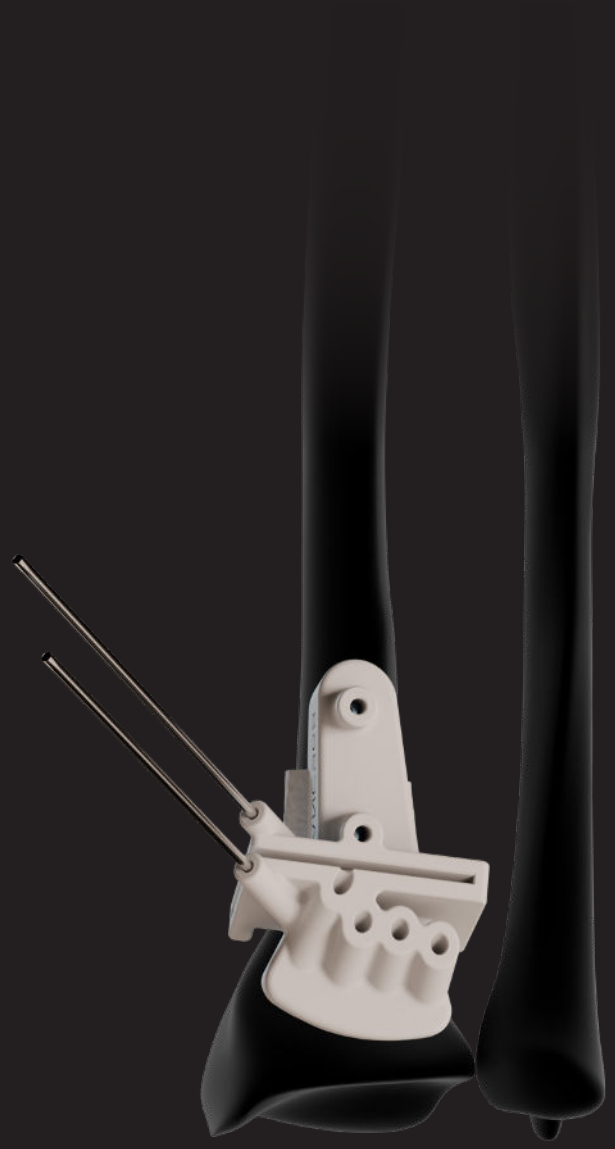
NEWCLIP-TECHNICS

CASE STUDY.



Pr Lionel
ATHLANI

XPERT WRIST 2.4:
Corrective osteotomy for an extra-articular distal radius malunion with patient-matched cutting guide

Physician profile.

Pr. Lionel ATHLANI

Surgeon in hand, wrist and peripheal nerves surgeries
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Patient history.

The patient is a retired woman of 65 years old who suffered an extra-articular distal radius malunion after an extra-articular fracture with dorsal deformity. The patient suffered wrist pain, deformity and limited pronation. It has been chosen to do an osteotomy of the radius to restore physiological anatomy of the distal radius in order to improve wrist function and reduce stiffness and pain.

Pre-op x-rays

Surgical treatment.

Concerning the choice of the implant and the approach, the palmar approach was defined in order to use an anatomical locking volar plate of the Xpert Wrist 2.4 kit. For the choice of the plate's size, it was only defined according to the width of the postoperative radius with the help of the simulation done by the PSI department. So, the standard size 2 volar plate was chosen for this surgery.

About the methods planned for this case, an initial plan was simulated in 3D by the PSI department and the surgeon's choice fell on a posterior opening to correct the dorsal inclination. The aim was to use Patient-Specific cutting and drilling guides for intraoperative guidance of the position and orientation of the osteotomy in order to help obtaining the desired correction.

This desired correction was evaluated with the preoperative radiographs, combined with a CT-Scan of the affected forearm and the contralateral one. Based on this CT-Scan, bones were segmented and measurements of both forearms were done by the PSI department, using computer-assisted 3D preoperative planning. This procedure helped for measuring rotational misalignment. [1]

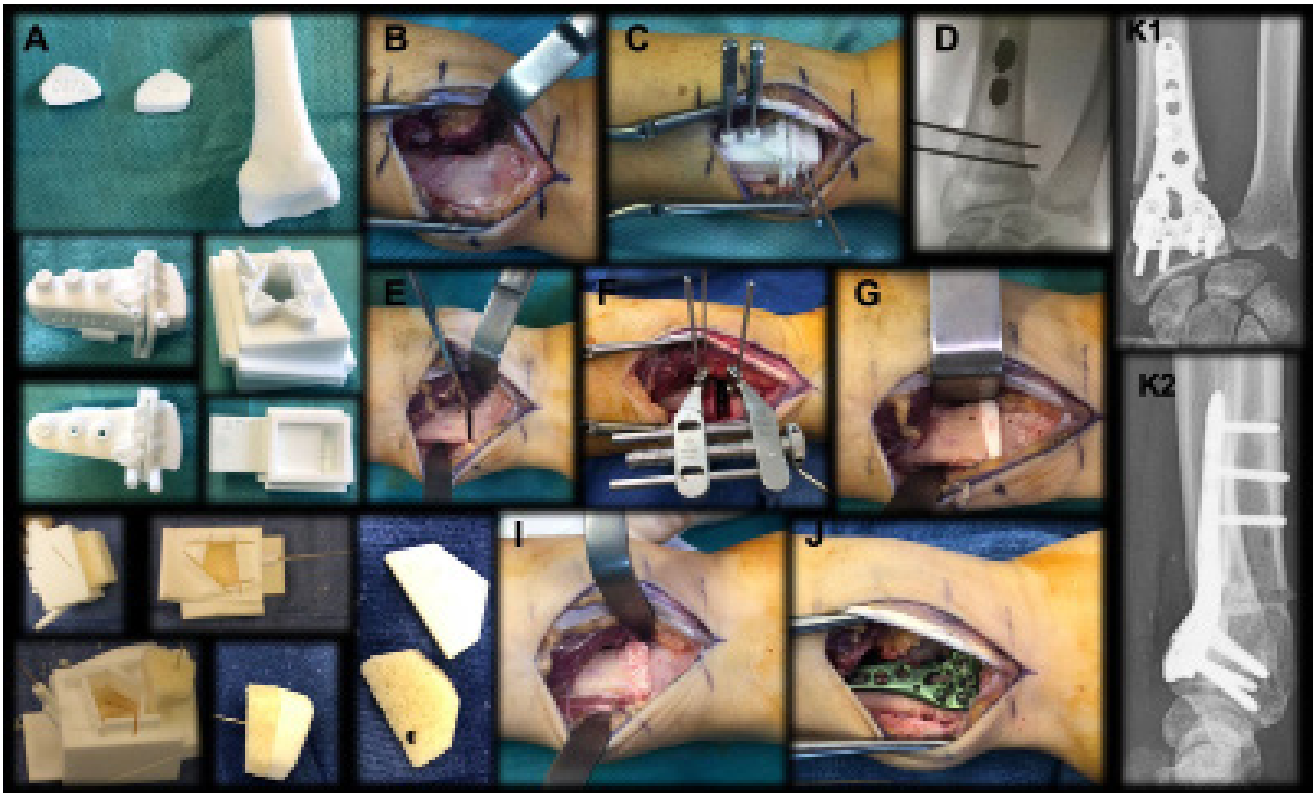
Finally, as a graft was required to fill the osteotomy site, a bone allograft cutting guide was also produced to allow the graft to adapt to the planned correction.

[1] Athlani, Lionel, et al. «Three-dimensional versus radiographic measurements for analyzing extra-articular distal radius malunion.» The Journal of Hand Surgery 45.10 (2020): 984-e1.

What about the surgical procedure ?

This procedure involves a number of different steps, that are explained and illustrated below by another example taken from the article [2] that is not our case but that is useful to understand the technique.

First, we have the 3D printed bone models and cutting guides (A). Then, we can expose the distal radius malunion by an anterior approach (B). The osteotomy guide is positioned and stabilized after that (C). A fluoroscopy control is done to confirm the position of the future osteotomy (D). Then, the osteotomy of the radius is realized with an oscillating saw (E) before the distraction of the osteotomy site (F). The bone graft template is introduced to check the radius epiphyseal reorientation (G). The bone allograft is prepared matching the 3D printed polyamide template (H). Finally, the bone allograft is introduced in the osteotomy site (I) and fixed with an Xpert Wrist 2.4 anatomic locking plate (J). Two postoperative radiographs are realized to confirm the position of the plate : the standard neutral PA (K1) and lateral (K2) views.



Steps about the surgical technique followed

! WARNING ! *These photos come from a different case than the one presented in this case study. They only serve to illustrate the surgical technique used.*

[2] Athlani, L., et al. «Computer-assisted 3D preoperative planning of corrective osteotomy for extra-articular distal radius malunion: A 16-patient case series.» Hand Surgery and Rehabilitation 39.4 (2020): 275-283.

Post-operative follow-up.

Following the surgery, the patient's wrist was immobilized in a volar cast for 48 to 72 hours. Then, the immobilization was extended for 4 weeks with a short-arm fiberglass cast. Radiographs were made at this time and the patient began 1 month of self-directed rehabilitation.

Post-op x-rays

New radiographs were made again 8 weeks after the surgery, following the start of physical therapy sessions. No heavy loads could be placed on the wrist for the first 6 months postoperatively.

The patient was reviewed in person every two weeks for the first 3 months, every month until 6 months, and finally every 6 months until 2 years following the surgery.

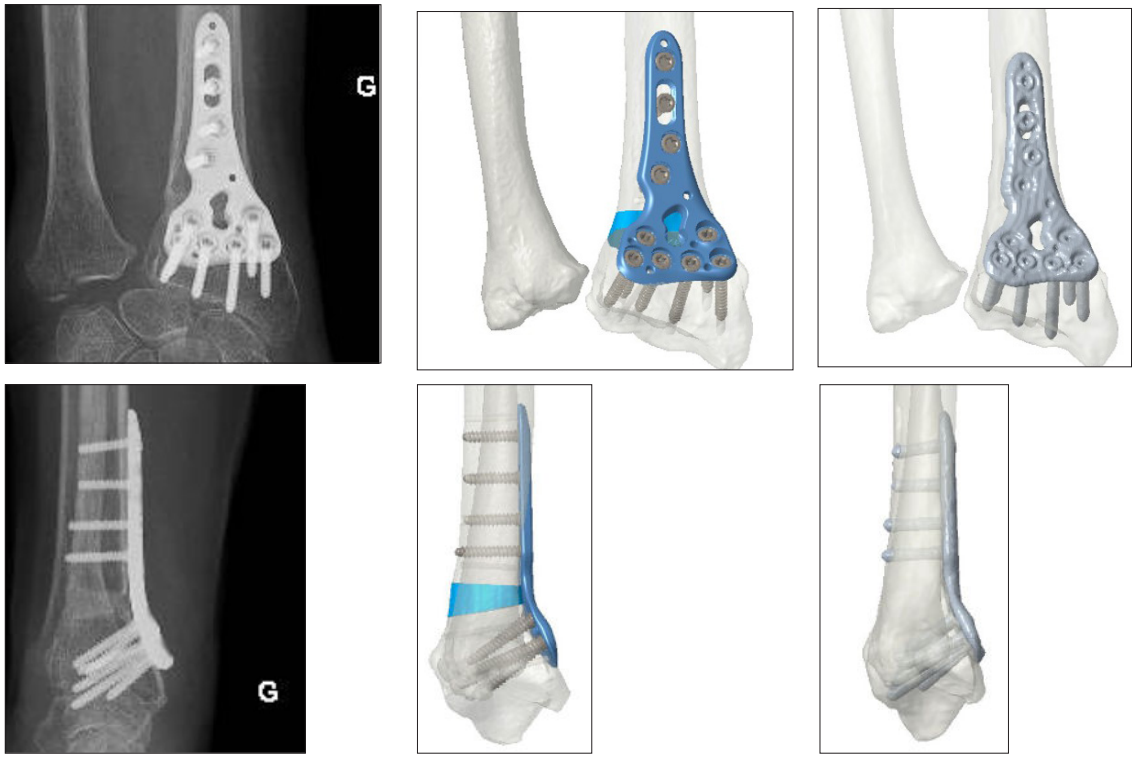
Concerning mobility and pain for the patient, pain levels were significantly reduced at rest and during effort. Grip strength had improved relative to the contralateral side : 48% preoperative versus 91% at follow-up. There was also a significant improvement in the wrist's ROM in flexion-extension and pronation-supination. The DASH and PRWE scores were also significantly better, with an improvement of respectively 40,5 points and 41 points. A total of 30 physical therapy sessions were performed to achieve this result. We can consider that the mean time of bone union was 10 weeks.

Physician conclusions.

At the last follow-up, palmar tilt, radial tilt and ulnar variance values measured were similar to those of the contralateral side. The measurements were realized after a postoperative CT-Scan.

The postoperative 3D values were similar to the 3D values simulated during correction planning and similar to the 3D values calculated on the healthy contralateral wrist.

The posterior ulnar head subluxation was corrected. The procedure provided satisfactory clinical, functional and radiological results.



Comparison between post-op x-rays at 4 months, the planned 3D correction and the 3D correction at 6 months

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