

Four-Corner Fusion vs. Proximal Row Carpectomy

This protocol is intended to provide the clinician with a guideline for the postoperative rehabilitation course of a patient who has undergone **Four-Corner Fusion or Proximal Row Carpectomy**. General time frames are given for reference to the average, but individual patients will progress at different rates depending on their age, comorbidities, pre-surgical range of motion, strength, health/functional status, rehabilitation compliance, learning barriers and complications. Specific time frames, restrictions and precautions are given to protect healing tissues and surgical reconstruction.

Wrist salvage procedures are performed to treat moderate to severe arthritis of the carpal bones with significant pain. They are most associated with progression of arthritic changes of the carpal bones as well as alignment due to non-union scaphoid fractures (scaphoid non-union advanced collapse (SNAC)), scapholunate ligament injury (scapholunate advanced collapse (SLAC)), avascular necrosis of lunate (Kienbock's Disease), and avascular necrosis of scaphoid (Preiser's disease). Usually these procedures are performed at the end stages of the conditions above (stage III or IV).

Postoperative Guidelines

Surgical Indication

Your physician will determine what surgery is appropriate for your wrist.

Four-Corner Fusion: SLAC and SNAC wrist with maintained carpal height. Lack of cartilage on the capitate and lunate fossa of the radius is a contraindication.

Surgery involves removal of scaphoid and fusion of lunate, capitate, hamate, and triquetrum usually with spider plate.

Proximal Row Carpectomy: SLAC wrist, nonunion scaphoid with arthritis, radioscaphoid arthritis, or advanced Kienbock's disease. Articular incongruity in the lunate fossa of radius is a contraindication.

Surgery involves removal of scaphoid, lunate, and triquetrum.

Return to Work

The timeline for returning to work can vary depending on the type of work performed, various accommodations that may be available within your work environment, and any postoperative complications. Your surgeon will discuss the timeline

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Phase I (7 to 10-14 days after surgery)

Rehabilitation appointments	<ul style="list-style-type: none"> 1-2x/week or per therapist discretion
Rehabilitation goals and priorities	<ul style="list-style-type: none"> Activities of daily living (ADLs) - within your restrictions Edema management Scar management
Suggested therapeutic exercises	<ul style="list-style-type: none"> AROM of the wrist, forearm, and digits out of orthoses 3-5x/day <p>Four-corner fusion:</p> <ul style="list-style-type: none"> If K-wires used, immobilize wrist for 6 weeks <p>Proximal row carpectomy:</p> <ul style="list-style-type: none"> Wrist becomes a hinged joint, therefore, wrist extension and flexion are the only directions of the wrist. *Dr. Salyapongse immobilizes the wrist until 4 weeks post op.
Precautions	<ul style="list-style-type: none"> No lifting, pushing, or pulling more than 5 pounds with the involved upper extremity No weightbearing through the involved upper extremity
Orthotic Management	<ul style="list-style-type: none"> Post op dressings removed. Fabrication of custom thermoplastic wrist cock-up orthosis Wear orthosis at all times except hygiene purposes and exercises
Progression criteria	<ul style="list-style-type: none"> Progress as pain allows

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Phase II (Post op 3 weeks)

Rehabilitation appointments	<ul style="list-style-type: none"> • 1-2/week or per therapist discretion
Rehabilitation goals and priorities	<ul style="list-style-type: none"> • Edema management • Scar management • Increase wrist motion while decreasing pain at wrist • Independent with ADLs per restrictions
Suggested therapeutic exercises	<p>Four-corner fusion:</p> <ul style="list-style-type: none"> • Continue with AROM of the wrist • Initiate Dart Thrower’s motion AROM of wrist <p>Proximal row carpectomy:</p> <ul style="list-style-type: none"> • Continue with AROM of the wrist • Initiate dart thrower’s motion AORM of the wrist • Wrist isometric strengthening to readjust tension • Proprioceptive retraining of the wrist and hand • *Dr. Salyaponse immobilizes the wrist for 4 weeks post op.
Precautions	<ul style="list-style-type: none"> • No lifting, pushing, or pulling more than 5 pounds with the involved upper extremity • No weightbearing through the involved upper extremity
Orthotic Management	<ul style="list-style-type: none"> • Continue to wear orthosis at all times, except hygiene purposes and exercises.
Progression criteria	<ul style="list-style-type: none"> • Progress as pain allows

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Phase III (Post op 4 weeks)

Rehabilitation appointments	<ul style="list-style-type: none"> 1-2x/week per therapist discretion
Rehabilitation goals and priorities	<ul style="list-style-type: none"> Edema management Scar management Increase wrist motion while maintaining a low level or pain free wrist Independent with ADLs
Suggested therapeutic exercises	<p>Four-corner fusion: Proprioceptive retraining of the wrist and hand</p> <ul style="list-style-type: none"> Perform light activities without wearing orthosis Initiated wrist isometrics <p>Proximal row carpectomy: Initiate gentle PROM Of the wrist and forearm</p> <ul style="list-style-type: none"> Perform light activities without wearing orthosis Perform functional proprioceptive retraining *Dr. Salyapone patients initiate wrist AROM.
Precautions	<ul style="list-style-type: none"> No lifting, pushing, or pulling more than 5 pounds with the involved upper extremity No weightbearing through the involved upper extremity
Orthotic Management	<ul style="list-style-type: none"> Wean from orthosis during light activities
Progression criteria	<ul style="list-style-type: none"> Progress as pain allows

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Phase IV (5 weeks post op)

Rehabilitation appointments	<ul style="list-style-type: none"> 1-2x/week per therapist discretion
Rehabilitation goals and priorities	<ul style="list-style-type: none"> Edema management Scar management Increase wrist ROM and strength while maintaining pain free wrist Independent with ADLs
Suggested therapeutic exercises	<p>Four-corner fusion:</p> <ul style="list-style-type: none"> Initiate gentle PROM of the wrist and forearm <p>Proximal row carpectomy:</p> <ul style="list-style-type: none"> Progress PROM to prolonged low load stretches with use of weight Gradual isotonic without weights Consider focusing on strengthening wrist extensors more than flexors due to biomechanics – see additional notes
Precautions	<ul style="list-style-type: none"> Be cautious with aggressive PROM. Only perform to expected AROM – see additional notes below No lifting, pushing, or pulling more than 5 pounds with the involved upper extremity No weightbearing through the involved upper extremity
Orthotic Management	<ul style="list-style-type: none"> Continue to wean from orthosis as able
Progression criteria	<ul style="list-style-type: none"> Progress as pain allows

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Phase V (6 weeks post op)

Rehabilitation appointments	<ul style="list-style-type: none"> 1-2x/week per therapist discretion
Rehabilitation goals and priorities	<ul style="list-style-type: none"> Edema management Scar management Increase wrist ROM and strength while maintaining pain free wrist Independent with ADLs
Suggested therapeutic exercises	<p>Four-corner fusion:</p> <ul style="list-style-type: none"> Progress PROM to prolonged low load stretches with use of weight Initiate light strengthening without weights or bands, consider functional motion strengthening <p>Proximal row carpectomy:</p> <ul style="list-style-type: none"> Progressive strengthening with use of putty/hand exerciser, weights, and bands Can initiate dynamic orthosis at this time if AROM gains are poor
Precautions	<ul style="list-style-type: none"> Be cautious with aggressive PROM. Only perform to expected AROM – see additional notes below No lifting, pushing, or pulling more than 5 pounds with the involved upper extremity No weightbearing through the involved upper extremity
Orthotic Management	<ul style="list-style-type: none"> Completely wean from orthosis
Progression criteria	<ul style="list-style-type: none"> Progress as pain allows

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Phase VI (8 weeks post op)

Rehabilitation appointments	<ul style="list-style-type: none"> 1-2x/week per therapist discretion
Rehabilitation goals and priorities	<ul style="list-style-type: none"> Scar management A stable, pain free wrist Independent with ADLs
Suggested therapeutic exercises	<p>Four-corner fusion:</p> <ul style="list-style-type: none"> Progressive strengthening with use of putty/hand exerciser, weights, and bands Can initiate dynamic orthosis at this time if AROM gains are poor <p>Proximal row carpectomy:</p> <ul style="list-style-type: none"> Continue strengthening program, consider work/heavy task specific strengthening program
Precautions	<p>Four-corner fusion:</p> <ul style="list-style-type: none"> No restrictions at 10-12 weeks. If the patient is going back to a manual labor job, work hardening program is recommended <p>Proximal row carpectomy:</p> <ul style="list-style-type: none"> No restrictions at this time. If the patient is going back to a manual labor job, work hardening program is recommended. <p>Patients report the wrist feeling well at 3 to 6 months, and 12 months is maximum recovery achieved.</p>
Orthotic Management	<ul style="list-style-type: none"> Discontinue orthosis

Progression criteria	<ul style="list-style-type: none">• Discharge from therapy with pain free wrist.• Independent in ADLs and IADLs.
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<p>Additional Notes</p>	<p>Expected AROM per Saltzman (2015):</p> <ul style="list-style-type: none"> • Four-corner fusion: <ul style="list-style-type: none"> • Wrist extension: 39 (SD: 11) • Wrist flexion: 32 (SD: 10) • Radial deviation: 14 (SD: 5) • Proximal row carpectomy: <ul style="list-style-type: none"> • Wrist extension: 43 (SD: 11) • Wrist flexion: 36 (SD: 11) <p>Expected grip strength per Saltzman (2015):</p> <ul style="list-style-type: none"> • Four-corner fusion: 74% • Proximal row carpectomy: 67% <ul style="list-style-type: none"> • Biomechanics of the wrist: Proximal row carpectomy alters the movement arm of wrist flexion and extension. Wrist extensors have smaller moment arms in extended posture. Four-corner wrist fusion alters radial and ulnar deviation by radial deviation has larger moment arms than ulnar. • Dart thrower’s motion is well maintained in both procedures, which means that patients continue to have functional movement. Radial extension decreased to 53% and ulnar flexion to 84% with a four-corner fusion. After proximal row carpectomy, radial extension did not significantly decrease but ulnar flexion decreased motion to 87%. It is still suggested to perform dart thrower’s motion to increase AROM after surgery as well as strengthen the hand for functional activities.
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References

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