Complications After … Finger osteosynthesis

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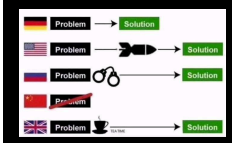
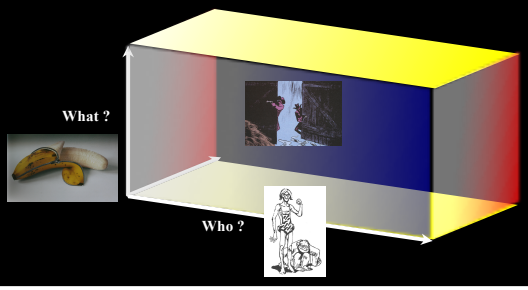
Conflict of Interest

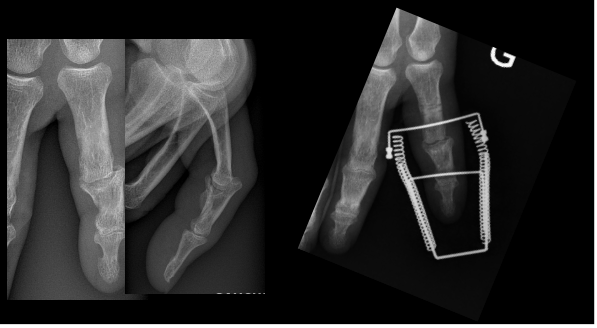
FX Solution, Zimmer, Medartis, Evolutis, Wright, Springer, Elsevier
University hospital & Medical School of Besancon

From complications to solutions … A cultural question ?

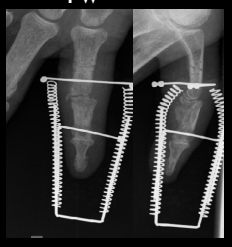


How to avoid complications ? « 3D » way of meaning





4 W



5 W

5 W

12 W

At 6 months New procedure but … TOXIC SHOCK SYD

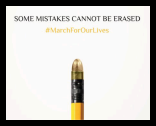
At 9 months …

At 1,5 year …

Complications ?

Each surgeon should know that :

Choosing your treatment mean choosing your complications



Complications after finger osteosynthesis

Which complications ? Major (Reop) … or Minor

Which Complications after finger osteosynthesis ?

Bone	Nonunion, malunions, delayed union, avascular necrosis, osteomyelitis, amputation
Soft tissue	Stiffness/motion loss, instability, laxity, poor durability, lack of coverage, contracture, flexion/extension loss
Tendon	Adhesions, lag, tightness
Nerve	Numbness, hypersensitivity, complex regional pain (reflex sympathetic dystrophy)
Vascular	Ischemia, congestion
Other	Vibration and temperature sensitivity, chondrolysis, acute pain, joint laxity

K-wire fixation	Stahl & Schwartz,[36] 2001	Osteomyelitis, loosening, migration, tendon rupture, nerve injury
	Botte et al,[37] 1992	Infections (7%), loosening (6%), loss of reduction, pin migration, nonunion, tendon/neurovascular injury
Screw and miniplate treatment	Page & Stern,[3] 1998	Stiffness, nonunion, plate prominence, infection, tendon rupture
	Duncan et al,[1] 1993	Stiffness, contracture, adhesions, nonunions, infection (deep and superficial), delayed union, reflex sympathetic dystrophy, osteomyelitis, late amputations
	Kurzen et al,[38] 2006	Stiffness, plate loosening, infection, chronic pain syndromes

Most frequent ... Minor complications : Pain & Stiffness

Minor malrotation / Cold sensitivity ! N= 87

Injury : P1 = 100%

Treatment : Screw= 47% > K Wire = 37% > Plate = 16%

Desaldeleer-Le Sant AS et al Hand Surg Rehabil. 2017

Major complications : Non & Mal union

Rare but Reop !

Non union : Bone defect ? Smoking ? Poor fixation ?

Mal union … In rotation **Serious … The Patient see it !**

Major complications : Infection

Rare but Reop !

Infection …

Injury : PIP joint = 100% Treatment : Ex Fix …

30 % N=26 *Ruland RT et al J Hand Surg Am. 2008*

20 % N=21 *Miao DY et al Zhongguo Gu Shang. 2015*

Amputation … ?

How to treat them !

Non Union : infected ? Bone defect ? New fixation … Bone ?

Mal union : osteotomy … at metacarpal bone
Intra articular mal union : cartilage or prosthesis

Infection : Masquelet technique

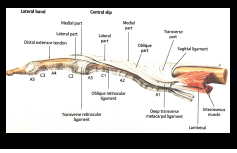
How to prevent them ?

Don't forget the Anatomy ...

P1 : Ovale, No extrinsec Muscle insertion (Plate)

P2 + P3 : Base = tendon insertion

P1/ P2 = 2



"Thumb P2 = D5 P1"

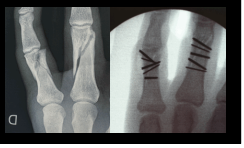
P1

Transverse / short oblique BUT CLOSED : Thomine …6 W

Open / Unreduced : plate

Long oblique : rotation / ORIF by … K Wire ! Threated / Screw

ORIF not OIF

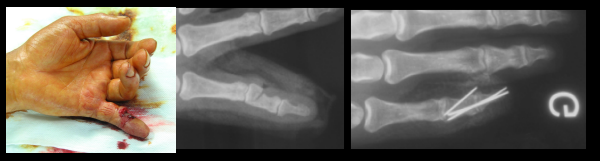


P2 fracture : ORIF by K Wire

Closed = Direct / Comminution

Open = Saw - Short Oblique

P2 : temporary arthrodesis of DIP



Base of P2 : Dorsal fragment

Palmar dislocation

External fixator ? ORIF !

Dorsal approach

Temporary arthrodesis of PIP joint 3 weeks

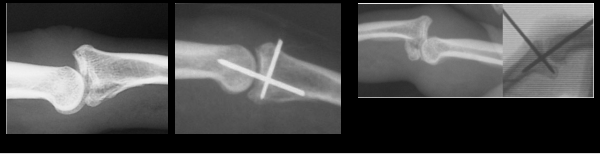
Base of P2 : Palmar fragment

Dorsal dislocation

External fixator ? (O)RIF !

Dorsal approach or percutaneous indirect fixation under traction

Temporary arthrodesis of PIP joint 3 weeks



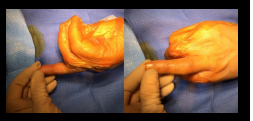
Base of P2 : Central impacti

External fixator

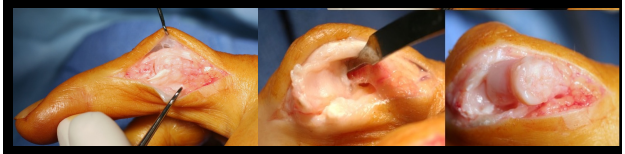
ORIF !

Dorsal approach

PIP ORIF …Dorsal approach

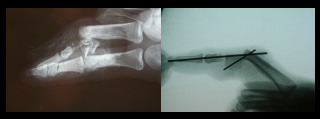


Best view on PIP joint
Tourniquet : 250 mmhg / 3 mn up
Drape … for one finger
No involvement of extensor Tendon



Fracture with bone defect : No bone Graft

Grafting in Emergency ?
High demanding technique
Risk of infection: 50%



Fracture with bone defect : Prosthesis

PIP joint bone defect (Head of P1)

Fracture with bone defect : Masquelet !

2 steps
Rigid fixation + Cement
Induced membrane
Cover extremities of bone + control volume and T° of PMMA

Immediate mobilization after 1rst step
2nd step when soft tissue healing and function
Autograft cancellous bone from distal radius (3 cc)

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Conclusion

Oblique = mal rotation !
Fracture "around" PIP : stiffness
ORIF with plate fixation : associated with higher reoperation rate, but also used for the more complex fractures
To promote immediate mobilization ?
Ex fix … Infection …

Bone defect : Reconstruction in emergency … by cement
DIP : keep simple

Choosing your treatment is choosing your TYPE of complication

Choosing your surgeon is choosing your NUMBER of complication