Use of Kirschner wires and cable plate in Fracture

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Comprehensive Bioskill Course on Fracture Fixation
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Kirschner Wire (K wire)

Surgical Principle

- For fixation or anchorage
- Size: 0.76mm to 2 mm diameter, 4 to 12 inches long
Design:

- **Plain Tip:**
  - Trocar end
  - Diamond end
  - Round end

- **Threaded tip:**
  - Trocar end
  - Diamond end
  - Round end
Fixation of Fractures

- **Definitive Treatment**
  - Intramedullary splintage
  - Interfragmentary fixation

- **Temporary fixation during fracture fixation**

- **Used as guide wires**

- **Supplement other internal or external fixation devices**
Applications

- Paediatric fractures – definitive fixation
- Adult fracture
  - Reduction
  - Temporary fixation
  - Definitive fixation
    - Rare
    - Supplement other ORIF
Operative Technique
Insertion

- **Antegrade** -
  - percutaneous insertion using Image Intensifier

- **Retrograde**
  - Wire introduced via fracture site intramedullary through distal fragment. Retrieved from distal end and reintroduced into proximal fragment.
A K-wire must purchase two cortices for maximal stability.

Axial K-wire - for alignment, cannot prevent rotation.

Parallel - prevents rotation but not as stable as cross wires.

Cross- Most stable construct.
- Image Intensifier
- Radiolucent board
Skin release

- Prevent undue tension—skin necrosis
- Better drainage—prevent pin track infection
- The length of the wound should be at least 2 times of the diameter of the wire.
Any tenting should also be released.
K-wire Bending

- Prevent internal migration of the wire.
- Bend close to skin using another pliers or strong needle holder as fulcrum.
Intraoperative hazard and pitfall
Soft tissues protection

- Especially important for percutaneous insertion.
- Beware of nerves, vessels and tendons.
- Drill guide may be utilized for protection.
- Skin release
Avoid bending force and distorted wire
Overheating

- Hard cortical bone
- May happen with repeated insertion
- Increase necrotic tissue formation; early wire loosening, infection
Application in Fracture Fixation

- Distal radius
- Supracondylar fracture
Distal radius
Distal Radius Fracture

- Trans-styloid Fixation
- Trans-Lister tubercle
- Kapandji Fixation
Trans-Lister tubercle fixation

- Subcutaneous
- Avoid injury to tendon or nerve
Trans-Styloid Fixation

- 1.6mm K wire
- 1 to 2
Following reduction and pin fixation, application of a well-padded cast can help maintain the reduction for 3 or 4 weeks.
? Proximal placement to avoid crossing physis
Trans-styloid Fixation

- Risk of premature closure of physis: minimal
For the more proximal fractures, the K-wire was passed up to medulla for at least 4 cm beyond fracture site.
Intrafocal Fixation (Kapandji)

- Introduce by hand through # site
- Level up the fragment and fixed to opposite cortex with power
Careful planning of entry site to prevent excessive skin impingement
Supracondylar fracture
Type III fracture

- manipulation to obtain reduction
- the quality of the reduction must be assessed
- maintaining the reduction until fracture healed
Manipulation
the most stable patterns were the medial-lateral pins crossing above the fracture site
The rotational strength was only slightly increased if three lateral pins were used.

The weakest configuration involved two lateral pins that crossed at or near the fracture site.
Stability can be improved if wire pass through capitulum to posterior cortex.
- After reduction, two lateral K-wire should be inserted first
- Then the configuration should be tested with c-arm screening
- Medial K-wire added in unstable case
do not hesitate to make a small incision medially to visualize the epicondyle and cubital canal with the **ulnar nerve**.
- Long arm POP applied
- Leave for 4-6 weeks
Cable Wiring
Applications

- Peri-prosthetic fractures
  - Intra-operative
  - Post-operative
- Revision surgery
- Trochanteric Osteotomies
- Strut onlay allograft
2-years Post-Fixation
Fixation with just 2 cable loops is similar to 2 screws - the construct is not stable!

M/94, 2 years post-AMA
Plating with Cables and Screws

Plus Bone Graft
M/60, post-THR revision
Female 82, very active
1 year later
M/43, Ankylosing Spondylitis, 8 years Post-Isoelastic
Revision with Impaction Bone Grafting done 1.5 years post-strut allograft
F/82, 9 years post-Rev. THR
M/32, Poly-ostotic Fibrous Dysplasia
F/60, Primary THR
F/63, 9 years post-AMA
1. Pass wire-passer antegrade.

2. Pass cable “retrograde”
Using the tightener
Crushing the “crimp”
Correct orientation of the crimp
Cutting the cable
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