

# Wrist Osteoarthritis

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## Overview

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- Osteoarthritis of the hand and wrist requires an individualized approach to treatment strategies based on site-specific diagnoses and varying disease manifestations [1].
- In most scenarios, there is no single preferred option for wrist osteoarthritis [5].
- Effective reduction and radiocarpal stabilization, along with the absence of radial and intracarpal marginal fractures, are attributed to good functional outcomes and absence of osteoarthritis in radiocarpal dislocations and fracture-dislocations [3].
- Over short-term follow-up, ulnar head replacement and sigmoid notch resurfacing arthroplasty provide a feasible option for distal radial ulnar joint arthritis, resulting in substantial improvements in pain and function [4].
- Joint denervation deserves a place of choice in the surgical arsenal for osteoarthritis of the wrist and hand, provided new anatomical observations are integrated, the procedure is meticulous, and patients are informed that it is a symptomatic treatment [6].
- The choice of procedure for scaphotrapeziotrapezoidal joint osteoarthritis depends on whether the joint is isolated or associated with carpal malalignment and other joint osteoarthritis [7].
- Arthroplasty should be used as an alternative to arthrodesis in the treatment of posttraumatic wrist arthritis, given proper patient selection and indications [18].
- Total wrist denervation is a reliable and reproducible surgical technique for pain relief and preservation of wrist function in painful osteoarthritis [19].
- A second and even a third operation can result in long-term pain improvement, good function, and capacity for work, with re-operation recommended in symptomatic cases with minor osteoarthritis of the wrist (SNAC stage 0 or 1) [21].
- Wrist arthroplasty provides functional mobility, improved strength, and reduced pain in carefully selected cases of severely destroyed wrist joints, though implant survival rates do not compare with hip and knee arthroplasties [26].
- If indications are accurately respected and the technique is well performed to prevent complications, motion-preserving procedures of the wrist can obtain good long-term results [57].

# Anatomy & Pathophysiology

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- Wrist alignment was maintained over time, but 13 patients presented mild to moderate symptomatic wrist arthritis following corrective osteotomy for distal radius malunion [2].
- Type I and III wrists in early rheumatoid arthritis exhibited radiographic progression and ultimately underwent deformation [12].
- Surgical treatments for scapholunate advanced collapse wrists resulted in decreased wrist kinematic motion and functional performance compared with individuals with normal wrists [32].
- Wrist biomechanics were significantly altered following trapeziectomy, with ligamentous reconstruction and tenodesis (LRTI) most closely resembling intact biomechanics in a cadaveric model [33].
- Computed fiber elongations of the dorsal carpal ligaments varied linearly with wrist position despite complex carpal bone anatomy and kinematics [35].
- Rotational malalignment of the wrist has significant effects on carpal, distal radial, and distal radioulnar joint measurements [36].
- Computer-aided CT analysis provides guidelines for measuring and quantifying carpal alignment three-dimensionally and establishes a database for normal values to aid in analyzing wrist pathologies and kinematics [37].
- Radioscapholunate fusion shows the most biomechanically similar behavior to the healthy wrist among three compared fusion types [38].
- A technique involving tendon ball arthroplasty and proximal carpal stabilization with tendon graft for advanced Kienböck's disease demonstrated reduced wrist pain, improved wrist motion and grip strength, and restored integrity of the proximal carpal row [39].
- Wrist range of motion within 20% extension and radial abduction to 50% flexion limits torque and lever force exacerbation between scaphoid fragments [41].
- Scapho-trapezo-trapezoid arthrodesis modifies the wrist center of rotation during flexion and extension, with stability considered more important than mobility in clinical conditions [42].
- Wrist arthrodesis may only compromise select wrist functions [43].
- The 'dart thrower's motion' of the wrist, from radial extension to ulnar flexion, may be a unifying concept of functional wrist motion that is uniquely human [44].
- Total wrist replacement aims for a painless mobile wrist rather than a painless stiff wrist, evolving with advances in technology, materials, and understanding of biomechanics [45].
- Intercarpal arthrodeses make constant radiocarpal and midcarpal congruence during radioulnar deviation in normal wrists no longer possible [46].
- Persistent middle finger CMCJ micromotion was likely present in 19/20 wrists (95%) that experienced symptomatic hardware complications [47].
- Changes in the motion pattern of the lunate during radioulnar deviation and flexion-extension after four-corner arthrodesis explain the shift of the centroid radially and dorsally [48].

- SNAC wrists differ from SLAC wrists by exhibiting a decreased sagittal lunotriquetral angle, indicating a distinct pathomechanism of carpal instability [49].
- The four-bone arthrodesis (FBA) wrist has significantly lower contact pressure, greater contact area, and equal contact translation compared with the proximal row carpectomy (PRC) wrist [50].

## Classification

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- Osteoarthritis of the hand and wrist requires an individualized approach to treatment strategies based on site-specific diagnoses and varying disease manifestations [1].
- The choice of procedure for osteoarthritis of the scaphotrapeziotrapezoidal joint depends on whether the joint is isolated or associated with carpal malalignment and other joint osteoarthritis [7].
- Type I and III wrists had radiographic progression and ultimately underwent deformation [12].
- Combining traditional qualitative evaluation and quantitative measurements may improve the classification of wrist osteoarthritis [14].
- Radiographic classification of SLAC wrist has moderate reliability and reproducibility [60].
- Classification of SNAC wrist has limited reliability [60].
- Reviewing multiview radiographs more commonly yielded Vender stage 3 osteoarthritis classification [61].

## Clinical Presentation

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- Osteoarthritis of the hand and wrist requires an individualized approach to treatment strategies based on site-specific diagnoses and varying disease manifestations [1].
- Wrist alignment was maintained over time but 13 patients presented mild to moderate symptomatic wrist arthritis after corrective osteotomy for distal radius malunion [2].
- Good functional outcomes and absence of osteoarthritis can be attributed to effective reduction and radiocarpal stabilization, along with the absence of radial and intracarpal marginal fractures in radiocarpal dislocations and fracture-dislocations [3].
- Over short-term follow-up, ulnar head replacement and sigmoid notch resurfacing arthroplasty provides a feasible option for distal radial ulnar joint arthritis, resulting in substantial improvements in pain and function [4].
- Despite advancements in management, in most scenarios there is no single preferred option for wrist osteoarthritis [5].
- Joint denervation deserves a place of choice in the surgical arsenal for osteoarthritis of the wrist and hand, provided new anatomical observations are integrated, the procedure is meticulous, and patients are informed that it is a symptomatic treatment [6].
- The choice of procedure for scaphotrapeziotrapezoidal joint osteoarthritis depends on whether the joint is isolated or associated with carpal malalignment and other joint osteoarthritis [7].

- The hand manifestations of osteoarthritis can be debilitating, with initial treatment being medical and many patients doing well with splinting and hand therapy [8].
- Midcarpal arthritis, which may develop after distal scaphoid resection for degenerative arthritis secondary to scaphoid nonunion, did not cause appreciable deterioration in patient outcomes [9].
- In perilunate dislocation and fracture dislocation of the wrist, 79% of patients showed radiographic signs of osteoarthritis at a mean follow-up time of 9.9 years [10].
- Removal of the trapezium as treatment for basal thumb osteoarthritis does not increase the risk of developing wrist osteoarthritis in the long term [11].
- Combining traditional qualitative evaluation and quantitative measurements may improve the classification of wrist osteoarthritis when comparing radial styloid size between osteoarthritic and healthy wrists [14].
- Preexisting OA in the wrist or CMC does not seem to impact outcomes of distal radius fractures, regardless of treatment, age, or sex [15].
- Radiographic signs of radioscapoid arthritis were often observed in patients with follow-up greater than 10 years after scaphocapitate arthrodesis for treatment of late stage Kienböck disease [17].
- A second and even a third operation can result in long-term pain improvement, good function and capacity for work, and re-operation is recommended in symptomatic cases with minor osteoarthritis of the wrist (SNAC stage 0 or 1) after failed surgery for scaphoid nonunion [21].
- Patients with wrist arthritis who undergo surgery face higher risks of CTS and subsequent CTR than those managed conservatively [22].
- Wrist radiographs demonstrate a 47% sensitivity and 94% specificity in predicting end-stage ST joint arthritis, emphasizing the importance of directly visualizing the ST joint after trapeziectomy [25].
- Signal changes in the flexor carpi radialis are infrequent and often incidental or associated with peritrapezial osteoarthritis [27].
- In most patients, wrist function was improved and pain relief was obtained with the use of a pyrocarbon capitate resurfacing implant in chronic wrist disorders [40].
- Radio-scapho-capitate ligament reconstruction during proximal row carpectomy is a technique to consider in similar cases, although one has to take into account the short-term follow-up of 1 year and the fact that the patient had rather low demands to his wrist [55].

## Investigations

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- Osteoarthritis of the hand and wrist requires an individualized approach to treatment strategies based on site-specific diagnoses and varying disease manifestations [1].
- Wrist alignment was maintained over time but 13 patients presented mild to moderate symptomatic wrist arthritis following corrective osteotomy for distal radius malunion [2].
- Good functional outcomes and absence of osteoarthritis can be attributed to effective reduction and radiocarpal stabilization, along with the absence of radial and intracarpal marginal fractures in radiocarpal dislocations and fracture-dislocations [3].

- Despite advancements in management, in most scenarios there is no single preferred option for wrist osteoarthritis [5].
- Joint denervation deserves a place of choice in the surgical arsenal for osteoarthritis of the wrist and hand, provided new anatomical observations are integrated, the procedure is meticulous, and patients are informed that it is a symptomatic treatment [6].
- The choice of procedure for scaphotrapeziotrapezoidal joint osteoarthritis depends on whether the joint is isolated or associated with carpal malalignment and other joint osteoarthritis [7].
- Midcarpal arthritis, which may develop after distal scaphoid resection for degenerative arthritis secondary to scaphoid nonunion, did not cause appreciable deterioration in patient outcomes [9].
- In perilunate dislocation and fracture dislocation of the wrist, 79% of patients showed radiographic signs of osteoarthritis at a mean follow-up time of 9.9 years [10].
- Type I and III wrists in early rheumatoid arthritis had radiographic progression and ultimately underwent deformation [12].
- Combining traditional qualitative evaluation and quantitative measurements may improve the classification of wrist osteoarthritis [14].
- Radiographic signs of radioscapoid arthritis were often observed in patients with follow-up greater than 10 years after scaphocapitate arthrodesis for late stage Kienböck disease [17].
- Wrist radiographs demonstrate a 47% sensitivity and 94% specificity in predicting end-stage scaphotrapezoid joint arthritis in patients with end-stage carpometacarpal arthritis of the thumb base [25].
- Signal changes in the flexor carpi radialis are infrequent and often incidental or associated with peritrapezial osteoarthritis [27].
- Radiocarpal joint injection of corticosteroid within 2 weeks of an intra-articular distal radius fracture does not appear to affect the development of post-traumatic osteoarthritis within 2 years follow-up in a small pilot cohort [28].
- Radiological evaluation showed normal radiocarpal angles, volar tilt, and radial length in patients treated arthroscopically for scapholunate ligament lesions associated with intra-articular distal radius fractures [67].
- The presence of radiological arthritis and static carpal instability did not cause reduced function at a minimum follow-up of 10 years in perilunate dislocations and transscaphoid perilunate fracture–dislocations [68].
- Preoperative radiographs did not correlate well with intraoperative findings, often underestimating degenerative changes at the radiolunate joint in proximal row carpectomy versus scaphoid excision and intercarpal arthrodesis [69].
- Long-term studies are needed to confirm clinical benefits and radiographic signs of radioscapoid arthritis [70].
- Wrist denervation resulted in improvement in pain scores in 39 patients despite radiological deterioration noted in 34 after 6 years [71].

- Postoperative progressive changes at the radiocarpitate articulation have been documented after proximal row carpectomy, yet these changes tend to remain asymptomatic [73].

## Treatment

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- Osteoarthritis of the hand and wrist requires an individualized approach to treatment strategies based on site-specific diagnoses and varying disease manifestations [1].
- Initial treatment for hand manifestations of osteoarthritis is medical, with many patients doing well with splinting and hand therapy [8].
- Surgical management of wrist arthritis remains a controversial issue, but proximal row carpectomy has gained recent support and its incidence has increased, even in patients under 45 years old [16].
- In most scenarios there is no single preferred option for wrist osteoarthritis [5].
- The choice of procedure for scaphotrapeziotrapezoidal joint osteoarthritis depends on whether the joint is isolated or associated with carpal malalignment and other joint osteoarthritis [7].
- Removal of the trapezium as treatment for basal thumb osteoarthritis does not increase the risk of developing wrist osteoarthritis in the long term [11].
- Preexisting OA in the wrist or CMC does not seem to impact outcomes of distal radius fractures, regardless of treatment, age, or sex [15].
- Both wrist arthrodesis and wrist arthroplasty were effective at alleviating pain and improving grip strength, with comparable complication rates of 17% and 19% respectively [13].
- Arthroplasty should be used as an alternative to arthrodesis in the treatment of posttraumatic wrist arthritis, given the proper patient selection and indications [18].
- Wrist arthroplasty provides functional mobility, improved strength, and reduced pain in carefully selected cases of severely destroyed wrist joints, though implant survival rates do not compare with hip and knee arthroplasties [26].
- Minimal arthroplasty may provide a temporary solution for active patients with symptomatic early wrist arthritis who are not candidates for salvage wrist surgery [62].
- Total wrist denervation is a reliable and reproducible surgical technique for pain relief and preservation of wrist function in painful osteoarthritis [19].
- Joint denervation deserves a place of choice in the surgical arsenal for osteoarthritis of the wrist and hand, provided new anatomical observations are integrated, the procedure is meticulous, and patients are informed that it is a symptomatic treatment [6].
- Wrist denervation was a viable salvage option for patients with symptomatic SLAC wrist osteoarthritis to preserve motion, decrease pain, and increase function with a low absolute failure rate at mid- to long-term follow-up [53].
- Limited wrist fusions are effective surgical procedures for providing pain relief while preserving motion of the wrist in patients with localized arthritis of the carpus [54].

- Radiocarpal fusion aims to alleviate pain and improve range of motion in patients with isolated radiolunate or radioscapholunate arthritis who have failed non-surgical treatment [63].
- Patients experienced good pain relief with preservation of wrist motion following proximal row carpectomy [58].
- Ulnar head replacement and sigmoid notch resurfacing arthroplasty provide a feasible option for distal radial ulnar joint arthritis, resulting in substantial improvements in pain and function over short-term follow-up [4].
- Patients with wrist arthritis who undergo surgery face higher risks of CTS and subsequent CTR than those managed conservatively [22].

## Complications

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- Wrist alignment maintenance after corrective osteotomy for distal radius malunion is associated with 13 patients presenting mild to moderate symptomatic wrist arthritis [2].
- Effective reduction and radiocarpal stabilization, along with the absence of radial and intracarpal marginal fractures, are associated with good functional outcomes and absence of osteoarthritis in radiocarpal dislocations and fracture-dislocations [3].
- Midcarpal arthritis may develop after distal scaphoid resection for degenerative arthritis secondary to scaphoid nonunion, but this did not cause appreciable deterioration in patient outcomes [9].
- 79% of patients with perilunate dislocation and fracture dislocation of the wrist showed radiographic signs of osteoarthritis at a mean follow-up of 9.9 years [10].
- Both wrist arthrodesis and wrist arthroplasty have comparable complication rates of 17% and 19% respectively in patients with rheumatoid arthritis [13].
- Dorsal intercarpal ligament capsulodesis for chronic scapholunate instability results in ongoing scapholunate instability and early arthritic degeneration, though most patients maintain acceptable long-term function [20].
- Arthroplasty does not prevent the natural evolution to carpal collapse after a follow-up of 20 years, although this is clinically well tolerated [29].
- Patients with SLAC wrist are more likely to be male and have a history of trauma compared to patients with first CMC OA [30].
- Patients with established scaphoid nonunion should be advised that osteoarthritis will most likely develop [31].
- Avascular necrosis of carpal bones other than Kienböck disease is a rare cause of chronic wrist pain with a poorly understood natural history [66].

# Recovery

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- Surgical management of hand and wrist osteoarthritis requires an individualized approach based on site-specific diagnoses and varying disease manifestations [1].
- Wrist alignment is maintained over time following corrective osteotomy for distal radius malunion, though 13 patients presented with mild to moderate symptomatic wrist arthritis [2].
- Good functional outcomes and absence of osteoarthritis after radiocarpal dislocations or fracture-dislocations are attributed to effective reduction, radiocarpal stabilization, and the absence of radial and intracarpal marginal fractures [3].
- Ulnar head replacement and sigmoid notch resurfacing arthroplasty provide substantial improvements in pain and function over short-term follow-up for distal radial ulnar joint arthritis [4].
- Midcarpal arthritis may develop after distal scaphoid resection for degenerative arthritis secondary to scaphoid nonunion, but it does not cause appreciable deterioration in patient outcomes [9].
- 79% of patients with perilunate dislocation or fracture dislocation show radiographic signs of osteoarthritis at a mean follow-up of 9.9 years [10].
- Both wrist arthrodesis and wrist arthroplasty are effective at alleviating pain and improving grip strength in patients with rheumatoid arthritis [13].
- Wrist arthrodesis and wrist arthroplasty have comparable complication rates of 17% and 19%, respectively, in patients with rheumatoid arthritis [13].
- Radiographic signs of radioscapoid arthritis are often observed in patients with scaphocapitate arthrodesis for late-stage Kienböck disease when follow-up is greater than 10 years [17].
- Ongoing scapholunate instability after dorsal intercarpal ligament capsulodesis results in early arthritic degeneration, yet most patients maintain acceptable long-term wrist function [20].
- The evolution of wrist arthroplasty, particularly with modular systems like the Motec prosthesis, represents a significant shift in managing advanced wrist arthritis driven by advancements in materials, surgical techniques, and patient selection [23].
- Uncemented total wrist arthroplasty can provide long-lasting unrestricted hand function in young and active patients over five- to 10-year follow-up [24].
- Total wrist arthroplasty does not prevent natural evolution to carpal collapse after 20 years of follow-up, though this progression is clinically well tolerated [29].
- Patients with SLAC wrist are more likely to be male and have a history of trauma compared to patients with first carpometacarpal osteoarthritis [30].
- Four-corner arthrodesis with a dorsal locking plate significantly reduces pain and improves wrist function compared with preoperative status at a mean follow-up of 6 years [51].
- Functional results remain good at long-term follow-up after 4-corner fusion for SLAC and SNAC wrist, despite radiographic changes in the radiolunate joint in 73% of patients [52].
- Total wrist arthroplasty can survive over many years in the rheumatoid wrist, with patients remaining nearly pain-free and retaining moderate motion [56].

- A symptomatic nonunion of the scaphoid is significantly likely to progress to osteoarthritis according to a predictable sequence, worsening both radiographically and clinically with time [72].
- The reduction and association of the scaphoid and lunate procedure should be abandoned due to early radiographic failure in the majority of patients in the short term, despite relatively low outcomes measures scores [74].

## Key Evidence

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- [L5] Osteoarthritis of the hand and wrist requires an individualized approach to treatment strategies based on site-specific diagnoses and varying disease manifestations. ([10.1016/j.jht.2022.01.001](#))
- [L4] Wrist alignment was maintained over time but 13 patients presented mild to moderate symptomatic wrist arthritis. ([10.1177/1753193409357373](#))
- [L4] Good functional outcomes and absence of osteoarthritis can be attributed to effective reduction and radiocarpal stabilization, along with the absence of radial and intracarpal marginal fractures. ([10.1016/j.otsr.2017.12.016](#))
- [L4] Over short-term follow-up, the procedure provides a feasible option for distal radial ulnar joint arthritis, resulting in substantial improvements in pain and function. ([10.1177/1753193419850116](#))
- [L5] Despite advancements in management, in most scenarios there is no single preferred option for wrist osteoarthritis. ([10.1177/17531934241296758](#))
- [L5] Joint denervation deserves a place of choice in the surgical arsenal for osteoarthritis of the wrist and hand, provided new anatomical observations are integrated, the procedure is meticulous, and patients are informed that it is a symptomatic treatment. ([10.1016/j.otsr.2021.102986](#))
- [L5] The choice of procedure depends on whether the joint is isolated or associated with carpal malalignment and other joint osteoarthritis. ([10.1177/17531934241295345](#))
- [L5] The hand manifestations of osteoarthritis can be debilitating, with initial treatment being medical and many patients doing well with splinting and hand therapy. ([10.1016/j.hcl.2010.09.003](#))
- [L4] Midcarpal arthritis, which may develop after the procedure, did not cause appreciable deterioration in patient outcomes. ([10.1016/j.jhsa.2014.05.031](#))
- [L4] The mean follow-up time was 9.9 years, with 79% of patients showing radiographic signs of osteoarthritis. ([10.1016/j.otsr.2022.103332](#))
- [L3] Removal of the trapezium as treatment for basal thumb osteoarthritis does not increase the risk of developing wrist osteoarthritis in the long term. ([10.1186/s13018-021-02856-x](#))
- [L2] Type I and III wrists had radiographic progression and ultimately underwent deformation. ([10.1016/j.jhsa.2009.01.016](#))
- [L2] Both wrist arthrodesis and wrist arthroplasty were effective at alleviating pain and improving grip strength, with comparable complication rates of 17% and 19% respectively. ([10.1177/1753193420953683](#))

- [L4] Combining traditional qualitative evaluation and quantitative measurements may improve the classification of wrist osteoarthritis. ([10.1177/1753193416669261](https://doi.org/10.1177/1753193416669261))
- [L2] Surgical management of wrist arthritis remains a controversial issue, but proximal row carpectomy has gained recent support and its incidence has increased, even in patients under 45 years old. ([10.1016/j.jhsa.2023.11.009](https://doi.org/10.1016/j.jhsa.2023.11.009))
- [L4] However, radiographic signs of radioscaphoid arthritis were often observed in patients with follow-up greater than 10 years. ([10.1177/1753193413496177](https://doi.org/10.1177/1753193413496177))
- [L3] Arthroplasty should be used as an alternative to arthrodesis in the treatment of posttraumatic wrist arthritis, given the proper patient selection and indications. ([10.1016/j.jhsa.2013.02.013](https://doi.org/10.1016/j.jhsa.2013.02.013))
- [Paper] Total wrist denervation is a reliable and reproducible surgical technique for pain relief and preservation of wrist function in painful osteoarthritis. ([10.1016/j.otsr.2019.04.024](https://doi.org/10.1016/j.otsr.2019.04.024))
- [L3] Although the consequent ongoing scapholunate instability resulted in early arthritic degeneration, most patients had acceptable long-term function of the wrist. ([10.1302/0301-620x.94b12.30007](https://doi.org/10.1302/0301-620x.94b12.30007))
- [L4] A second and even a third operation can result in long-term pain improvement, good function and capacity for work, and we recommend re-operation in symptomatic cases with minor osteoarthritis of the wrist (SNAC stage 0 or 1). ([10.1177/1753193409346093](https://doi.org/10.1177/1753193409346093))
- [L2] Patients with wrist arthritis who undergo surgery face higher risks of CTS and subsequent CTR than those managed conservatively. ([10.1016/j.jhsa.2026.01.013](https://doi.org/10.1016/j.jhsa.2026.01.013))
- [L5] The evolution of wrist arthroplasty, especially with modular systems like the Motec, represents a significant shift in the management of advanced wrist arthritis, driven by advancements in materials, surgical techniques and patient selection. ([10.1177/17531934251406868](https://doi.org/10.1177/17531934251406868))
- [L4] An uncemented total wrist arthroplasty can provide long-lasting unrestricted hand function in young and active patients. ([10.1016/j.jhsa.2017.06.097](https://doi.org/10.1016/j.jhsa.2017.06.097))
- [L3] Wrist radiographs demonstrate a 47% sensitivity and 94% specificity in predicting end-stage ST joint arthritis, emphasizing the importance of directly visualizing the ST joint after trapeziectomy. ([10.1177/1558944718765246](https://doi.org/10.1177/1558944718765246))
- [L4] Wrist arthroplasty provides functional mobility, improved strength, and reduced pain in carefully selected cases of severely destroyed wrist joints, though implant survival rates do not compare with hip and knee arthroplasties. ([10.1016/j.hcl.2017.04.004](https://doi.org/10.1016/j.hcl.2017.04.004))
- [L3] Signal changes in the flexor carpi radialis are infrequent and often incidental or associated with peritrapezial osteoarthritis. ([10.1177/1558944718760033](https://doi.org/10.1177/1558944718760033))
- [L2] Radiocarpal joint injection of corticosteroid within 2 weeks of an intra-articular distal radius fracture does not appear to affect the development of post-traumatic osteoarthritis within 2 years follow-up in a small pilot cohort. ([10.1016/j.jhsa.2023.11.026](https://doi.org/10.1016/j.jhsa.2023.11.026))
- [L3] Patients with SLAC wrist were more likely to be male and have a history of trauma compared to patients with first CMC OA. ([10.1177/1558944718788672](https://doi.org/10.1177/1558944718788672))
- [L4] Patients with established scaphoid non-union should be advised that osteoarthritis will most likely develop. ([10.2106/00004623-198567030-00013](https://doi.org/10.2106/00004623-198567030-00013))

- [L2] Both surgical groups demonstrated decreased wrist kinematic motion and functional performance compared with individuals with normal wrists. ([10.1016/j.jhsa.2015.04.035](https://doi.org/10.1016/j.jhsa.2015.04.035))
- [L5] Wrist biomechanics were significantly altered following trapeziectomy, and of the reconstructions tested, LRTI most closely resembled the intact biomechanics in this cadaveric model. ([10.1016/j.jhsa.2019.10.003](https://doi.org/10.1016/j.jhsa.2019.10.003))
- [L5] Despite complex carpal bone anatomy and kinematics, computed fiber elongations were found to vary linearly with wrist position. ([10.1016/j.jhsa.2012.04.025](https://doi.org/10.1016/j.jhsa.2012.04.025))
- [L4] Rotational malalignment of the wrist has significant effects on carpal, distal radial and distal radioulnar joint measurements. ([10.1177/1753193408090393](https://doi.org/10.1177/1753193408090393))
- [L4] This study provides guidelines on how to measure and quantify carpal alignment three-dimensionally and establishes a database for normal values, which may be useful when analysing various wrist pathologies and kinematics. ([10.1177/17531934231160100](https://doi.org/10.1177/17531934231160100))
- [L4] The technique demonstrated reduced wrist pain and improved wrist motion and grip strength while restoring the integrity of the proximal carpal row. ([10.1177/17531934241238939](https://doi.org/10.1177/17531934241238939))
- [L4] In most patients, wrist function was improved and pain relief was obtained. ([10.1177/1753193413501730](https://doi.org/10.1177/1753193413501730))
- [L5] Wrist ROM within 20% extension and radial abduction to 50% flexion limits torque and lever force exacerbation between scaphoid fragments. ([10.1186/s13018-020-01897-y](https://doi.org/10.1186/s13018-020-01897-y))
- [L4] The study also characterized the modification of the wrist CoR during flexion and extension, noting that stability is considered more important than mobility in clinical conditions. ([10.1016/s0749-0712\(03\)00008-8](https://doi.org/10.1016/s0749-0712(03)00008-8))
- [L4] Our findings suggest that wrist arthrodesis may only compromise select wrist functions. ([10.1177/1558944715626930](https://doi.org/10.1177/1558944715626930))
- [L5] The ‘dart thrower’s motion’ of the wrist, from radial extension to ulnar flexion, may be a unifying concept of functional wrist motion that is uniquely human. ([10.5435/00124635-201001000-00007](https://doi.org/10.5435/00124635-201001000-00007))
- [L5] The study confirms that constant radiocarpal and midcarpal congruence during radioulnar deviation in normal wrists is no longer possible with intercarpal kinematic modifications after these arthrodeses. ([10.1177/17531934231176004](https://doi.org/10.1177/17531934231176004))
- [L4] Changes of the motion pattern of the lunate during radioulnar deviation and flexion-extension of the wrist after FCA can explain the shift of the centroid radially and dorsally. ([10.1016/j.jhsa.2014.11.028](https://doi.org/10.1016/j.jhsa.2014.11.028))
- [L4] SNAC wrists differ from SLAC wrists in exhibiting a decreased sagittal lunotriquetral angle, indicating a distinct pathomechanism of carpal instability. ([10.1186/s12891-025-08652-6](https://doi.org/10.1186/s12891-025-08652-6))
- [L5] The FBA wrist has significantly lower contact pressure, greater contact area, and equal contact translation compared with the PRC wrist. ([10.1016/j.jhsa.2012.05.040](https://doi.org/10.1016/j.jhsa.2012.05.040))
- [L4] At a mean follow-up of 6 years, pain was significantly reduced and wrist function was significantly improved compared with preoperative status. ([10.1177/1753193420930587](https://doi.org/10.1177/1753193420930587))
- [L4] Functional results were good at long-term follow-up despite radiographic changes in the radiolunate joint in 73% of patients. ([10.1177/1558944716681949](https://doi.org/10.1177/1558944716681949))

- [L4] This method of wrist denervation was a viable salvage option for patients with symptomatic SLAC wrist osteoarthritis to preserve motion, decrease pain, and increase function with a low absolute failure rate at mid- to long-term follow-up. ([10.1016/j.jhsa.2021.02.023](https://doi.org/10.1016/j.jhsa.2021.02.023))
- [L4] Although one has to take into account the short-term follow-up of 1 year, and the fact that the patient had rather low demands to his wrist, it is a technique to consider in similar cases. ([10.1177/1753193417752319](https://doi.org/10.1177/1753193417752319))
- [L3] Patients experienced good pain relief with preservation of wrist motion. ([10.1177/1753193415597096](https://doi.org/10.1177/1753193415597096))
- [L4] Radiographic classification of SLAC wrist has moderate reliability and reproducibility, whereas classification of SNAC wrist has limited reliability. ([10.1177/1753193413484629](https://doi.org/10.1177/1753193413484629))
- [L4] Reviewing multiview radiographs more commonly yielded Vender stage 3 osteoarthritis classification. ([10.1177/1558944720937359](https://doi.org/10.1177/1558944720937359))
- [L5] The procedure aims to alleviate pain and improve range of motion in patients with isolated radiolunate or radioscapolunate arthritis who have failed non-surgical treatment. ([10.1016/j.jhsa.2022.04.002](https://doi.org/10.1016/j.jhsa.2022.04.002))
- [L5] AVN of the carpal bones other than Kienböck disease is a rare cause of chronic wrist pain with a poorly understood natural history. ([10.1016/j.jhsa.2019.05.022](https://doi.org/10.1016/j.jhsa.2019.05.022))
- [L4] Radiological evaluation showed normal radiocarpal angles, volar tilt, and radial length in all patients. ([10.1007/s001670050172](https://doi.org/10.1007/s001670050172))
- [L4] The presence of radiological arthritis and static carpal instability did not cause reduced function at our minimum follow-up of 10 years. ([10.1016/j.jhsa.2009.09.003](https://doi.org/10.1016/j.jhsa.2009.09.003))
- [L4] Preoperative radiographs did not correlate well with intraoperative findings, often underestimating degenerative changes at the radiolunate joint. ([10.1016/j.jhsa.2014.03.032](https://doi.org/10.1016/j.jhsa.2014.03.032))
- [L4] Wrist denervation resulted in improvement in pain scores in 39 patients despite radiological deterioration noted in 34 after 6 years. ([10.1016/j.jhsa.2011.03.004](https://doi.org/10.1016/j.jhsa.2011.03.004))
- [L5] Postoperative progressive changes at the radiocapitate articulation have been documented, yet these changes tend to remain asymptomatic. ([10.1016/j.hcl.2012.08.022](https://doi.org/10.1016/j.hcl.2012.08.022))
- [L4] With a majority of patients experiencing early radiographic failure of the procedure in the short term, our experience suggests that the reduction and association of the scaphoid and lunate procedure should be abandoned despite the relatively low outcomes measures scores. ([10.1016/j.jhsa.2014.07.014](https://doi.org/10.1016/j.jhsa.2014.07.014))

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