American College of Radiology
ACR Appropriateness Criteria®

Clinical Condition: **Chronic Wrist Pain**

Variant 1: **With or without prior injury. No specific area of pain specified. Best initial study.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray wrist	9		Min
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Variant 2: **Routine radiographs normal or nondiagnostic. Next study.**

Radiologic Procedure	Rating	Comments	RRL*
MRI wrist	9	Most of the time, imaging is not required. If imaging is to be performed, this is the study of choice.	None
US wrist	1		None
INV biopsy/aspiration wrist	1		IP
CT wrist	1		Min
NUC bone scan targeted	1		Med
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Variant 3: **Suspect arthritis. Routine radiographs normal or nondiagnostic. Next study.**

Radiologic Procedure	Rating	Comments	RRL*
MRI wrist with contrast	4	Most of the time, imaging is not required. If imaging is to be performed this is the study of choice.	None
CT wrist	1		Min
INV biopsy/aspiration wrist	1		IP
NUC bone scan targeted	1		Med
US wrist	1		None
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Clinical Condition: **Chronic Wrist Pain**

Variant 4: **Arthritis on radiographs nondiagnostic on type, exclude infection. Next study.**

Radiologic Procedure	Rating	Comments	RRL*
INV biopsy/aspiration wrist	9		IP
MRI wrist	1		None
US wrist	1		None
CT wrist	1		Min
NUC bone scan targeted	1		Med
Rating Scale: 1=Least appropriate, 9=Most appropriate			***Relative Radiation Level**

Variant 5: **On ulnar side, suspect triangular fibrocartilage or lunotriquetral ligament tear. Radiographs normal. Next study.**

Radiologic Procedure	Rating	Comments	RRL*
INV arthrography wrist radiocarpal	9		IP
MRI wrist with contrast	9	Either MR arthrogram or MR routine is appropriate. Depends on availability.	None
MRI wrist without contrast	9	Either MR arthrogram or MR routine is appropriate. Depends on availability.	None
INV arthrography wrist tricompartmental	8	If original radiocarpal study is not positive or does not answer question, this is the next study.	IP
INV arthrography wrist midcarpal	1		IP
INV arthrography wrist bilateral	1		IP
X-ray wrist instability series	1		Min
CT wrist	1		Min
NUC bone scan targeted	1		Med
INV biopsy/aspiration wrist	1		IP
US wrist	1		None
Rating Scale: 1=Least appropriate, 9=Most appropriate			***Relative Radiation Level**

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Variant 6: **Radiographs normal. Suspect soft tissue tumor. Next study.**

Radiologic Procedure	Rating	Comments	RRL*
MRI wrist without contrast	9		None
MRI wrist with contrast	8	If routine MRI does not answer question, add contrast.	None
US wrist	7	US is often helpful in evaluating wrist masses as the very common fluid filled ganglion may be easily distinguished from a solid mass.	None
CT wrist	1		Min
NUC bone scan targeted	1		Med
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Variant 7: **Radiographs show positive ulnar variance and irregularity in proximal lunate articular surface. Next study.**

Radiologic Procedure	Rating	Comments	RRL*
MRI wrist	2		None
INV biopsy/aspiration wrist	2		IP
US wrist	2		None
NUC bone scan targeted	2		Med
INV arthrography wrist radiocarpal	2		IP
INV arthrography wrist midcarpal	2		IP
INV arthrography wrist tricompartmental	2		IP
INV arthrography wrist tricompartmental-bilateral	2		IP
CT wrist	2		Min
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Variant 8: **Radiographs normal or equivocal. Suspect Kienböck's disease. Next study.**

Radiologic Procedure	Rating	Comments	RRL*
MRI wrist	9		None
NUC bone scan targeted	2		Med
CT wrist	2		Min
US wrist	2		None
INV biopsy/aspiration wrist	2		IP
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Clinical Condition: **Chronic Wrist Pain**

Variant 9: **Kienböck's disease on radiographs. Next study.**

Radiologic Procedure	Rating	Comments	RRL*
CT wrist	5	Only if needed to assess degree of collapse and associated fractures.	Min
NUC bone scan targeted	1		Med
INV biopsy/aspiration wrist	1		IP
US wrist	1		None
MRI wrist	1		None
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Variant 10: **Pain for more than 3 weeks. Suspect occult fracture. Radiographs nondiagnostic. Next study.**

Radiologic Procedure	Rating	Comments	RRL*
MRI wrist	9		None
CT wrist	7	If hook of hamate is suspected, CT is study of choice.	Min
X-ray wrist carpal tunnel views	2	May be of value if obtained at time of original study.	Min
X-ray wrist additional views semipronational oblique	2	May be of value if obtained at time of original study.	Min
US wrist	1		None
NUC bone scan targeted	1		Med
INV biopsy/aspiration wrist	1		IP
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Variant 11: **Suspect Carpal tunnel syndrome.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray wrist	9		Min
MRI wrist	2	If mass is suspected or symptoms recur post surgery.	None
X-ray wrist carpal tunnel views	1		Min
US wrist	1		None
CT wrist	1		Min
NUC bone scan targeted	1		Med
INV biopsy/aspiration wrist	1		IP
INV arthrography wrist	1		IP
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Expert Panel on Musculoskeletal Imaging: Murray K. Dalinka, MD[1]; Richard H. Daffner, MD[2]; Arthur A. De Smet, MD[3]; George Y. El-Khoury, MD[4]; John B. Kneeland, MD[5]; B.J. Manaster, MD, PhD[6]; William B. Morrison, MD[7]; Helene Pavlov, MD[8]; David A. Rubin, MD[9]; Robert Schneider, MD[10]; Lynne S. Steinbach, MD[11]; Barbara N. Weissman, MD[12]; Robert H. Haralson III, MD.[13]

Summary of Literature Review

The role of imaging in chronic wrist pain has received much attention but remains controversial. There is considerable disagreement about which imaging study, if any, should be performed in a given situation. If one compares the radiologic literature to the orthopedic literature, the controversy becomes apparent.

Most physicians agree that the imaging evaluation of the painful wrist should begin with radiographs. This simple, relatively inexpensive study may establish a specific diagnosis in patients with arthritis, complications of injury, infection, some bone, or soft-tissue tumors, and occasionally in patients with wrist instability. The standard radiographic examination consists of PA and lateral views, and often an oblique view as well. Specific suspected problems may require additional views, e.g., PA in ulnar deviation to look for a scaphoid fracture. If the patient is suspected of having wrist instability, other views are often added to this routine. There is no universal or near-universal standard for this series, and it can consist of anything from PA views in radial and ulnar deviation to bilateral studies with multiple views of each wrist [1].

Fluoroscopy or video imaging is sometimes recommended to establish the diagnosis of dynamic wrist instability, and it has been suggested that it is a cost-effective method of making this diagnosis [2].

Bone scintigraphy has been used for the diagnosis of occult wrist fractures and also as a screening procedure in patients with wrist pain and negative radiographs. In these cases, a negative bone scan may obviate the need for further workup.

Wrist arthrography, utilizing a radiocarpal injection, was commonly used in the diagnosis of tears of the triangular fibrocartilage (TFC) and interosseous ligaments [3]. Many authors have replaced the standard radiocarpal wrist arthrogram with a three-injection technique, with injections into the radiocarpal, midcarpal, and distal radial-ulnar joints [4]. Some authors have advocated bilateral tricompartmental arthrography because bilateral intercarpal communications are not uncommon [5].

Recently, magnetic resonance imaging (MRI) has been advocated for patients with chronic wrist pain because it provides a global examination of both the osseous and soft-tissue structures [6]. It may be diagnostic in patients with TFC and intraosseous ligament tears, occult fractures, avascular necrosis (AVN), and miscellaneous other abnormalities [7]. It may aid in treatment planning for bone and soft-tissue tumors. Contrast-enhanced and dynamic MRI have been suggested in specific situations such as detecting erosions and their progression in rheumatoid arthritis [8]. Some investigators have used MR arthrography, both direct and indirect to detect ligamentous abnormalities of the wrist. Haims and Schweitzer [9] found that indirect MR arthrography was more sensitive than conventional MRI in detecting scapholunate abnormalities but did not improve sensitivity in detecting triangular fibrocartilage or lunatotriquetral tears.

A recent paper showed that immediate MRI for patients with possible occult wrist fractures with a modified screening protocol was nearly equivalent in cost to follow-up with delayed imaging [10]. This included the cost for orthopedic consultation and casting as well as additional follow-up with radiographs and in the orthopedic clinic. The loss of productivity resulting from casts and splints was excluded from the cost analysis.

Herneth et al [11] performed radiography, high-resolution ultrasound (US), and MRI on 15 consecutive patients with suspected scaphoid fractures. Of nine fractures, five were positive on radiograph, seven were positive on US and all nine were present on MRI.

MRI is helpful in diagnosing ulnar-sided pain caused by impaction syndromes [12]. It can differentiate between the impaction syndromes and also detect other causes of ulnar-sided pain including occult fractures and TFC tears.

Other authors used computed tomography (CT) post arthrography for diagnosing ligament injuries of the wrist and claimed that it increased precision without affecting the sensitivity or specificity of the diagnosis [13]. Zanetti et al [14] felt that MR arthrography increased the diagnostic performance of the examination.

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Tenography has a few advocates, but most authorities believe it has limited utility. CT can be used, particularly in the follow-up of complex fractures or distal radioulnar subluxations.

Many articles, particularly in the orthopedic literature, dispute the value of imaging in the diagnosis of ligamentous tears, because the authors believe that arthroscopy is more accurate and that treatment can be performed along with the diagnostic portions of the procedure [15-17]. To our knowledge, no outcome or cost analysis studies have been performed regarding the results of the various treatment regimens.

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