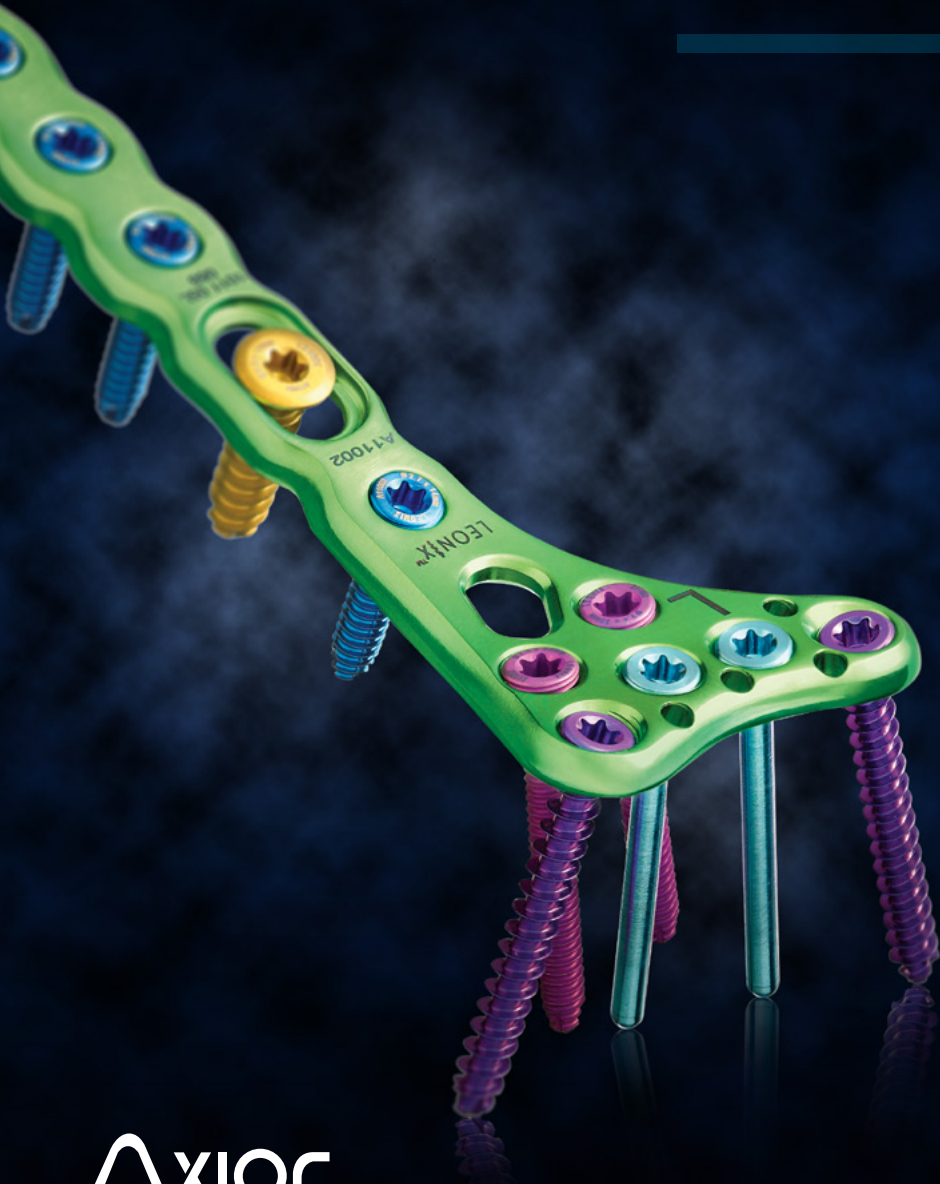


The Treatment of Distal Radius Fractures
using Axior Distal Radius Plating System

A BRIEF REVIEW



Introduction

The treatment of distal radius fractures using locking plate system is common today. This brief review provides an insight to the design features, benefits and clinical outcome of the treatment of distal radius fractures using the Axior Distal Radius Plating System. In 2012, Leonix launched Axior Distal Radius Plating System (ADPRS); since then, the ADPRS has achieved promising results. Leonix is pleased to share the success stories within this review.



AO Principles



Fracture reduction to restore anatomical relationships.



Fracture fixation providing absolute or relative stability as the personality of fracture, patient and injury requires.



Preservation of blood supply to soft tissues and bone.



Early and safe mobilization of the injured part and the patient as a whole.



Overview of Axior Distal Radius Plating System

Axior Distal Radius Plating System features a comprehensive plates design indicated for various scenarios such as intra and extra articular distal radius fracture, capital and subcapital ulna fractures. The plates and various type of screws are housed in a modular graphic case to accommodate a set of intuitive surgical instruments which provide surgical convenience, improve surgical performance and reducing OR time.

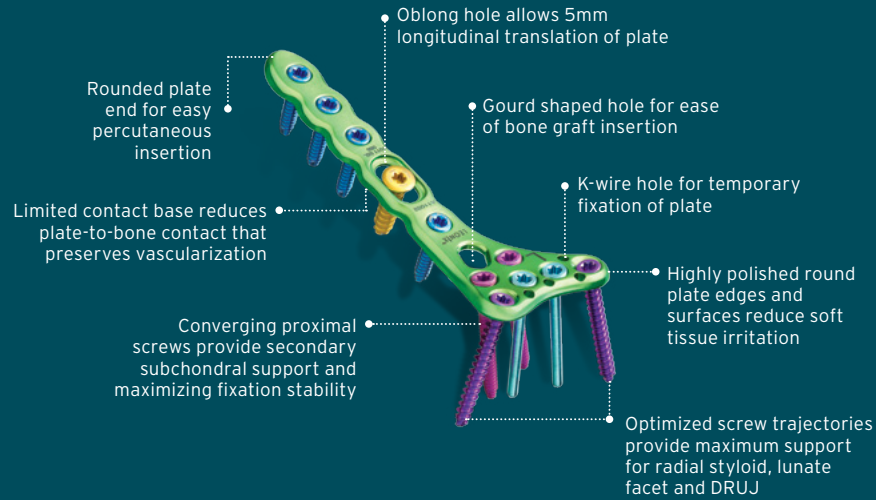
PLATES

- Anatomic volar distal radius locking plate for fragmentary fractures
- Distal Radius locking T-plate
- Distal ulna duo-claws locking plate

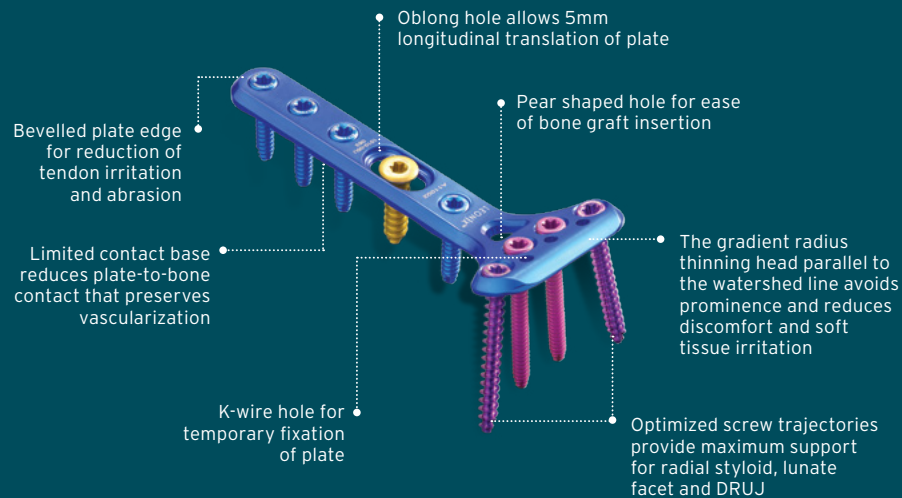
SCREWS

- Locking screws 2.4 mm for the head screw holes (metaphyseal bone)
- Locking screws 2.7 mm for the shaft screw holes (diaphyseal bone)
- Threaded peg 2.7 mm for the shaft and head screw holes (Osteoporosis bone)
- Cortex screws 3.5 mm for oblong hole (compression screw)

Anatomic Volar Distal Radius Locking Plate



Distal Radius Locking T-Plate



Design Rationale & Benefits

The Axiom Distal Radius Plating System design features an optimum anatomical fitted plate that comes with a set of effective screw trajectories. The comprehensive choice of screws design provides well suited requirements for various bone characteristic. These features fulfil the biomechanical and clinical needs to obtain the results guided by AO principles. Its' biomechanical strength were computationally analyzed and experimentally tested.

Anatomically fitted design to facilitate placement of plate to bone to achieve low profile fixation and reduce soft tissue irritation

Adequate number of screw holes and optimised trajectories at the head portion to enhance the fracture fixation at the metaphyseal bone

Optimized plate design to provide a well suited stiffness and stability of the bone-plate construct

Comprehensive screw design to address secured purchasing of different bone characteristic

Superior Titanium alloy material supports Biomechanically stabled fixation to promote bone healing

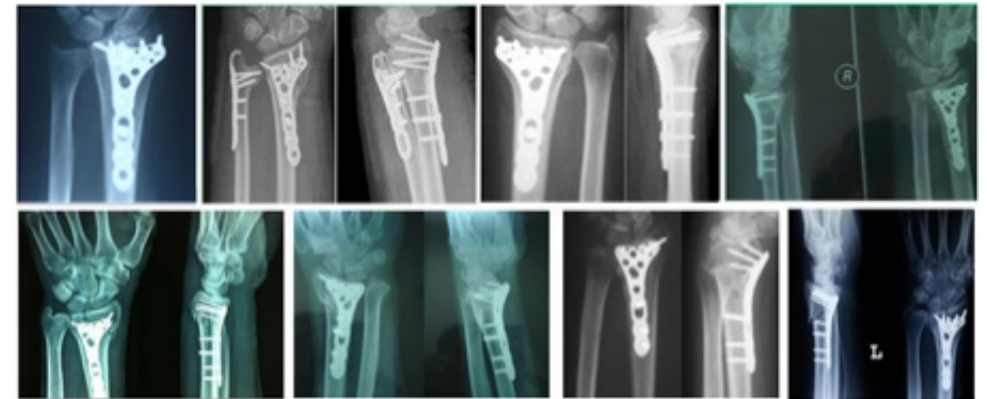
Limited contact shaft profile on the underside facilitate blood supply



Clinical Cases



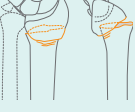

OVERVIEW



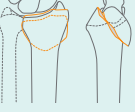
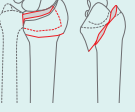
A clinical study was carried out between April 2012 to November 2014. In this study, post-operative outcome were followed up for patients with a selection criteria of at least three months post-operation. A total of 46 patients post operative outcome were evaluated. Out of 46 patients, 29 were male and 17 were female with mean age of 38 (range: 17 - 67) years old.







TYPE OF FRACTURES

All of the 46 patients were having a distal radius fracture due to the motor vehicle accident and a fall with outstretched hand. The fracture type were classified with AO Classification where 54% of the fractures with type 23-B, 38% with type 23-C, and 8% with type 23-A. 92% of the fractures were located at the metaphysis of the distal radius bone. The patients were treated with Axior Anatomic Volar Distal Radius Locking Plate.

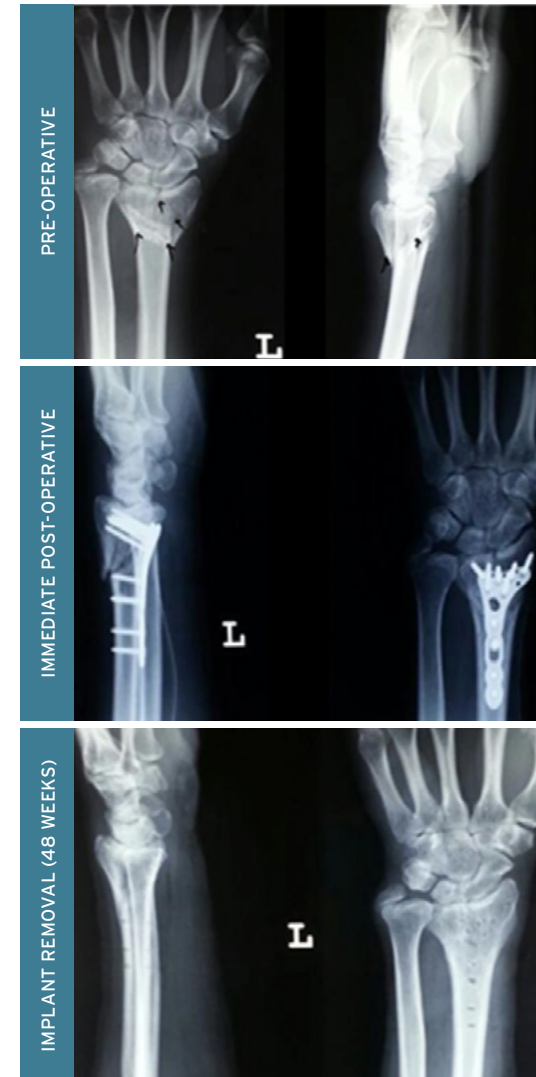
AO classification	Number of cases	Extra articular	23-A1 ulna, radius intact	23-A2 radius, simple and impacted	23-A3 radius, multifragmentary
23-A1	3				
23-A2	1				
23-A3	1				

AO classification	Number of cases	Partially articular	23-B1 radius, sagittal	23-B2 radius, frontal, dorsal rim	23-B3 radius, frontal, volar rim
23-B1	1				
23-B2	8				
23-B3	15				

AO classification	Number of cases	Complete articular	23-C1 simple, metaphyseal simple	23-C2 simple, metaphyseal multifragmentary	23-C3 multifragmentary
23-C1	6				
23-C2	9				
23-C3	2				

CASE 1 Male 54 years old

Fracture type : 23-B3
 Injury cause : Falling
 Implant Removal : 48 weeks post-operative



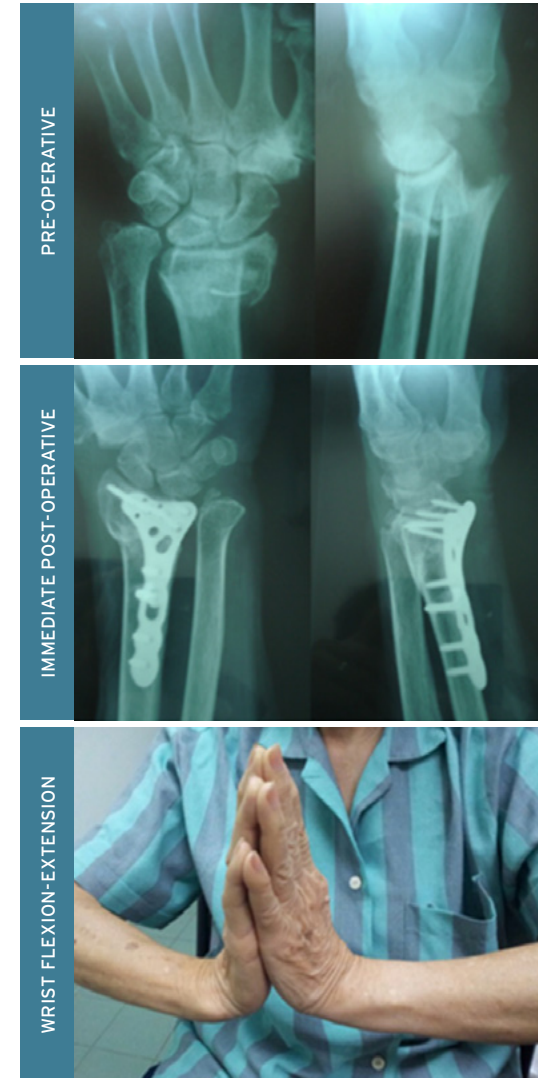
CASE 2 Male 60 years old

Fracture type : 23-C1
Injury cause : Falling
Union : 5 weeks post-operative



CASE 3 Female 81 years old

Fracture type : 23-A2
Injury cause : Falling
Wrist full function : 33 weeks post-operative

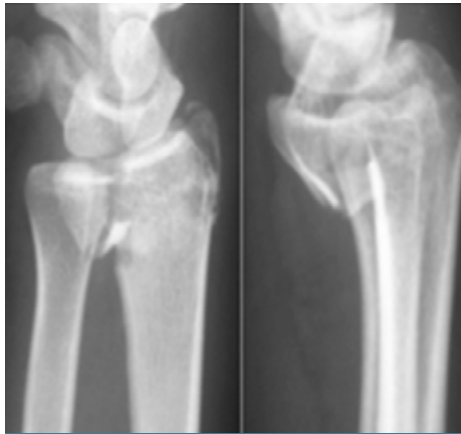


CASE 4 Male 27 years old

Fracture type : 23-B3

Injury cause : Motor vehicle accident

Union : 11 weeks post-operative



PRE-OPERATIVE



UNION (11 WEEKS)



WRIST FLEXION-EXTENSION

CASE 5 Female 45 years old

Fracture type : 23-B3

Injury cause : Motor vehicle accident

Union : 20 weeks post-operative



PRE-OPERATIVE



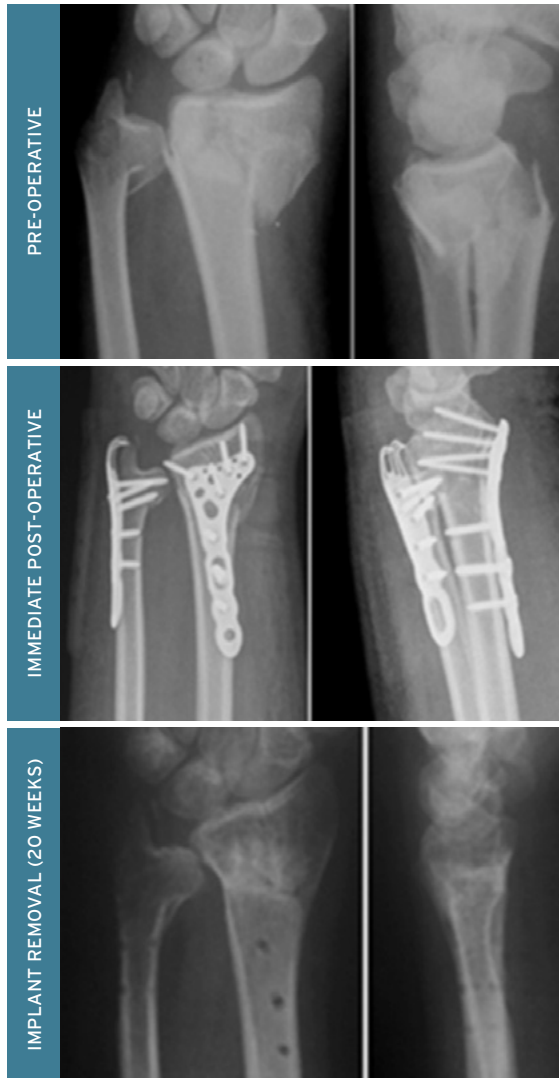
UNION (20 WEEKS)



WRIST FLEXION-EXTENSION

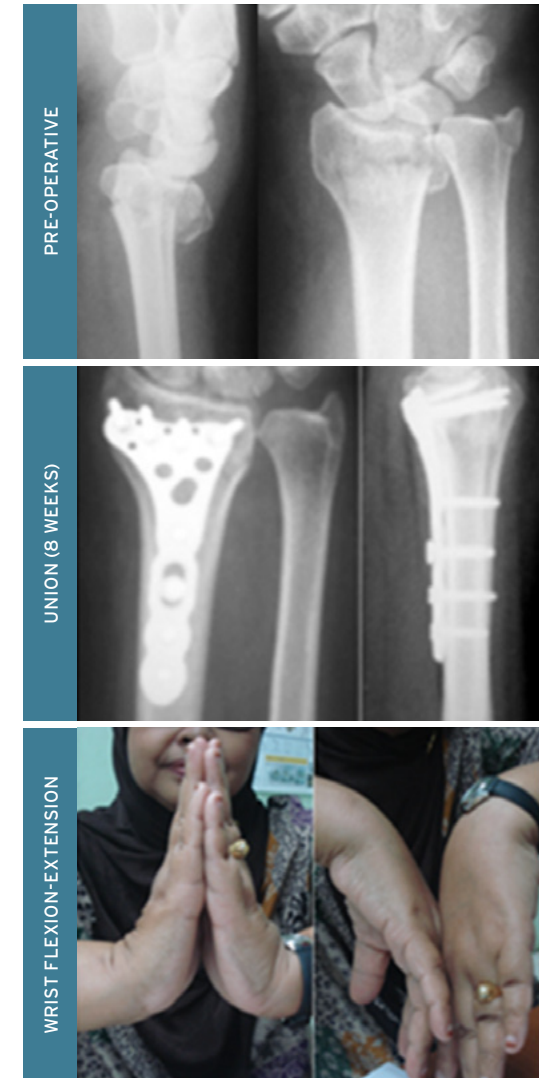
CASE 6 Male 20 years old

Fracture type : 23-A2
Injury cause : Motor vehicle accident
Implant Removal : 20 weeks post-operative



CASE 7 Female 50 years old

Fracture type : 23-A2
Injury cause : Quick slipping and falling
Union : 8 weeks post-operative

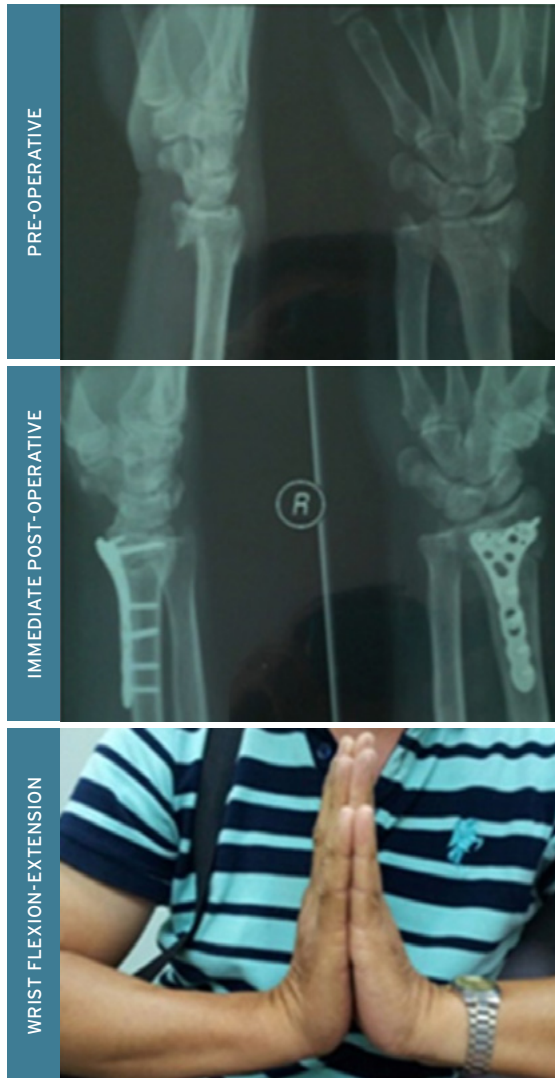


CASE 8 Male 56 years old

Fracture type : 23-B3

Injury cause : Falling

Union : 8 weeks post-operative



CASE 9 Male 24 years old

Fracture type : 23-A2

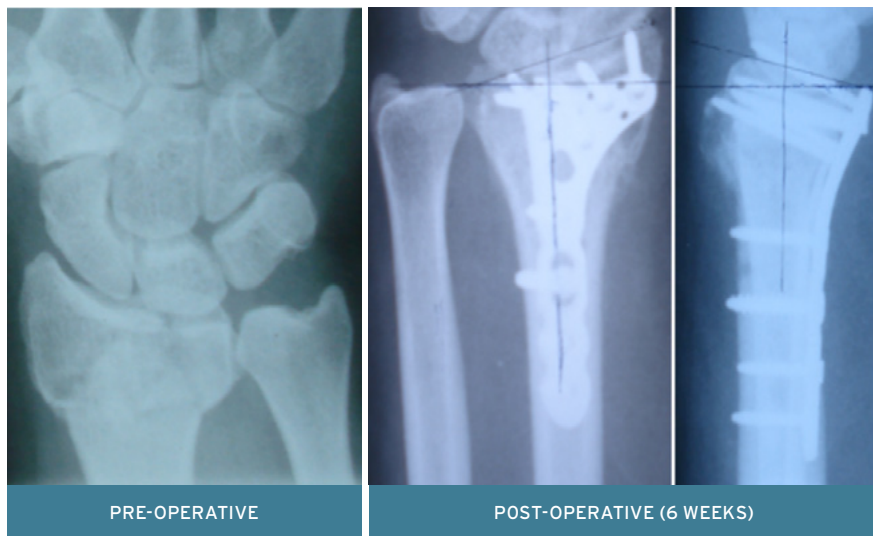
Injury cause : Motor vehicle accident

Union : 13 weeks post-operative



CASE 10 Male 36 years old

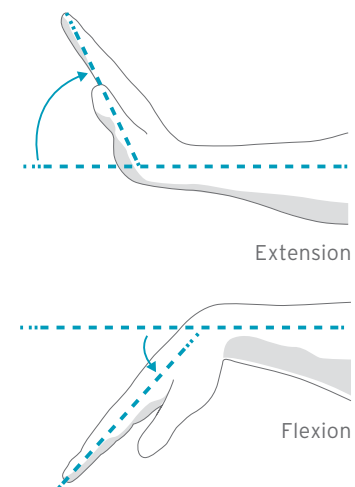
Fracture type : 23-C2
Injury cause : Motor vehicle accident
Union : 14 weeks post-operative



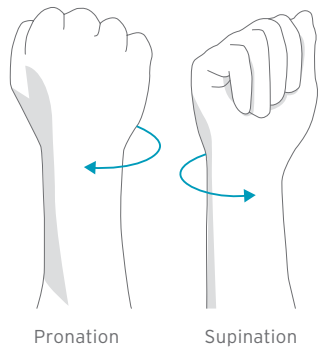
RANGE OF MOTION AND ANATOMICAL MEASUREMENTS

The range of motion and anatomical measurements of the DRUJ were evaluated between 10~20 weeks follow up. The X-ray scans for 45 cases (97%) shows good results with anatomical measurement within that of a healthy bone. The wrist function was assessed for all 46 patients and the range of motion were found to be acceptable.

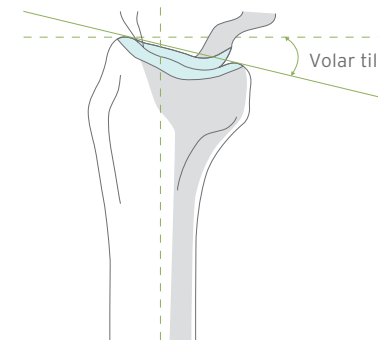
	Extension	Flexion
Natural range in healthy bone	60	45
Mean value	43	38
Range	15-60	20-45



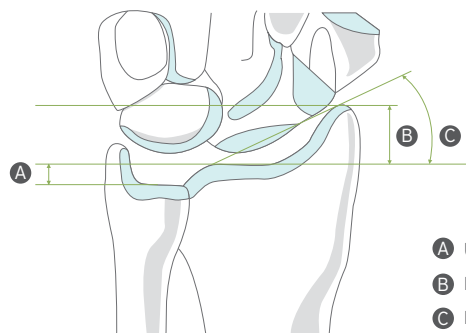
	Supination	Pronation
Natural range in healthy bone	90	80
Mean value	84	78
Range	45-90	45-80



	Volar Tilt
Natural range in healthy bone	3-8
Mean value	5.5
Range	0-15



	Radial Inclination	Radial Height	Ulnar Variance
Natural range in healthy bone	15-25	8-15	0-2
Mean value	18	11	0.3
Range	5-28	3-15	0-5



- A** Ulnar variance
- B** Radial inclination
- C** Radial height

FUNCTIONAL SCORES

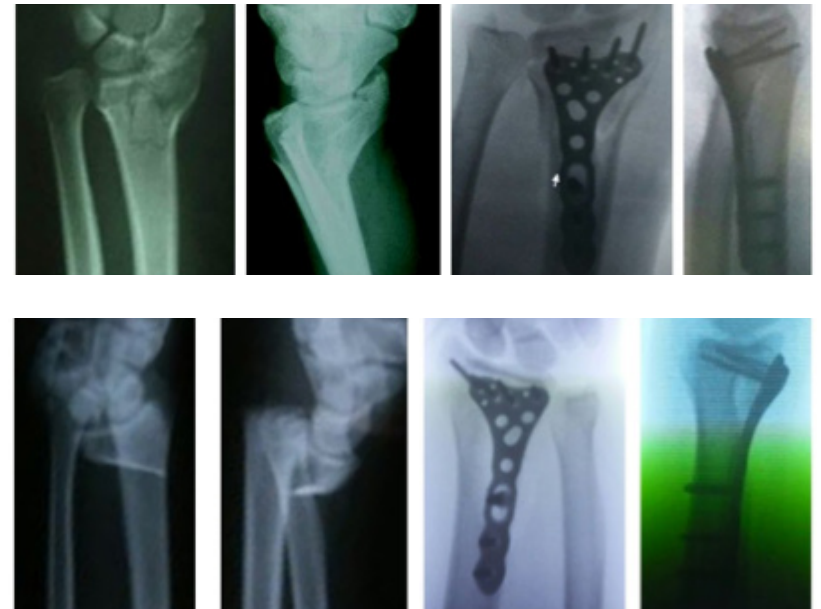
All 46 patient's wrist pain and functional score were evaluated using patient rated wrist evaluation (PRWE) and disabilities of the arm, shoulder, and hand (DASH) score questionnaires. The post operative functional scores were found to be within good range. The mean PRWE score was 11 which can be considered mild pain with good functional results. The mean DASH score is 8 which shows that the patients can perform general and specific activities without any problem.

Functional Score	Overall Score
PRWE Score	11
DASH Score	8



Techniques & Tips

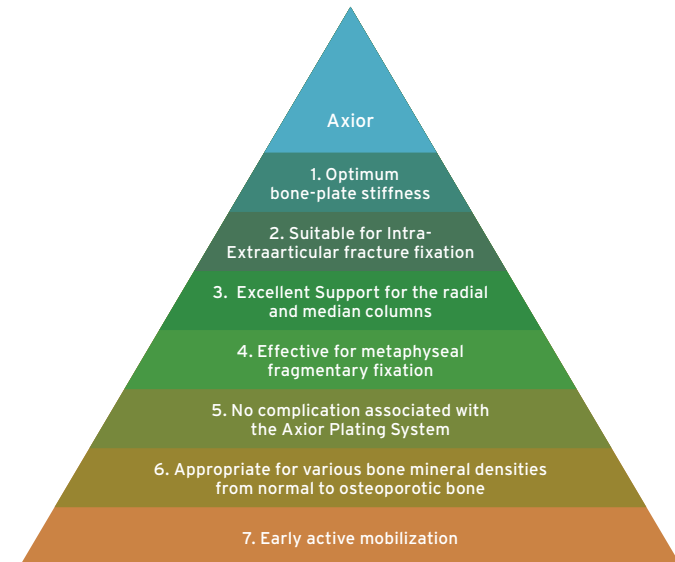
The Axior anatomic distal radius plate anatomy is found suitable for the treatment of fractures at the distal metaphysis of the radius bone. In some cases, the fracture occurs toward the radial or medial column. The presence of 6 screw holes distributed on the distal head portion of the plate and various screw lengths allow optimum purchase of the bone fragments for the radial or medial column. Optimum screw trajectories construction enables the plate to maneuver freely between the radial or medial column in larger bones to provide effective fixation of the radial fragment particularly the radial styloid, and maximum support to the medial column around the DRUJ.

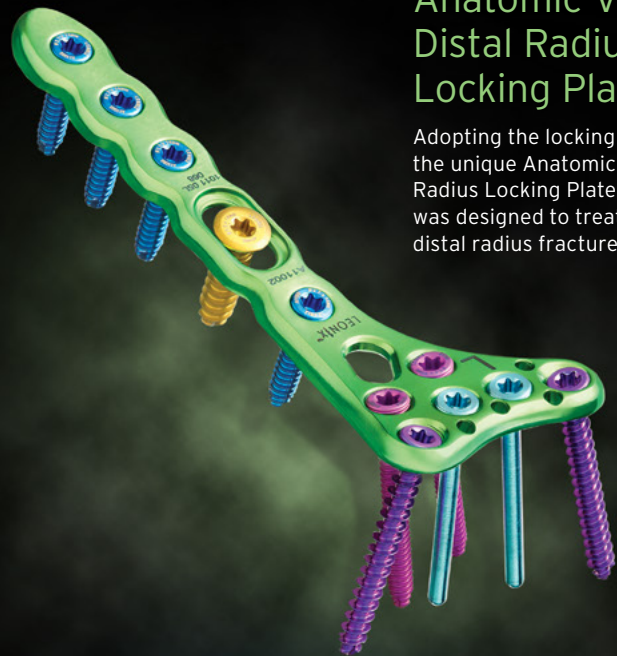




Conclusion

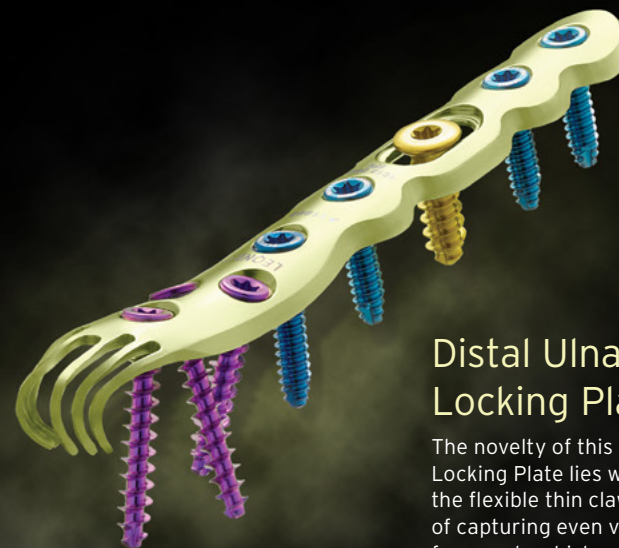
This clinical study shows that Axior Anatomic Volar Distal Radius Locking Plate was found to be an effective plate to treat the metaphysis and diaphysis fractures of the distal radius bone. The plate width was found suitable to secure the fragments at the radial and median columns, nevertheless, the surgeon has an option to place the plate closer to median or radial column to secure the small fragment in larger bones. In all the cases within this study, a good union was achieved. There were no complications of and implant failure, screw loosening, or other unsatisfactory results which were associated to the implant. From the 46 cases within the study, the wrist function was restored without problem for general daily activities for all the patients and specific activities such as lifting heavy objects in 40 patients.





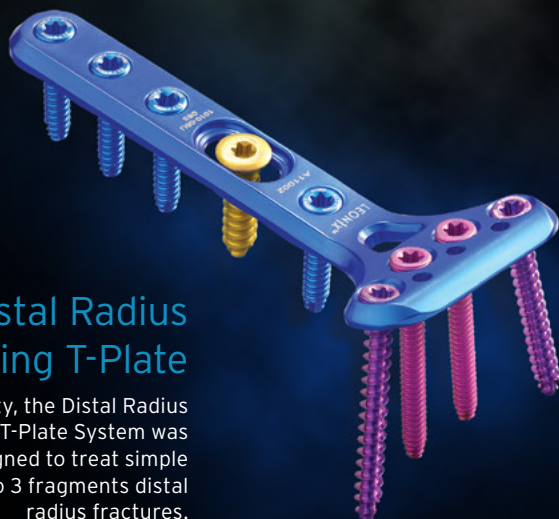
Anatomic Volar Distal Radius Locking Plate

Adopting the locking technology, the unique Anatomic Volar Distal Radius Locking Plate System was designed to treat complex distal radius fractures.



Distal Ulna Duo-Claws Locking Plate

The novelty of this Distal Ulna Duo-Claws Locking Plate lies within the function of the flexible thin claws that are capable of capturing even very small ulna styloid fragments which were not feasibly secured by screw, peg or wire.



Distal Radius Locking T-Plate

For simplicity, the Distal Radius Locking T-Plate System was designed to treat simple 2 to 3 fragments distal radius fractures.



One System. Multiple Solutions.

LEONIX

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