

## Variants of the HK2 technique in the treatment of distal radius fractures. A technical note

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### ABSTRACT:

**Introduction:** There are many indications for surgical treatment of distal radius fractures, ranging from conventional pinning to prosthetic replacement. The authors report on variants of the HK2 technique in the treatment of distal radius fractures. **Description:** Intrafocal HK2 block pinning is performed under image intensifier, on a previously reduced distal radius fracture, using 1.8 mm diameter Kirschner wires. This technique requires: One handle, Two wires, cut in half, are required for this osteosynthesis. A pair of sleeve pliers for crimping the connectors and cutting the wires, Surgical wire is used in the absence of a connector, The external intrafocal and external juxtaglenoidal wires and the posterior intrafocal and juxtaglenoidal wires are secured in two different ways, enabling early mobilization, A leaded gown for scopic checks. **Discussion:** Gerard Hoël HK2 blocked intrafocal pinning [69,70,110] is indicated for posterior displacement and anterior displacement fractures of the distal end of the radius. The reliability and reproducibility of this technique could, in our country, constitute an alternative to other osteosynthesis techniques, given its low cost, especially for the variant with surgical wire.

**Key words:** Fracture, distal radius, connector.

### INTRODUCTION:

The surgical therapeutic indications for distal radius fractures are multiple, ranging from conventional pinning to prosthetic replacement. The authors report variants of the HK2 technique in the treatment of distal radius fractures.

### DESCRIPTION:

Intrafocal pinning blocks HK2, is carried out under image intensifier, on a previously reduced distal radius fracture, Kirschner wires of 1.8 mm diameter are used.

This technique requires:

- A handful.
- Two pins, cut in two, are necessary to carry out this osteosynthesis.
- A handcuff pliers for crimping connectors and cutting pins.
- We use surgical wire if there is no connector.
- intrafocal and external juxtaglenoid pins and the posterior intrafocal and juxtaglenoid pins are joined together in two variants, allowing early mobilization.
- A lead coat for scopic checks.

### DISCUSSION:

The blocked intrafocal pinning of Gerard Hoël HK2 [69,70,110] is indicated in cases of fracture of the distal end of the radius with posterior displacement or anterior displacement. The reliability and reproducibility of this technique could constitute, in our country, an alternative to other osteosynthesis techniques due to its low cost, especially for the variant with surgical wire.

Fractures of the distal radius remain the most frequent fractures in traumatology [12]. They account for 75% of all fractures of the antebrachial segment [9,15]. They are often complex lesions involving, to varying degrees, the radial metaphysis (M), radial epiphysis (E) and distal ulna (U) [10]. Fractures of the distal radius continue to be of particular interest, as they represent a real surgical challenge due to the diversity of anatomical types, metaphyseal communication, joint impingement, and the frequent association of soft tissue and osteoligamentous lesions [13,14,16].

Gerard Höel has described an original intra- and extrafocal pinning system called HK2, which combines intrafocal Kapandji wires with extrafocal subchondral wires [6] (Fig 9).

It is simple, reproducible and does not require a long learning curve, This procedure preserves the spirit of the Kapandji method: rapidity of the operative gesture, use of the same open or percutaneous approaches [6,7,8]. Once the upper limb has been draped, the surgeon proceeds with orthopedic reduction, The procedure is performed without a pneumatic tourniquet, The number of implant insertion sites and the number of wires are determined by fracture analysis (degree of metaphyseal comminution, direction of displacement, articular fractures, etc.) (Fig 11). Kirschner wires are 1.8 mm in diameter, The procedure can be performed with a single operating

aid, or even without one, Scopic control is mandatory (Fig 5,6).

**Type of Anesthesia:**

All forms of anaesthesia are used, and may be :

- General
- Locoregional
- Local intrafocal (Fig 1)

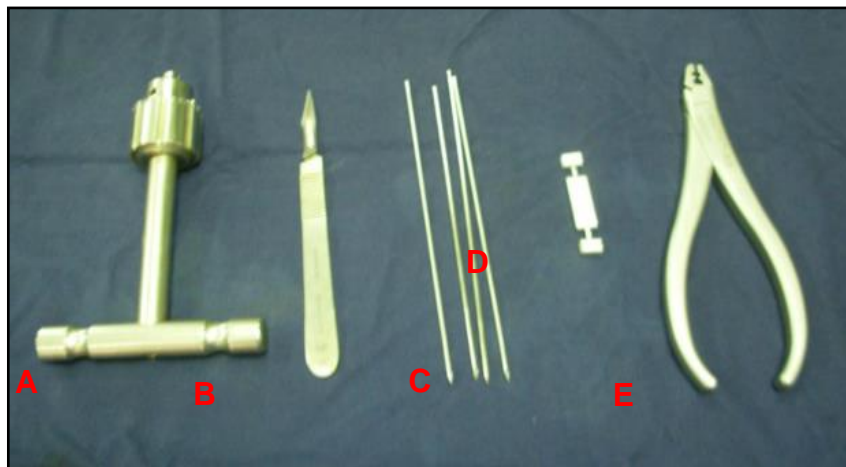
Local anesthesia without sedation or tourniquet (WALANT: Wide-Awake Local Anesthesia No Tourniquet) [1].



**Fig 1 : Intrafocal local anesthesia**

**INSTRUMENTATION:**

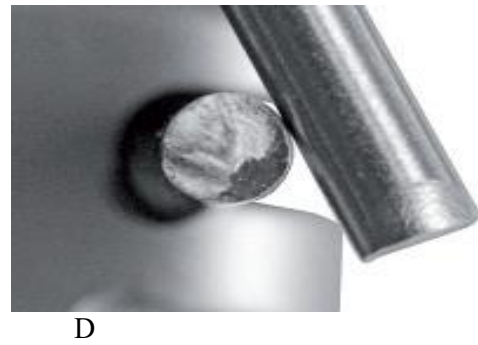
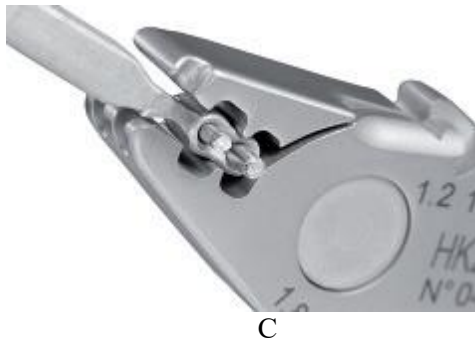
Stabilization using the HK2 technique, performed on a pre-reduced distal radius fracture. The following instruments are required for the procedure.



**Fig 2 : Instrumentation A) handle, B) blade holder, C) 18/10th or 20/10th spindle, D) connector, E) sleeve clamp**

An American handle and two halved pins, A pair of pliers for bending and crimping connectors and cutting pins.





**Fig 3 A) Sleeve clamp, B) Pin twist, C) Connector crimp, D) Pin clean cut**

Two wire connectors (Fig. 4): one to secure the external intrafocal wire to the external juxtaglenoidal wire, and the other to secure the posterior intrafocal wire to the posterior juxtaglenoidal wire, creating a solid contention that eliminates the need for post-operative immobilization, enabling early mobilization [6,11].



**Fig 4. Connectors**

A lead-lined gown to protect operators during X-ray inspections..

**TECHNIQUE:**

**Implant principle:**

A juxta-cortical glenoid support pin must be attached to the intra-focal pin, to maintain the gap between the proximal part of the fracture site (in solid metaphysis) and the glenoid cortex, which is also solid, and thus bridge the fragmented metaphyseal zone. The glenoid pin is inserted through the same incision as the intra-focal pin, and this gap is maintained throughout the healing process by mechanical bridging of the comminuted zone. Intra-focal wires are inserted at 45 degrees using Kapandji's primary technique, in both the frontal and sagittal planes [5,6,7,8]. Juxta-glenoid wires must reach the bone margin opposite the insertion hole, without protruding beyond it.



**Fig 5. Epiphyseal radiological location of fracture site**



**Fig 6 External and posterolateral intrafocal wires in place**



**Fig 7. Connector crimping**



**Fig 8. HK2 system in the sagittal plane**

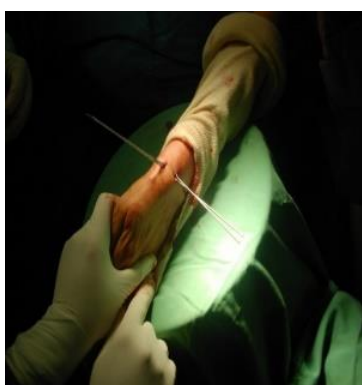
Each intrafocal pin is bent by 45 degrees at the point where it emerges from the skin, using Manotte forceps or equivalent.

**Connectors:**

Each connector links two pins: intrafocal and juxtaglenoidal. It is crimped to the pins by compression (crushing).

**A) HK2 system In the frontal plane**

**B intra-focal and epiphyseal pin connection via connector**

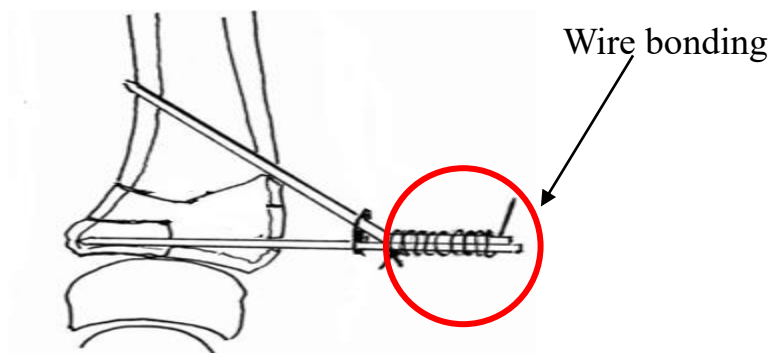


**A**



**B**

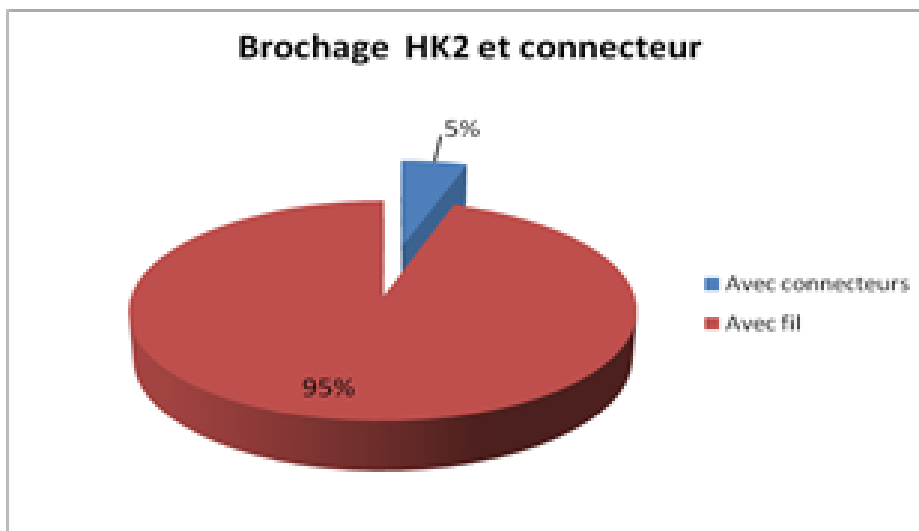
**Fig 9. A) intra-focal and epiphyseal pin connection via connector**





**Fig 10 HK2 system with surgical wire, as no connectors are available, the pins are linked with N:1 surgical wire.**

**1. HK2 pinout and connectors**



Distribution according to connectors and surgical wire. In our series of 210 cases of distal radius fractures stabilized by HK2 pinning, 95% of pins were attached with N:1 surgical wire, and 5% with connectors.

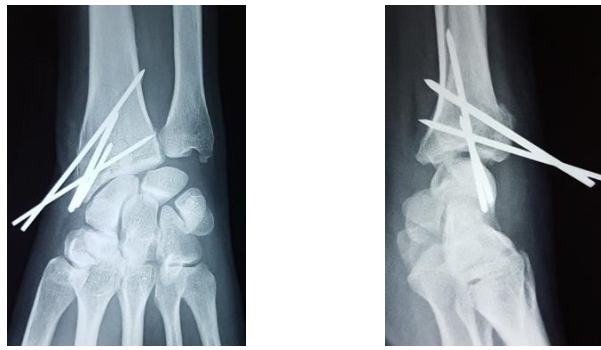
**DISCUSSION:**

Subchondral pins play the same role as epiphyseal screws in locked anterior plates. The intrafocal wires can be attached to the subchondral wires in two ways: either with an external connector, making the system stable, or without a connector, using surgical wire. The second, without a connector, uses surgical wire, making the HK2 system more economical. Gerard Höel's innovative HK2 technique is simple, economical and reproducible. It is the result of the evolution of broaching techniques derived from Kapandji's intrafocal method. It is performed with a closed focus, ensuring rapid consolidation by preserving the muscular and vascular environment of the fracture [5,6,11,17]. Fractures of the distal radius are a daily and recurrent problem for orthopaedic surgeons. The treatment of distal radius fractures is not unequivocal. Extra-articular fractures with anterior

displacement are unstable and justify pinning using the HK2 system or an anterior plate [11,18,19]. For posterior displacement extra-articular fractures, there is a wide range of treatment methods. A closed focus with HK2-type intra- and extrafocal pins, open focus with anterior or posterior plate, osteosynthesis with locked nail and external fixator. Orthopedic reduction, under anaesthesia at the fracture site or locally, followed by plaster, is nowadays reserved only for patients with contraindications to surgery or who do not wish to undergo osteosynthesis [3,4]. The choice of treatment is discussed with the patient, taking into account the medical context, professional profile and leisure and sporting activities. L'embrochage de type HK2 est préconisé, pour ces fractures instables et de plus en plus fréquentes, pour sa solidité, sa rapidité d'exécution et son faible coût [2,11].



**Fig 11 : HK2 technique variant with surgical wire on distal radius and ulna**



**Figure 12 : HK2 surgical wire system for posterior marginal fracture**

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