Aquilion ONE Clinical Evidence: Musculoskeletal

Four-dimensional CT Analysis of Wrist Kinematics during Radioulnar Deviation

Aymeric Rauch, Waled Abou Arab, François Dap, Gilles Dautel, Alain Blum, Pedro Augusto Gondim Teixeira

Radiology. 2018 Dec;289(3):750-758

- This paper demonstrated the benefits of 4DCT in MSK diagnosis and is the first study to show this quantitatively in a non-invasive low dose technique. 4D ortho software is used and all 3D images are rendered with Global Illumination

Single-shot CT after wrist trauma: impact on detection accuracy and treatment of fractures

Monique Brink, Arjan Steenbakkers, Micha Holla, Jacky de Rooy, Simon Cornelisse, Michael J. Edwards, Mathias Prokop

Skeletal Radiol. 2019 Jun;48(6):949-957

- Single-shot CT in patients with clinical suspicion of wrist injury increases accuracy of fracture detection. This has a significant impact therapy in this population, mainly on cast immobilization

Comparison between subtalar joint quantitative kinematic 4-D CT parameters in healthy volunteers and patients with joint stiffness or chronic ankle instability: A preliminary study

Pedro Augusto Gondim Teixeira, Anne-Sophie Formery, Gwenaël Balazuc, Guillaume Lux, Isabelle Loiret, Gabriela Hossu, Alain Blum

European Journal of Radiology 114 (2019) 76–84

- Quantitative analysis in 4D CT can provide an objective criteria for the differentiation between healthy volunteers and patients with subtalar joint stiffness and chronic ankle instability

Four-Dimensional Computed Tomography Scanning for Dynamic Wrist Disorders: Prospective Analysis and Recommendations for Clinical Utility

Renee Carr, Simon MacLean, John Slavotinek, Gregory I. Bain

J Wrist Surg. 2019 Apr;8(2):161-167

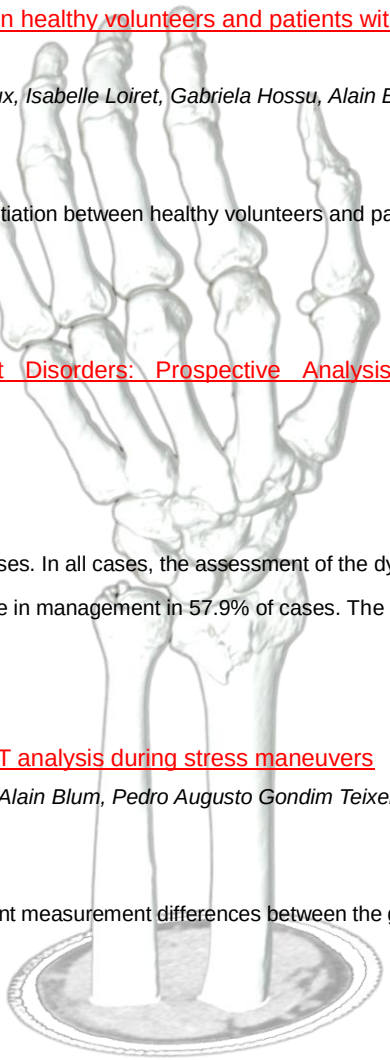
- Interpretation of the 4D CT scan changed the clinical diagnosis in 68.4% of cases. In all cases, the assessment of the dynamic wrist motion assisted in understanding the clinical problem and led to a change in management in 57.9% of cases. The mean effective radiation dose for the scan was 0.26mSv.

Scapholunate instability: improved detection with semi-automated kinematic CT analysis during stress maneuvers

Waled Abou Arab, Aymeric Rauch, Mohammad B. Chawki, Francois Dap, Gilles Dautel, Alain Blum, Pedro Augusto Gondim Teixeira

Eur Radiol. 2018 Oct;28(10):4397-4406

- Analysis of scapho-lunate dissociation using kinematic CT has shown significant measurement differences between the groups with or without scapholunate instability with good diagnostic performance.



Quantitative Analysis of Subtalar Joint Motion With 4D CT: Proof of Concept With Cadaveric and Healthy Subject Evaluation

Gondim Teixeira P, Formery A-S, Jacquot A, Lux G, Loiret I, Perez M, Blum A

AJR Am J Roentgenol. 2017 Jan;208(1):150-158

- Quantitative dynamic CT of the subtalar joint can provide a detailed analysis of joint motion, supporting its potential role in the evaluation of subtalar instability. Utilizes the 4D Ortho application

CT of hip prosthesis: New techniques and new paradigms

A. Blum, J.-B. Meyer, A. Raymond, M. Louis,O. Bakour, R. Kechidi, A. Chanson, P. Gondim-Teixeira

Diagnostic and Interventional Imaging, 2016, ePub

- Based on our experience, computed tomography (CT) is the cornerstone for diagnosing the main prosthesis-related complications. In this article, we describe the different CT techniques used for this kind of investigation and provide indications for each technique.

Developments in imaging methods used inhip arthroplasty: A diagnostic algorithm

A. Blum, P. Gondim-Teixeira, E. Gabiache,O. Roche, F. Sirveaux, P. Olivier, H. Coudane, A. Raymond, M. Louis, M. Grandhaye, J.-B. Meyer, D. Mainard, D. Molé

Diagnostic and Interventional Imaging, 2016, ePub

- Excellent summary of the current techniques used in imaging hip arthroplasty including SEMAR and subtraction

Evidence-based recommendations for musculoskeletal kinematic 4D-CT studies using wide area-detector scanners: a phantom study with cadaveric correlation

Gondim Teixeira Pedro Augusto; Formery Anne-Sophie; Hossu Gabriela; Winninger Daniel; Batch Toufik; Gervaise Alban; Blum Alain

European Radiology, 2016, Epub.

- This paper describes evidence based recommendations for performing 4D-CT in musculoskeletal examinations. Recommendations are made based on phantom and cadaveric data.

Characterization of patellar maltracking using dynamic kinematic CT imaging in patients with patellar instability

Tanaka Miho J.; Elias John J.; Williams Ariel A.; Demehri Shadpour; Cosgarea Andrew J.

Knee Surgery, Sports Traumatology, Arthroscopy, 2016, EPub.

- Dynamic CT showed several patellar maltracking patterns in patients with patellar instability. Incorporation of this approach of objectively quantifying maltracking patterns is recommended in the evaluation of patellofemoral instability.

Wide field of view computed tomography and mid carpal instability : The value of the sagittal radius – lunate – capitate axis – Preliminary experience

Repse S, Koulouris G, Troupis J

European Journal of Radiology, 2015; 84:908–914

- 4D CT has provided a unique insight into motion disorders. This improved assessment of wrist motion disorders has highlighted sufficient differences in the dynamic CT classifications we have described and suggests that further research may result in refinement of the MCI classification system

Evaluation of piso-triquetral motion pattern using four-dimensional CT: initial clinical experience in asymptomatic wrists

S. Demehri, N. Hafezi-Nejad, U. Thakur, J.N. Morelli, S.D. Lifchez, K.R. Means, J.T. Shores

Clinical Radiology, 2015, 70(12):1362-9

- PT joint kinematics in asymptomatic wrists demonstrates an increase in AP interval and CC excursion during wrist flexion. MPR techniques provide good inter observer agreements for AP interval measurements. The reported intervals for asymptomatic joints can be used as a reference for asymptomatic wrists.

Musculoskeletal wide detector CT: Principles, techniques and applications in clinical practice and research

Pedro Augusto Gondim Teixeira, Alban Gervaise, Matthias Louis, Sophie Lecocq, Ariane Raymond, Sabine Aptel, Alain Blum

European Journal of Radiology, 2015, 84(5):892-900

- This article offers a practical guide for the use of these tools including acquisition protocol, post-processing options and data interpretation based on 7 years of clinical experience in a tertiary university hospital

Wide field of view CT and acromioclavicular joint instability: A technical innovation

David R Dyer, John M Troupis and Afshin Kamali Moaveni

Journal of Medical Imaging and Radiation Oncology, 2015, ePub ahead of print

- Wide field of view dynamic CT (4D CT) is an accurate and quick modality to diagnose complex acromioclavicular joint injury. It provides dynamic information that no other modality can; 4D CT shows future benefits for clinical approach to diagnosis and management of acromioclavicular joint injury, and other musculoskeletal pathologies.

Four-dimensional computed tomography scans facilitate preoperative planning in snapping scapula syndrome

Simon N. Bell, John M. Troupis, David Miller, Tjarco D. Alta, Jennifer A. Coghlan, Malin D. Wijeratna

J Shoulder Elbow Surg (2015) 24, e83-e90

- The 4D CT scan images defined pathology well in patients with snapping scapula syndrome and improved assessment of the amount and location of the scapular bone and soft tissue causing symptoms.

Four-dimensional computed tomography and detection of dynamic capitate subluxation.

Stephen E Repse, Benjamin Amis and John M Troupis

Journal of Medical Imaging and Radiation Oncology, 2014, ePub ahead of print

- 4D CT investigation of all functional carpal instability syndromes may be beneficial as this technique has the potential to significantly increase our knowledge of dynamic carpal bone abnormalities.

Dynamic motion analysis of dart throwers motion visualized through computerized tomography and calculation of the axis of rotation

Edirisinghe Y.; Troupis J. M.; Patel M.; Smith J.; Crossett M.

Journal of Hand Surgery (European Volume), 2014, 39(4):364-72

- This article describes the power of dynamic volume CT in visualizing the interactions of the bones of the wrist while undergoing the so-called Dart Throwers Motion. They were able to describe the interactions among several of the bones in the wrist including the lunate-capitate hinge, the trapezium-trapezoid motion arc, the hamate-triquetrum motion, and the calculation of the DTM axis of rotation.

Dynamic evaluation of pisotriquetral instability using 4-dimensional computed tomography.

Demehri S, Wadhwa V, Thawait GK, Fattahi N, Means KR, Carrino JA, Chhabra A.

J Comput Assist Tomogr. 2014 Jul-Aug;38(4):507-12

- The authors describe wrist pathology could only be diagnosed by using 4D-CT during kinematic motion and that there was no corresponding pathology using static imaging (CT, MRI). Due to AIDR 3D the effective dose was far below sub mSv.

Four-dimensional Computed Tomography and Trigger Lunate Syndrome

Troupis John M; Amis Benjamin

Journal of Computer Assisted Tomography, 2013, 37(4):639-43

- This case report demonstrates in an excellent way that the Aquilion ONE is superior to any other modality. With an easy to use approach the patient has a real benefit from this technique.

Real time visualization of femoroacetabular impingement and subluxation using 320-slice computed tomography

Wassilew Georgi I; Janz Viktor; Heller Markus O; Tohtz Stephan; Rogalla Patrik; Hein Patrick; Perka Carsten

Journal of Orthopaedic Research, 2013, 31(2):275-81

- This paper describes the dynamic CT evaluation of thirty patients with clinical and radiological evidence of femoroacetabular impingement (FAI). The group used helical and 4D dynamic volume CT acquisitions to access and plan surgical intervention. They demonstrate outstanding correlation of their dynamic imaging findings with the surgical discoveries. The image acquisition and analysis techniques are well described, and the clinical utility of the technique is unmistakably clear.

Kinematic " 4 Dimensional " CT Imaging in the Assessment of Wrist Biomechanics Before and After Surgical Repair

Shores Jaimie T; Demehri Shadpour; Chhabra Avneesh

ePlasty, 2013

- The paper investigates the utility of 4D MSK CT of the wrist in patients pre and post-surgery. The numbers of wrists studied is low (n=6 with one normal volunteer) but they were all extensively examined using 15-20 seconds of scan time over 5 different motions.

The new 4-dimensional computed tomographic scanner allows dynamic visualization and measurement of normal acromioclavicular joint motion in an unloaded and loaded condition.

Alta Tjarco D; Bell Simon N; Troupis John M; Coghlan Jennifer; Miller David

Journal of Computer Assisted Tomography, 2012, 36(6):749-54

- This paper describes the value of dynamic volume CT in accurately depicting acromio-clavicular joint motion under load. Radiation dose is low at 2.5 to 3.5 mSv. 16 asymptomatic volunteers were imaged making this a baseline study to compare motion in symptomatic patients.

Using the 320-Multidetector computed tomography scanner for four-dimensional functional assessment of the elbow joint

Goh YP, Lau KK.

Am J Orthop., 2012, 41(2):E20-4

- Case study clearly demonstrating the use of Aquilion ONE for dynamic imaging of joint motion. The case describes malunion of a supracondylar fracture of the distal humerus with associated osteophytes which are causing a decreased range of motion and pain.

Dynamic four-dimensional 320 section CT and carpal bone injury d A description of a novel technique to diagnose scapholunate instability

Halpenny D; Courtney K; Torreggiani W C

Clinical Radiology, 2012, 67(2):185-7

- Single case study example of the use of dynamic CT for imaging of the wrist. Clear description of the advantages of Aquilion ONE. Described the scan technique and the radiation dose is included.