation. Radiographic assessment should be posteroanterior and lateral views centred at the wrist.
2. If manipulation is indicated, it should be undertaken using regional anaesthesia, performed by a suitably qualified and trained practitioner (as opposed to local haematoma block).
3. Open fractures should undergo surgical debridement and stabilisation in accordance with the BOAST Open Fractures.
4. Patients should be referred to the Fracture Clinic service and assessed within 72 hours (BOAST for Fracture Clinic Services).
5. Patients with a stable fracture of the distal radius should be considered for early mobilisation from a removable support once pain allows.
6. When using a plaster cast to treat a distal radius fracture, the wrist should be in neutral flexion with 3point moulding used to hold the fracture and not forced palmar flexion. Consider removing the cast and starting mobilisation 4 weeks after injury.
7. In patients 65 years of age or older, non-operative treatment can be considered as a primary treatment for dorsally displaced distal radius fractures unless there is significant deformity or neurological compromise.
8. In patients under 65, consider ulnar variance, intra-articular step, dorsal tilt and reflect on the patient's needs when assessing whether the patient may benefit from surgical reconstruction.
9. Volar displaced fractures are unstable and should be considered for open reduction and plate fixation.
10. When surgical fixation is indicated for dorsally displaced distal radius fractures offer K-wire fixation if displacement of the radial carpal joint can be reduced by closed manipulation. If this is not possible consider open reduction and internal fixation.
11. If surgical intervention is undertaken, this should be performed within 72 hours of injury for intraarticular fractures and within one week for extra-articular fractures. When operative management is indicated for re-displacement following manipulation, surgery should be undertaken within 72 hours of the decision to operate.
12. Repeat radiographs of the wrist between 1-2 weeks after injury (or manipulation) where it is thought that the fracture pattern is unstable AND when subsequent displacement will lead to surgical intervention.
13. A radiograph of the patient's wrist at the time of removing immobilisation is not required unless there is clinical cause for concern.
14. Patients should be assessed for falls risks and bone health, and referred to the fracture liaison services and or falls service where appropriate.
15. All patients should receive information regarding expected functional recovery and rehabilitation, including advice about return to normal activities such as work, education and driving. Patients should be able to self-refer to the fracture service if progress is not as anticipated and hospitals should provide this mechanism.

How to Fix?

- **Percutaneous fixation with Kirschner wires versus volar locking plate fixation in adults with dorsally displaced fracture of distal radius: randomised controlled trial**
- Costa ML, DRAFFT Study Group, BMJ 2014

  - Adult, <2/52, 3cm from RCJ
  - Surgeon had to believe CR possible
  - No diff PRWE @1yr
  - If the fracture can be treated with K wires they should be due to cost saving
  - Issues
    - Median 1 op per surgeon
    - Varying grades (60% non cons)
    - Short follow up
    - Do these fractures need fixation at all?

- **Percutaneous fixation with Kirschner wires versus volar locking-plate fixation in adults with dorsally displaced fracture of distal radius: five-year follow-up of a randomized controlled trial.**
- Costa ML et al, Bone Joint J, 2019

  - 44% of original cohort (198/448)
  - No diff in PRWE at any timepoint
  - 3 pt had repeat op in the 5 yrs (x1 K-wire, x2 plate)

- **Surgical fixation with K-wires versus plaster casting in the treatment of dorsally displaced distal radius fractures: protocol for Distal Radius Acute Fracture Fixation Trial 2 (DRAFFT 2)**
- If you can achieve a closed reduction do you need to K-wire?

Volar Plate Fixation Versus Plaster Immobilization in Acceptably Reduced Extra-Articular Distal Radial Fractures: A Multicenter Randomized Controlled Trial

Mulders MAM, VIPER Trial Collaborators J Bone Joint Surg Am, 2019

- ORIF sig better DASH at all time points
- 42% non-op manages fractures = 2ndry procedure


1001.
CRTLUT 1/3
S: 126
L
Pixel zoom: 62%


1001.
L
143
CRTLUT 1/3
S: 98
Pixel zoom: 46%

No effect on functional outcome after repair of pronator quadratus in volar plating of distal radial fractures: a randomized clinical trial.

Sonntag J et al, Bone Joint J, 2019

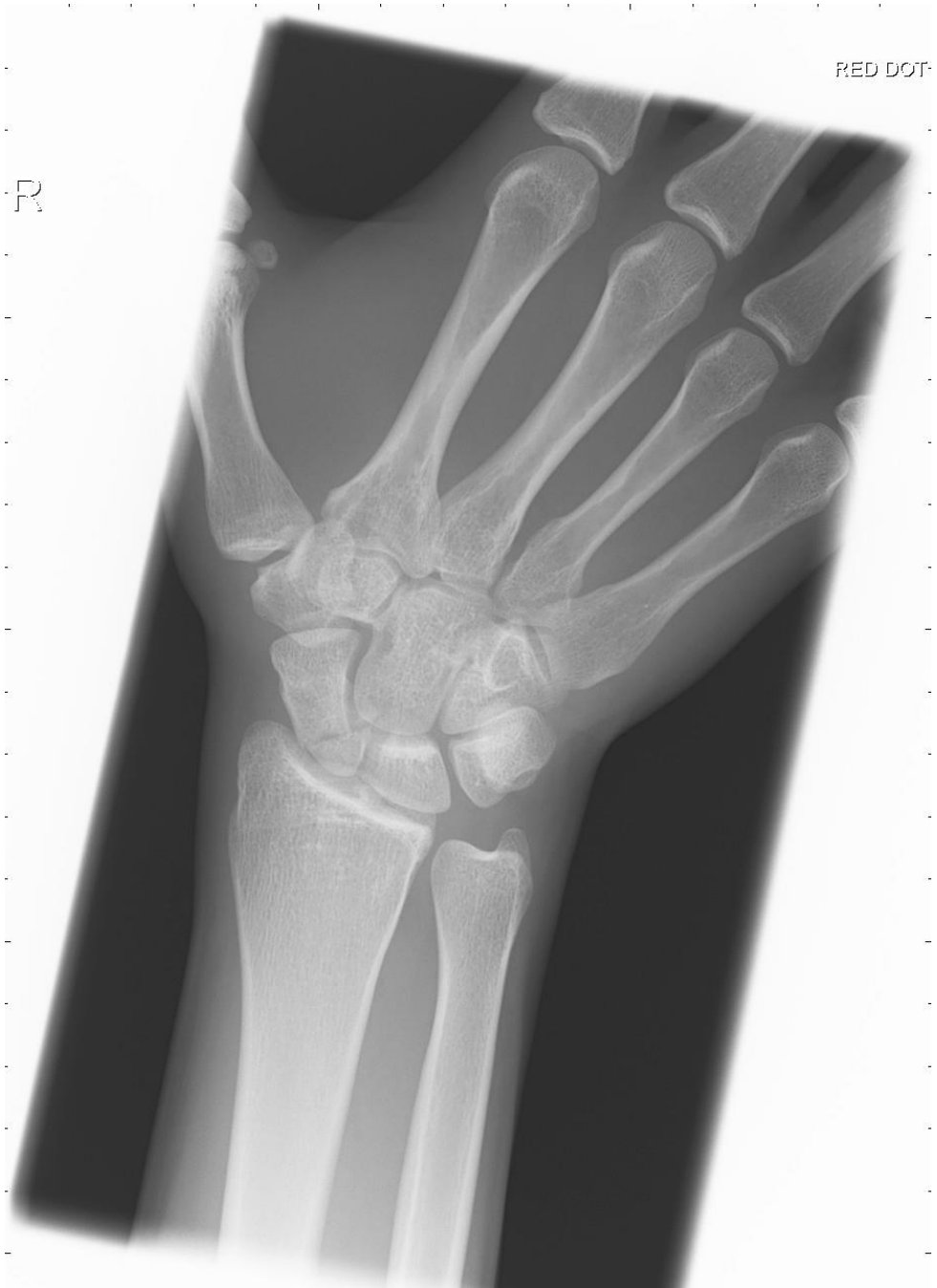
- DB RCT
- 12 month F/U of 72 pt
- No sig diff in PRWE
- Sig increased pronation strength in non-repair

Rehabilitation

- **'Doctor, when can I drive?': an update on the medico-legal aspects of driving following an injury or operation**
- Giddins GE, Injury, 2004
  - The responsibility for determining the fitness to drive of an individual now rests entirely with the Driving and Vehicle Licensing Agency (DVLA)
  - We should advise our patients to drive once they feel safe, but they should be careful during the earlier stages of rehabilitation
  - If in any doubt, the driver should contact the DVLA and take advice accordingly from their medical advisors

- **Safe Return to Driving After Volar Plating of Distal Radius Fractures**
- Jones CM et al, J Hand Surg Am, 2017
  - Driving test 2 & 4 weeks post DR# ORIF
  - 70% passed @ 2/52
  - 90% passed @ 4/52
  - Pain was main limiting factor
  - Most pts safe to drive at 3 weeks

- 25M, dom hand
- Banker, amateur rugby player
- No comorbidities



- 55F, non-dom hand
- Cleaner
- Diabetic

Decision making…

- Operative v non-operative?
- What is the correct non-operative management?
- *What type of surgery should we perform?*

Non Operative	Controversial	Operative
Tubercle #	Undisplaced waist #	Any visible displacement on XR
Incomplete #		Lateral inter-scaphoid angle >35 degrees
		Bone loss / comminution
		Perilunate # dislocation
		Undisplaced Proximal Pole #

Non-operative Management

Non-operative Management

- Cast Immobilization
  - Thumb free - wrist immobilisation prevents scaphoid ROM [1]
  - Long arm casts offer no benefit [2]
  - Position of wrist in cast does not affect healing [3]

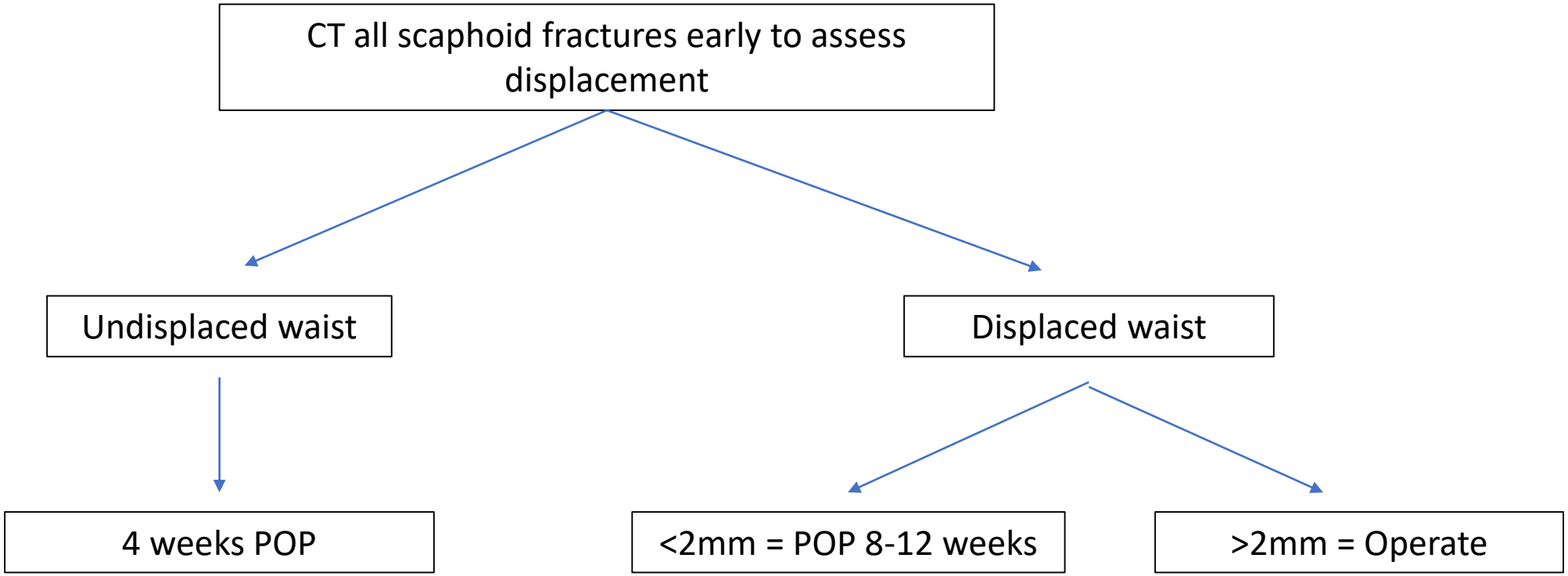
1. Clay NR, Dias JJ, Costigan PS, Gregg PJ, Barton NJ. Need the thumb be immobilised in scaphoid fractures? A randomised prospective trial. J Bone Joint Surg [Br] 1991;73-B:828-32.
2. McAdams TR, Spisak S, Beaulieu CF, Ladd AL. The effect of pronation and supination on the minimally displaced scaphoid fracture. Clin Orthop 2003-411:255-9
3. Hambidge JE, Desai VV, Schranz PJ, Compson JP, Davis TR, Barton NJ. Acute fractures of the scaphoid. Treatment by cast immobilisation with the wrist in flexion or extension? J Bone Joint Surg [Br] 1999;81-B:91-2.

Prediction of outcome of non-operative treatment of acute scaphoid waist fracture.

Davis TR, Ann R Coll Surg Engl, 2013

- Cant predict outcome of non-op management on XR classification / pattern
- Gadolinium studies demonstrating PP avascularity doesn't predict non-union
- Asked experts to predict union on initial CT – poor correlation
  - All undisplaced fractures on initial CT united (1/3 displaced did not)
- On a 4 wk CT out of plaster 96% fractures with <2mm dorsal displacement united
  - 2-3mm =50% union
  - >3mm = <50% union
- Malunion at 8-12/52 had no effect @ 1 yr

Davis Algorithm



Displaced fracture of the waist of the scaphoid

Dias JJ, Singh HP., J Bone Joint Surg Br, 2011

Instructional Review.

- 60% of waist #’s will be displaced on CT
- 20% NU rate if displaced
- 50% risk of progression to SNAC

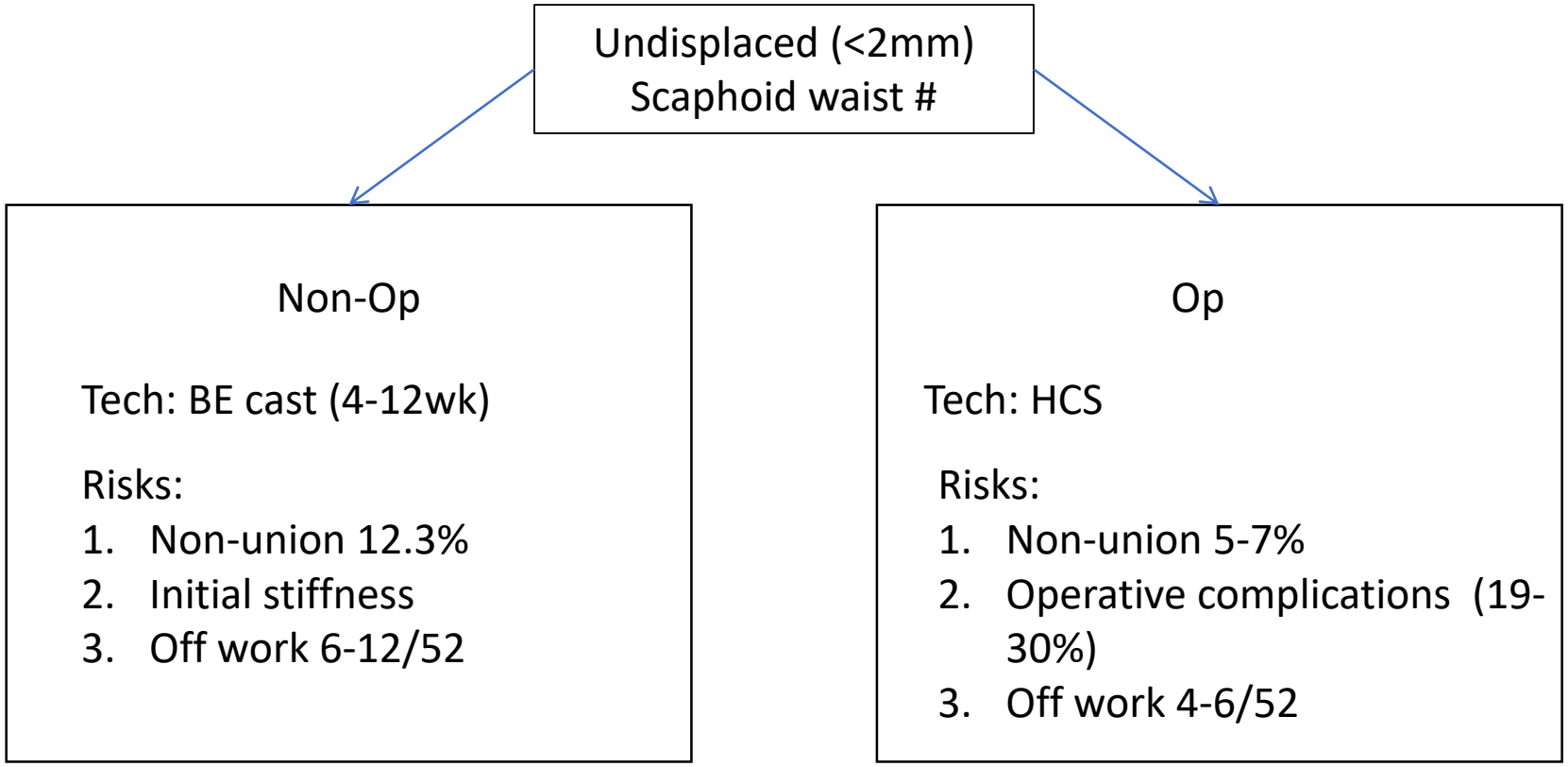
Scaphoid Waist Internal Fixation for Fractures Trial (SWIFFT) protocol:

- Study aim and protocol;
  - To compare clinical and cost-effectiveness of surgical fixation with cast treatment and early fixation of those that fail to unite for scaphoid waist fractures in adults.
  - Clear bicortical waist fracture
  - BE cast 6-10 wk vs immediate fixation
  - If not united at 6-12 weeks – urgent surgery performed
  - Pragmatic surgical technique
- Initial results;
  - No clinically relevant difference in the total PRWE at 52 weeks
  - Non-union rate was low (surgery group n=1; cast group n=4)
  - Eight participants in the surgery group had 11 re-operations
  - 1 participant in the cast group required a re-operation for non-union
  - The base-case economic analysis at 52 weeks found the cost of surgery was £1,295 more per patient

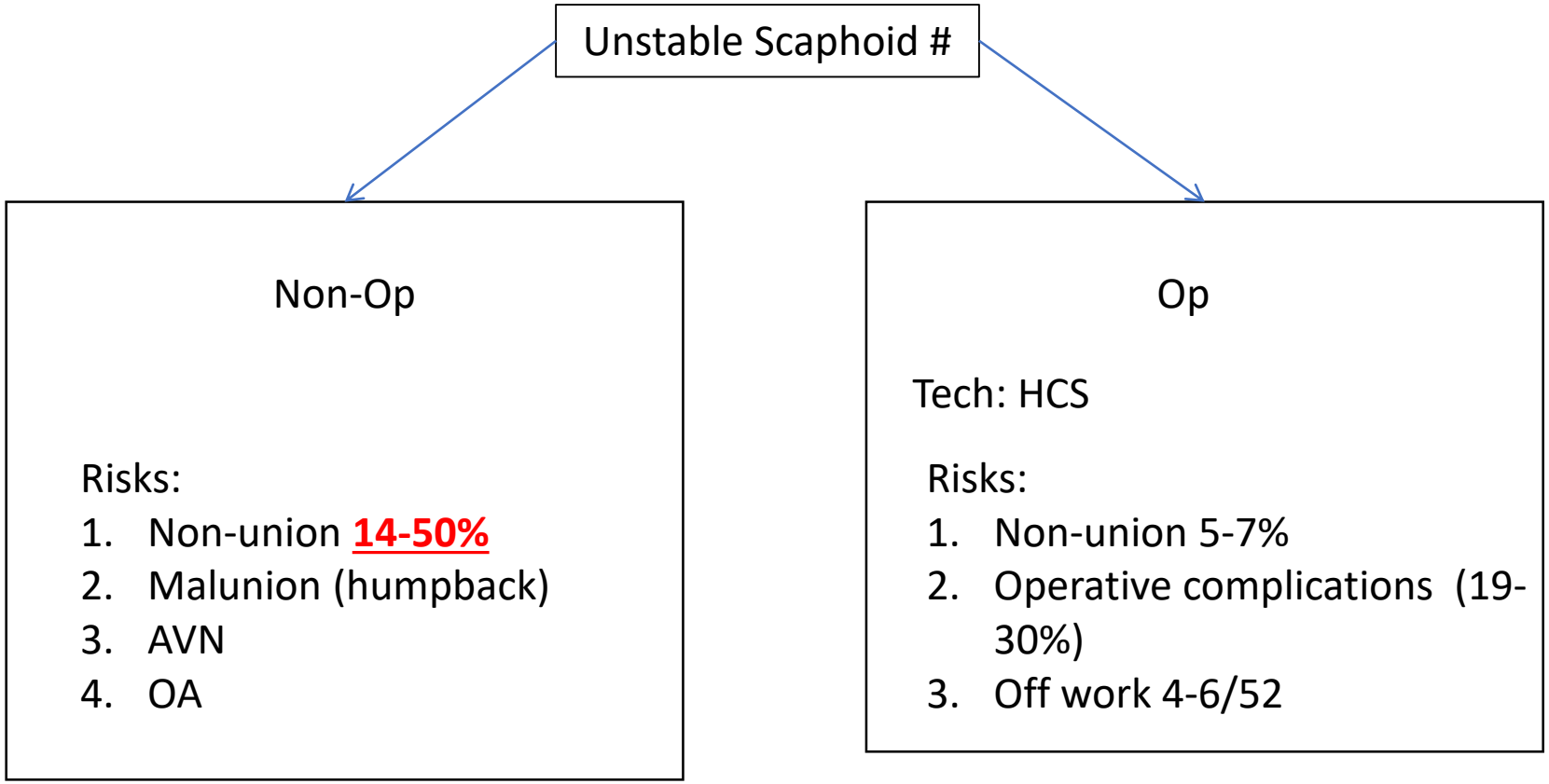
- **Percutaneous screw fixation or cast immobilization for nondisplaced scaphoid fractures**
- Bond CD et al, J Bone Joint Surg, 2001
  - Faster time to union and return to military duty.
  - Same union rate

- **Percutaneous screw fixation versus conservative treatment for fractures of the waist of the scaphoid: a prospective randomized study**
- McQueen M et al, J Bone Joint Surg, 2008
  - Surg = Faster time to union. Faster ret to work and sport.
  - Non sig higher union rate in surg.
  - Low complications

EBM Undisplaced Waist



EBM Unstable Scaphoid



EBM Unstable Waist

Unstable Scaphoid #

Non Operative	Controversial	Operative
Tubercle #	Undisplaced waist #	Any visible displacement on XR
Incomplete #		Lateral inter-scaphoid angle >35 degrees
		Bone loss / comminution
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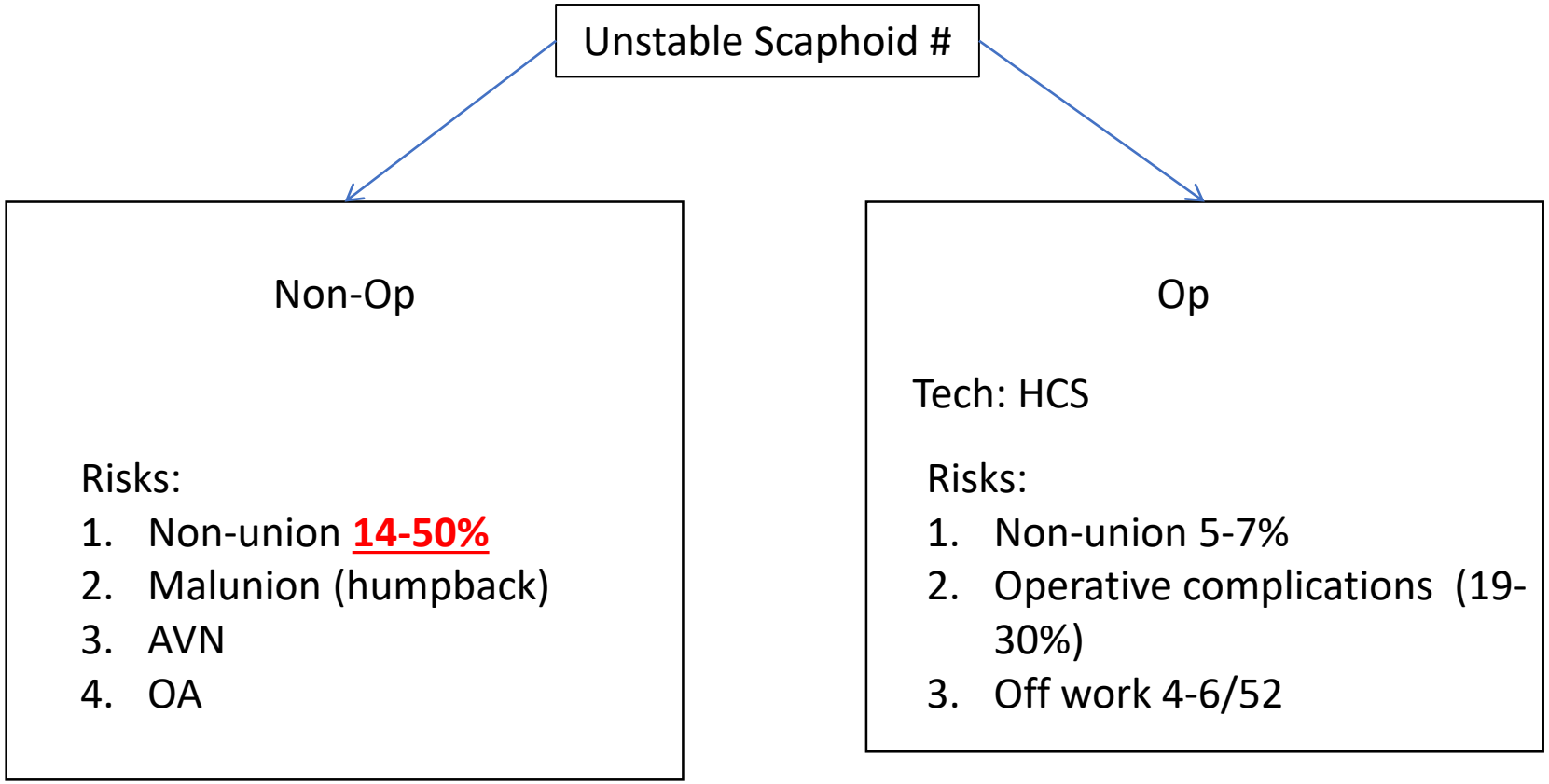
		Undisplaced Proximal Pole #

EBM Unstable Waist



Case 1

- 22M, non-dom hand
- FOOSLH last week
- No comorbidities
- Smoker

Case 1

- 22M, non-dom hand
- ***Suspected sprain 9/12***
- FOOSLH last week
- No comorbidities
- Smoker

Case 2

- 70M, dom hand
- No previous injury recalled
- Worsening pain 6 months
- Fit & well
- Non-smoker

Decision making…

- Does it need an operation?
- Which operation should you perform?
  - Open / closed?
  - Bone graft
    - Composition
    - Source
    - Vascularity
- What factors do we know effect outcome?

The outcome of bone graft surgery for nonunion of fractures of the scaphoid.

Elvey M, Davis TRC, J Hand Surg Eur Vol, 2019

- 806 pts from 19 tertiary referral UK centres
- 69% union overall
- Smoking – OR 1.8 @ 1 yr
- Delay to surgery – OR 2.4 @ 1yr
- Bone graft – no sig effect

Vascularised graft??

- **K. Rancy et al. Success of scaphoid nonunion surgery is independent of proximal pole vascularity JHS Eu 2018**
  - 35 Nus treated with NV autograft. Looked at pre op MRI, intra op bleed and histo.
  - 9 had ischamia on MRI. 28/35 had decreased intraop bleeding. 4/33 had tissue necrosis.
  - 33/35 healed by 12 weeks.
  - Conc = pp infarction is rare and VBG rarely required.
- **Kim J et al. Non-vascularized iliac bone grafting for scaphoid nonunion with avascular necrosis. Journal of Hand Surgery (European Volume) 2018,**
  - 24 pt with pp #'s with MRI showing AVN had NV IC BG.
  - Severe humpback had fisk wedge. Others simple cancellous graft. 22/24 united.
  - Conc - **NO high-quality randomized trial or prospective study has compared vascularized and non-vascularized bone grafts in scaphoid fractures with AVN.**
  - Can use NVBG for MRI proven AVN.

Scaphoid fracture non-union: a systematic review of surgical treatment using bone graft.

Ferguson DO, Davis TR, J Hand Surg Eur Vol, 2016

- 5464 nonunions across 144 studies
- Mean reported union rates for vascularized and non-vascularized bone graft were 84% and 80%, respectively.
- Avascular necrosis was diagnosed in several ways and, when present, the vascularized bone graft union rate was 74% compared with 62% with non-vascularized bone graft.

Evidence – Based Scaphoid Nonunion Algorithm

1. Define

No formal consensus. "Failure of the scaphoid to heal after 9 months with no evidence of radiological healing within the last 3 months" [1, 2]

2. Assess

History, Examination, Imaging (Scaphoid series, CT +/- MRI

Patient Factors:

1. Duration
2. Pain / Dysfunction
3. Age
4. Activity levels
5. Co-morbidities

Nonunion Factors:

1. Location?
2. Displacement?
3. Deformity
4. Comminution / Cyst Formation?
5. Prior Surgery?
6. Proximal pole AVN?
7. SNAC?
8. Fragment salvagability?

3. Stratify

- Delayed Union
- Waist non-union
  - Fibrous v Sclerotic?
  - Humpback deformity?
- Proximal Pole non-union
  - No evidence AVN
  - Possible AVN

Abbreviations

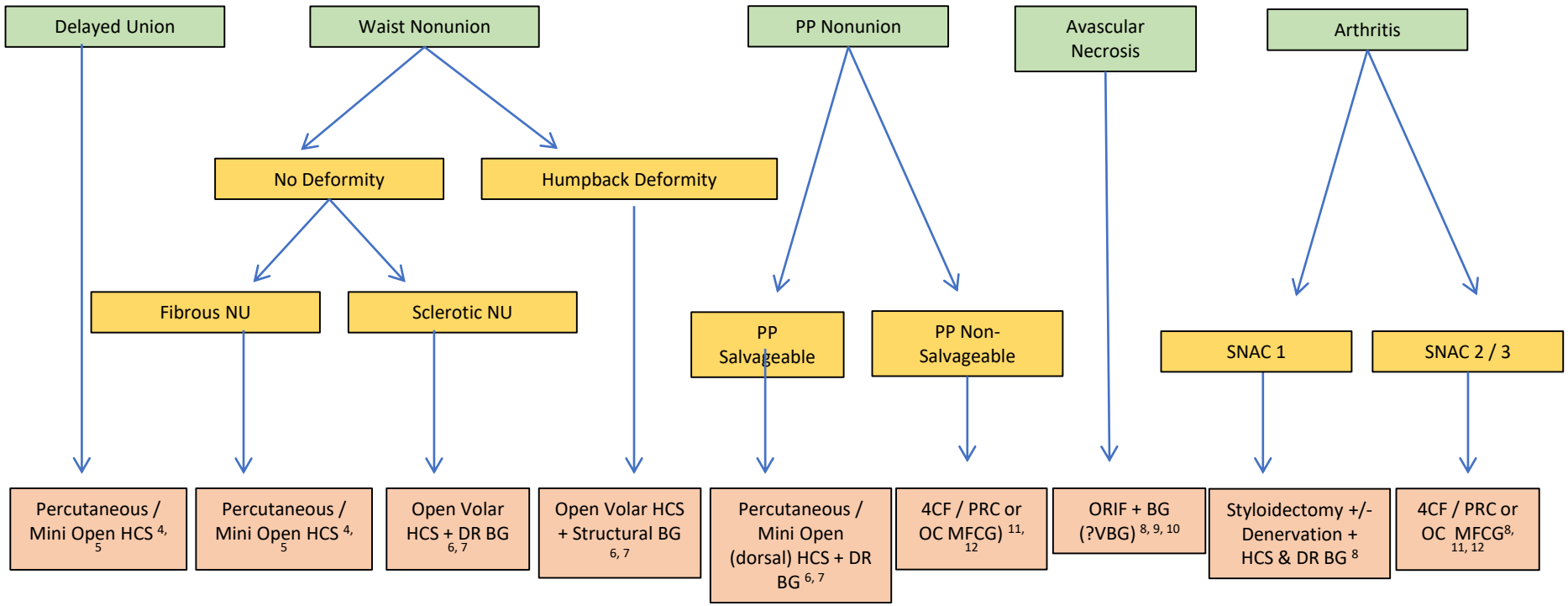
- SNAC – scaphoid nonunion advanced collapse
- AVN – avascular necrosis
- PP – proximal Pole
- 4CF – 4 corner fusion
- PRC – proximal row carpectomy
- OC MFCG – osteochondral medial femoral condyle graft
- DR – distal radius
- BG – bone graft
- HCS – headless compression screw

References

1. Higgins A, Glover M, Yang Y, Bayliss S, Meads C, Lord J. Exogen ultrasound bone healing system for long bone fractures with non-union or delayed healing: A nice medical technology guidance. Appl Health Econ Health Policy. 2014, 12: 477-84
2. Dias JJ. Definition of union after acute fracture and surgery for fracture of the non-union scaphoid. J Hand Surg Br 2001. 26: 321-325

4. Treat

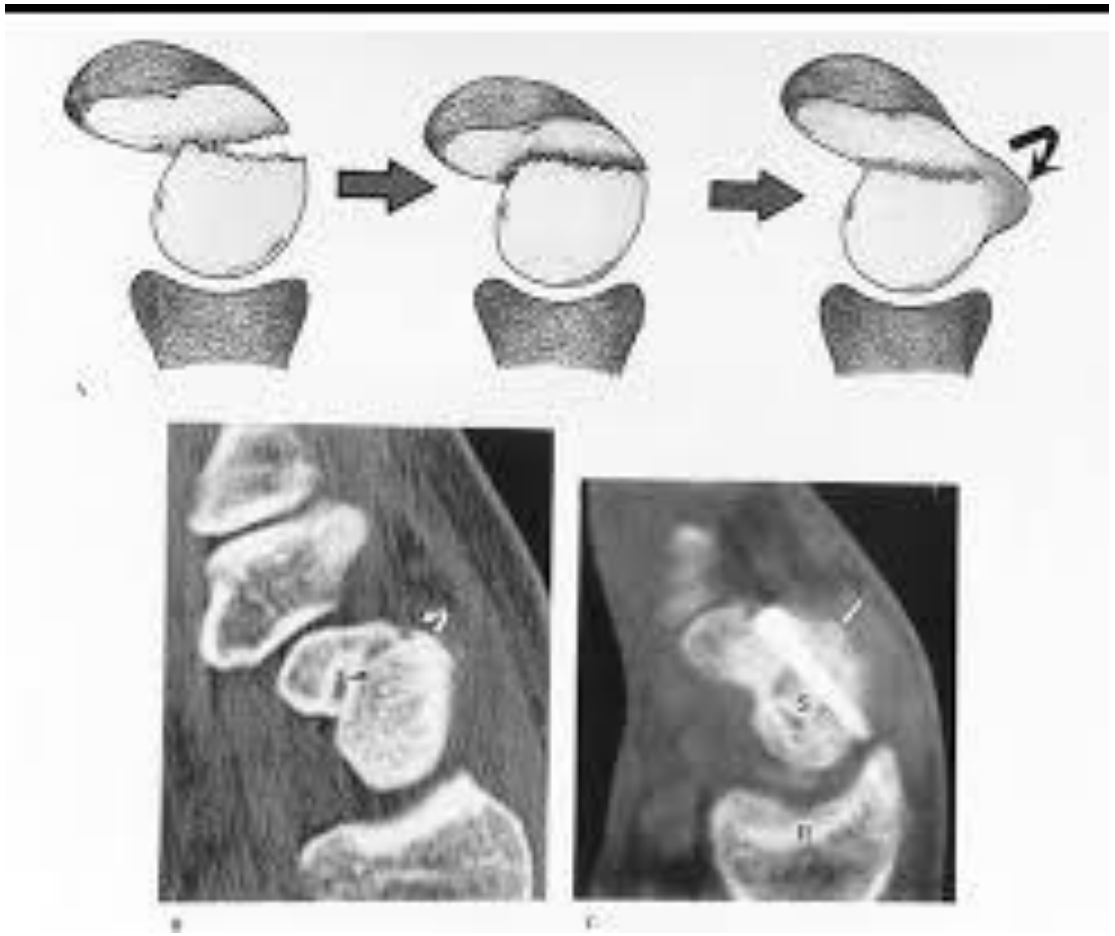
Optimise: 1 Minimise delay to surgery. 2 Smoking cessation [3].



References

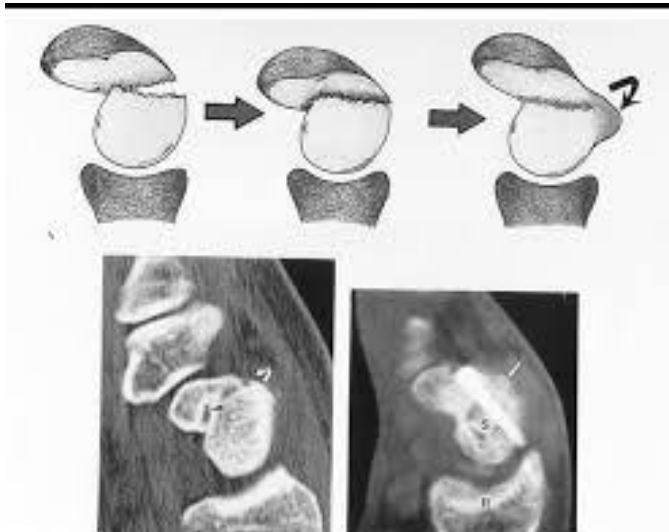
3. Little CP, Burston BJ, Hopkinson-Wooley J, Burge P. Failure of surgery for scaphoid non-union is associated with smoking. J Hand surg Br 2006. 31B:6: 252-255
4. J Shah, WA Jones: Factors affecting the outcome in 50 cases of scaphoid nonunion treated with Herbert screw fixation. *J Hand Surg [Br].* 23 (5):680-685 1998
5. McQueen MM, Gelbke MK, Wakefield A, Will EM, Gaebler C. Percutaneous screw fixation versus conservative treatment for fractures of the waist of the scaphoid: a prospective randomised study. J Bone Joint Surg Br. 2008 Jan;90(1):66-71.
6. GA Merrell, SW Wolfe, JF Slade 3rd: Treatment of scaphoid nonunions: quantitative meta-analysis of the literature. *J Hand Surg [Am].* 27 (4):685-691 2002
7. MS Cohen, JB Jupiter, K Fallahi, et al.: Scaphoid waist nonunion with humpback deformity treated without structural bone graft. *J Hand Surg [Am].*38 (4):701-705 2013
8. Ferguson DO, Shanbhag V, Hedley H, Reichert I, Lipscombe S , Davis TRC. Scaphoid fracture non-union: A Systematic Review. J Hand surg (E). Jun 2016 , 41E (5) 492-500
9. C Zaidemberg, JW Siebert, C Angrigiani: A new vascularized bone graft for scaphoid nonunion. J Hand Surg [Am]. 16 (3):474-478 1991
10. DG Sotereanos, NA Darlis, ZH Dailiana, et al.: A capsular-based vascularized distal radius graft for proximal pole scaphoid pseudarthrosis. J Hand Surg [Am]. 31 (4):580-587 2006
11. Watson HK, Ballet FL. The SLAC wrist: scapholunate advanced collapse pattern of degenerative arthritis. J Hand Surg Am. 1984;9:358-365
12. Pulos N, Kollitz KM, Bishop AT, Shin AY. Free vascularised medial femoral bone graft after failed scaphoid non-union surgery. JBJS Am 2018; 100(16): 1379-1386

Is malunion a problem?



Is malunion a problem?

- **Treatment of the scaphoid humpback deformity – is correction of the dorsal intercalated segment instability deformity critical?**
- Mathoulin C, JHS Eur 2018
  - No consensus or evidence base on whether to correct but lots of theoretical benefits.
  - Op technique involves flexing wrist and driving a perc RL wire.



Case 5

- 40 M
- Plumber
- Multiple past injuries
- Worsening pain 1 yr
- Still working

Decision Making

- Chronicity?
- Symptoms?
- Associated def?ormity / arthritis

Analysis of carpal instability: II. Clinical applications

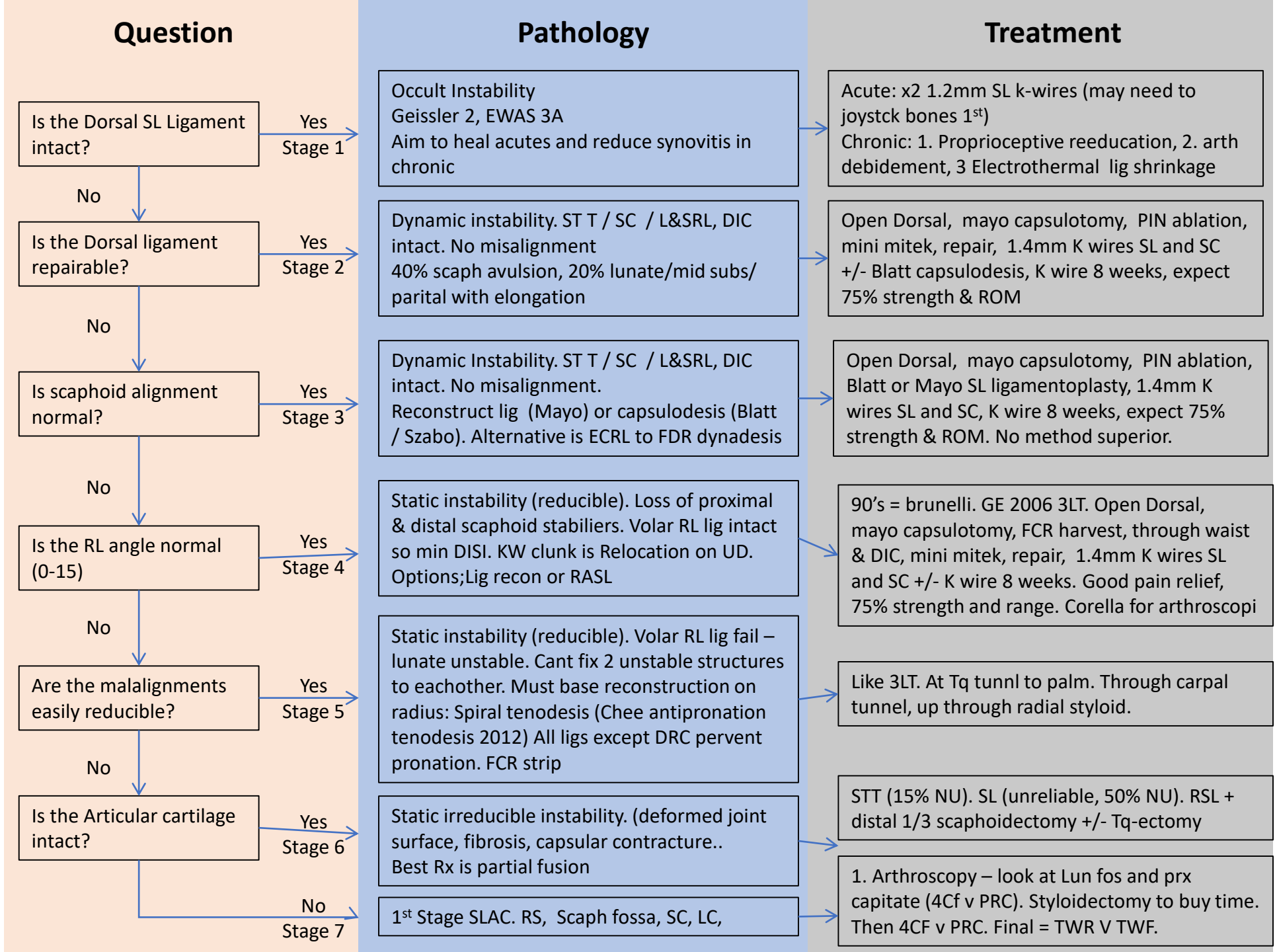
Larsen CF, J Hand Surg Am, 1995

1. Chronicity	2. Severity	3. Aetiology	4. Location	5. Direction
Acute (<1/52)	Occult (partial injury, no disp under stress)	Trauma (most common)	RCJ	DISI rotation
Subacute (<6/52)	Dynamic (complete rupture, displ under load)	Congen	Prox Row	Visi Rotation
Chronic (>6/52)	Static (reducible)	Inflamm	Midcarpal joint	Ulnar Translation
	Static (irreducible)	Iatrogenic	Distal Row	Dorsal
			CMC	

Three-ligament tenodesis for the treatment of scapholunate dissociation: indications and surgical technique

Garcia-Elias M, Lluch AL, Stanley JK, J Hand Surg Am, 2006

- 6 questions of SL instability;
  - Is the Dorsal SL Ligament intact?
  - Is the Dorsal ligament repairable?
  - Is scaphoid alignment normal?
  - Is the RL angle normal (0-15)?
  - Are the malalignments easily reducible?
  - Is the articular cartilage intact?


Question
Pathology
Treatment
Is the Dorsal SL Ligament intact?
Yes
Stage 1
Occult Instability
Geissler 2, EWAS 3A
Aim to heal acutes and reduce synovitis in chronic
Acute: x2 1.2mm SL k-wires (may need to joystck bones 1st)
Chronic: 1. Proprioceptive reeducation, 2. arth debidement, 3 Electrothermal lig shrinkage
No
Is the Dorsal ligament repairable?
Yes
Stage 2
Dynamic instability. ST T / SC / L&SRL, DIC intact. No misalignment
40% scaph avulsion, 20% lunate/mid subs/ parital with elongation
Open Dorsal, mayo capsulotomy, PIN ablation, mini mitek, repair, 1.4mm K wires SL and SC +/- Blatt capsulodesis, K wire 8 weeks, expect 75% strength & ROM
No
Is scaphoid alignment normal?
Yes
Stage 3
Dynamic Instability. ST T / SC / L&SRL, DIC intact. No misalignment.
Reconstruct lig (Mayo) or capsulodesis (Blatt / Szabo). Alternative is ECRL to FDR dynadesis
Open Dorsal, mayo capsulotomy, PIN ablation, Blatt or Mayo SL ligamentoplasty, 1.4mm K wires SL and SC, K wire 8 weeks, expect 75% strength & ROM. No method superior.
No
Is the RL angle normal (0-15)
Yes
Stage 4
Static instability (reducible). Loss of proximal & distal scaphoid stabiliers. Volar RL lig intact so min DISI. KW clunk is Relocation on UD. Options;Lig recon or RASL
90's = brunelli. GE 2006 3LT. Open Dorsal, mayo capsulotomy, FCR harvest, through waist & DIC, mini mitek, repair, 1.4mm K wires SL and SC +/- K wire 8 weeks. Good pain relief, 75% strength and range. Corella for arthroscopi
No
Are the malalignments easily reducible?
Yes
Stage 5
Static instability (reducible). Volar RL lig fail – lunate unstable. Cant fix 2 unstable structures to eachother. Must base reconstruction on radius: Spiral tenodesis (Chee antipronation tenodesis 2012) All ligs except DRC pervent pronation. FCR strip
Like 3LT. At Tq tunnl to palm. Through carpal tunnel, up through radial styloid.
No
Is the Articular cartilage intact?
Yes
Stage 6
Static irreducible instability. (deformed joint surface, fibrosis, capsular contracture..
Best Rx is partial fusion
STT (15% NU). SL (unreliable, 50% NU). RSL + distal 1/3 scaphoidectomy +/- Tq-ectomy
No
Stage 7
1st Stage SLAC. RS, Scaph fossa, SC, LC,
1. Arthroscopy – look at Lun fos and prx capitate (4Cf v PRC). Styloidectomy to buy time. Then 4CF v PRC. Final = TWR V TWF.

Scapholunate Interosseous Ligament

- **Assessment of scapholunate instability and review of evidence for management in the absence of arthritis.**
- Chennagiri RJ, Lindau TR. J Hand Surg Eur Vol, 2013
  - No level 1 evidence to support decision making
  - Offer algorithm based on Geisller classification

- **The management of chronic non-arthritic scapholunate dissociation: a systematic review.**
- Naqui Z et al, J Hand Surg Eur Vol, 2018
- All level 4 evi (SR not MA)
  - Tenodesis better at restoring RS angle but inferior ROM
  - Comb = 50% reduction in pain, a 25% increase grip strength 20% loss of flexion arc & 20% comp.
  - We don’t know Nat Hx of MGE 3+4!

When it all goes wrong….

Case 6

- 65 Male
- Retired lawyer
- Keen golfer – x3/wk
- F&W

Decision making..

- Non-op v op
- Temporising v Definitive Salvage

Wrist Denervation

- **Buck-Gramcko D. Denervation of the wrist joint. JHS(A) 1977**
- Wilhelm 1966 (godfather of wrist denervation)
- 4 y r follow up of 313 cases from German speaking hand society
- 26% asymp, 43% some pain on heavy work, 26% pain on light work.
- 60% lose some strength, 20% change jobs after but ROM normally increases slightly. No charcot changes. Unlikely to effect disease progression.
- 70% pain free with light work.

- **Partial denervation of the wrist: a new approach.**
- Berger RA, Tech Hand Up Extrem Surg, 1998

- **Analgesic benefit, functional outcome, and patient satisfaction after partial wrist denervation.**
- Weinstein LP[1], Berger RA, J Hand Surg Am, 2002
  - 19pt @ mean 2.5yr
  - 80% dec pain
  - 73% ret to work
  - 3 pt had further procedures


R


R
VH

- **Degenerative arthritis of the wrist: proximal row carpectomy versus scaphoid excision and four corner arthrodesis.**
- Cohen M, Kozin S, JHS(A) 2001

  - Institution specific, short/midterm
  - 4CF = better RD, grip strength, mental health
  - PRC = faster procedure & recovery, less complications (NU)
  - No statistical diff in pain or function

Final Options

Fig. 3

Clinical outcomes of arthrodesis and arthroplasty for the treatment of posttraumatic wrist arthritis.

Nydick JA et al, J Hand Surg Am, 2013

- Retro r/w 22 pt
- Mean 5 yr F/U
- No Sig diff in DASH
- PRWE = 73 (arthrodesis) v 31 (arthroplasty)
- Similar complications

Kienbocks

- **Lichtman, D et al The classification and Treatment of the Kienböck's Disease: The state of the Art and a Look at the Future. J Hand Surgery 2010**
  - Always CT – will often upstage esp 2 and 3A.

- **An articular-based approach to Kienbock avascular necrosis of the lunate.**
- Bain GI, Durrant A. Tech Hand Up Extrem Surg, 2011
  - 3 pathological phases
  - Grade according to no. of non-functional surfaces

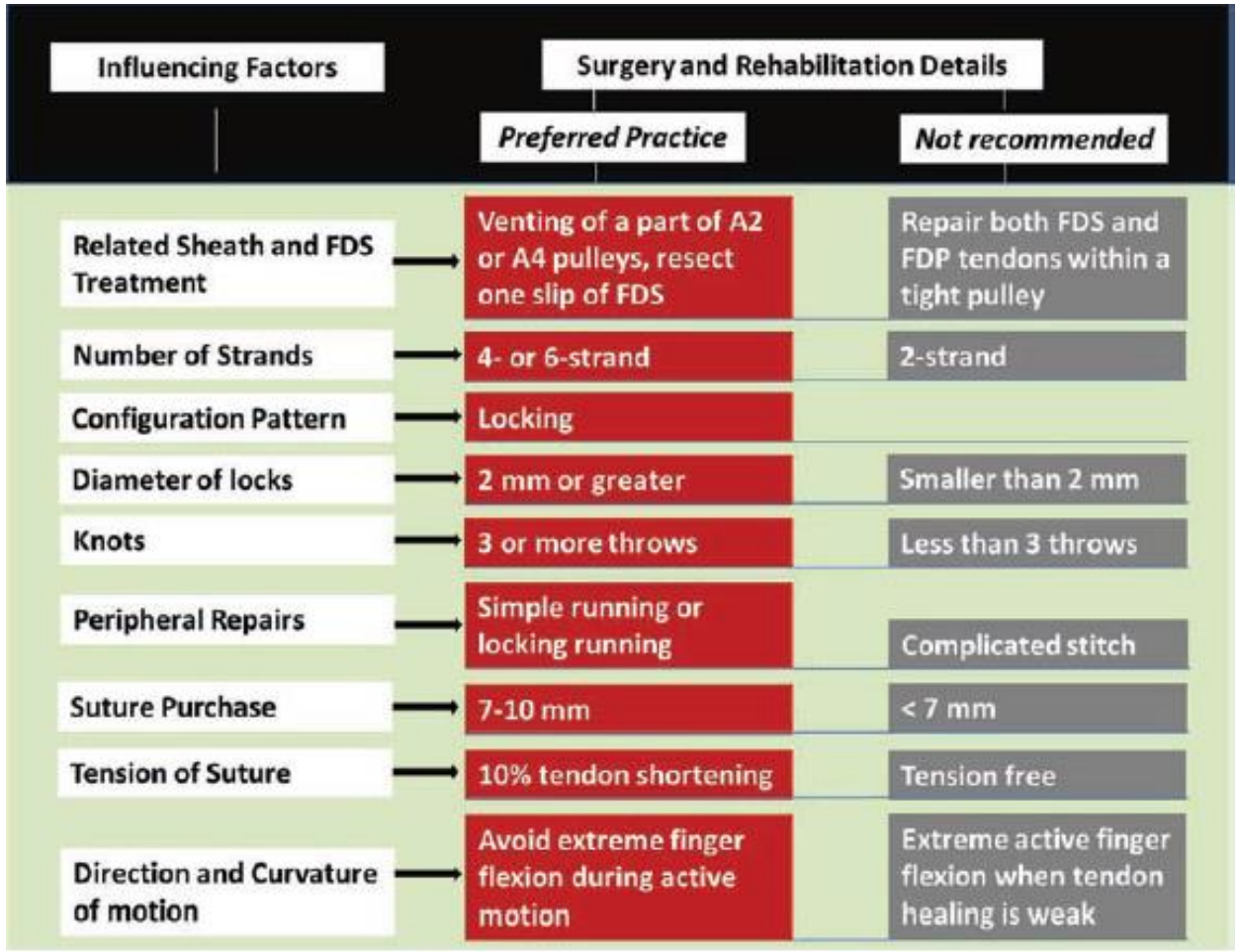
- 22M
- Rugby injury 3/7
- F&W

Decision making

- Surgical technique?
- Material?
- Configuration?
- Epitendinous suture?
- Pulley management
- Rehab?

Recent developments in flexor tendon repair techniques and factors influencing strength of the tendon repair.

Tang JB, The JHS(E) 2014



Influencing Factors	Surgery and Rehabilitation Details	
	Preferred Practice	*Not recommended*
Related Sheath and FDS Treatment	Venting of a part of A2 or A4 pulleys, resect one slip of FDS	Repair both FDS and FDP tendons within a tight pulley
Number of Strands	4- or 6-strand	2-strand
Configuration Pattern	Locking	
Diameter of locks	2 mm or greater	Smaller than 2 mm
Knots	3 or more throws	Less than 3 throws
Peripheral Repairs	Simple running or locking running	Complicated stitch
Suture Purchase	7-10 mm	< 7 mm
Tension of Suture	10% tendon shortening	Tension free
Direction and Curvature of motion	Avoid extreme finger flexion during active motion	Extreme active finger flexion when tendon healing is weak

Recent evolutions in flexor tendon repairs and rehabilitation

J B Tang, JHS Eu 2018

- Peripheral sutures may not be required, or few simple on palmar side only
- Bulkiness is good as demonstrates adequate tensioning
- Can vent whole A2 or 3&4 if needed as adhesions are worse than bowstringing
- Short forearm splint with wrist in neutral is adequate for all – should allow FROM digits but go to finger tips
- Recommends **6** strand repair.

Flexor Tendon Rehab and Complications

- **Complications after Flexor Tendon Repair: A Systematic Review and Meta-Analysis. Dy JC, J Hand Surg 2012**
  - Re op 6%,
  - Rupture 4%,
  - Adhesions 4%.
  - Technique of core suture or epitendon repair had no effect but epitendinous repair reduced re-op rate 84%.

- **Starr et al. Flexor Tendon Repair Rehabilitation Protocols: A Systematic Review. J Hand Surg 2013**
  - AROM protocols = sig better post op range of movement
  - Re-rupture rate reducing over last 10rs (unable to identify cause)

Elective

- Carpal Tunnel
- Trigger Finger
- CMC1 OA
- Ganglia
- De Quervains
- Dupuytrens
- Congenital Hand

CMC1 OA

- Is this common
- Non op management?
- Operative options?

CMC1 Osteoarthritis

- **The prevalence of degenerative arthritis of the base of the thumb in post-menopausal women.**
- Armstrong AL, Hunter JB, Davis TR J Hand Surg Br. 1994
  - Isolated carpometacarpal and scapho-trapezial osteoarthritis were 25% and 2% respectively.
  - Combined carpometacarpal and scapho-trapezial osteoarthritis was 8%.
  - 28% of women with isolated carpometacarpal osteoarthritis and 55% with combined carpometacarpal and scapho-trapezial osteoarthritis complained of basal thumb pain.

- **The benefit of radiologically-guided steroid injections for trapeziometacarpal osteoarthritis.**
- Swindells MG, et al Ann R Coll Surg Engl, 2010
  - 40% chance of missing joint blindly

Which operation?

- **Davis TCR et al. Trapeziectomy alone, with tendon interposition or with ligament reconstruction? A randomized prospective trial. JHS(B) 1997**
- Pros RCT. All pt had k wire 4/52 and 6 wk splint
- @ 1 year = No diff in pain, stiffness, weakness, functional disability, ROM. XR – LRTI maintained scaphoid metacarpal distance sig more.

Five- to 18-year follow-up for treatment of trapeziometacarpal osteoarthritis: a prospective comparison of excision, tendon interposition, and ligament reconstruction and tendon interposition.

Davis TR et al, J Hand Surg Am. 2012

- Eaton 2-4, failed non-op management, females
- Issues
  - K wire = possible stable pseudoarthrosis (not Trapeziectomy)
  - No PROMS (predated)

- **Thumb carpometacarpal joint total arthroplasty: a systematic review.**
- Giddins G, J Hand Surg Eur Vol. 2015.
  - Variable
  - Trend is better short term vs trapeziectomy but increased long term
  - RCTs required
- **Trapeziometacarpal total joint arthroplasty for osteoarthritis: 199 patients with a minimum of 10 years follow-up.** Martin-Ferrero M et al, J Hand Surg Eur Vol. 2019
  - 228 consecutive Arpe
  - 93% 10 yr survival

Case 7

- 55M, dom hand
- IHD, T2DM
- 2yr Hx

Decision making..

- What are the options?
- What are recurrence rates?
- How will I rehab the patient?

Procedure	Cost Effectiveness	Length of Recovery	Most Common Treatment-Specific Complications	Recurrence (%/year)
Needle fasciotomy	Best	Week–weeks	>1%: skin tears	10–20
			<1%: nerve, tendon injury	
Enzymatic fasciotomy	Next best	Week–weeks	>1%: extensive bruising, skin tears	10–20
			<1%: tendon rupture, pulley rupture	
Local fasciectomy, ± skin graft	Worse	Month–months	>1%: prolonged inflammation, delayed healing, nerve injury, loss of flexion	5–10
			<1%: amputation for ischemia	
Dermofasciectomy	Worse	Months	>1%: prolonged inflammation, delayed healing, nerve injury, loss of flexion	2
			<1%: amputation for ischemia	

Enzymic Fasciotomy

- **CORD I Study Group. Injectable collagenase clostridium histolyticum for Dupuytren's contracture.**
- Hurst L C et al, N Engl J Med, 2009
  - Prospective DB RCT (placebo)
  - Sig improvement with xiapex

- **Dupuytren Contracture Recurrence Following Treatment With Collagenase Clostridium histolyticum (CORDLESS [Collagenase Option for Reduction of Dupuytren Long-Term Evaluation of Safety Study]):**
- Lindau et al, JHS am 2015
  - 5yr observational study
  - 47% recurrence (PIP>MCP)
  - 2nd course & fasciectomy safe as 2ndy procedure

Enzymic Fasciotomy

- **Stromberg at al, Percutaneous Needle Fasciotomy Versus Collagenase Treatment for Dupuytren Contracture: A Randomized Controlled Trial with a Two-Year Follow-up. Gothenburg Sweden. JBJS 2018**
  - No sig diff b/n PNF & EF
  - Cords can regress following reduced tension

Dupuytren's Interventions Surgery vs Collagenase (DISC)

- A pragmatic multi-centre randomised controlled non-inferiority, cost effectiveness trial comparing injections of collagenase into the cord to surgical correction in the treatment of moderate Dupuytren's Contracture in adult patients.
  - Recurrence
  - Cost
  - Patient satisfaction

Dermofasciectomy

- **Tonkin MA, Burke FD & Varian JPW. Dupuytren's contracture: A Comparative study of fasciectomy & dermofasciectomy in one hundred patients. Journal of Hand Surgery 1984**
  - 50 % recc in fasciectomy v 0% dermofasciectomy
  - ? Suitable in young diasthesis

Splinting

- **Night-time splinting after fasciectomy or dermo-fasciectomy for Dupuytren's contracture**
- Jerosch-Herold C, et al, BMC Musculoskelet Disord, 2011
  - MC pragmatic RCT
  - HT v HT + 6/12 night splint
  - No diff in AROM or DASH @1 yr

The natural history of untreated dorsal wrist ganglia and patient reported outcome 6 years after intervention.

Dias JJ, J Hand Surg Eur Vol. 2007

- 236 pts
- Recurrence rates;
  - Aspiration = 58%
  - Excision = 39%

- 50% will spontaneously resolve within 2 years in adults
- 60% by 6 years
- 80% will resolve in 1 yr in children

Planning treatment of the rheumatoid hand.
Souter W, Hand, 1979

- Expert opinion
- Spectacularly sermon-like
- Principles remain relevant today
    1. Relieve pain
    2. Restore function
    3. Prevent further damage
    4. Cosmetic improvement
- Rates groups of operations

Classification of congenital anomalies of the hand and upper limb: development and assessment of a new system.
Tonkin MA et al. J Hand Surg Am. 2013

- Swanson class (1976) is *morphological* only
- OMT incorporates pathogenetics.
  - Malformation = abnormal formation (whole limb v hand plate / axis)
  - Deformation = insult after normal formation.
  - Dysplasia = abnormality of size, shape, organisation of cells within a tissue.
  - Syndromes

Conclusion

- You can find evidence to support most positions
- Use the evidence to help you understand why we make specific decisions rather than have a superficial knowledge of the options
- You don’t need to quote papers in the exam!

Questions?

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