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EDITORIAL COMMENTARY

Diffusion-weighted MR in chronic periaortitis, a new technique has entered the clinical arena

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Chronic periaortitis (CP), also known as retroperitoneal fibrosis, is characterized by the presence of fibro-inflammatory tissue within the retroperitoneum abutting the aorta and iliac arteries that may extend to involve adjacent retroperitoneal structures [1]. Although a rare condition, CP is associated with significant morbidity, including urinary obstruction as well as arterial and venous compromise. While serum inflammatory markers such as erythrocyte sedimentation rate and C-reactive protein are useful in supporting the initial diagnosis of CP, they are nonspecific and may not be reliable in monitoring disease activity over the course of treatment [2]. Treatment monitoring is of importance in this population, particularly to determine the length and dose of steroid therapy. Thus, vascular imaging plays a critical in initial diagnosis and especially treatment monitoring in CP patients. Given its ability to assess metabolic activity via 18F-Fluorodeoxyglucose (18F-FDG) uptake, positron emission tomography (PET) has shown to be useful in CP diagnosis and treatment [3, 4]. The value of PET in aortic disease has been demonstrated in the setting of acute aortic syndromes and atherosclerotic disease [5–7]. Disadvantages of PET include radiation exposure, the logistics surrounding radiotracer administration, and limited availability.

Recently, MRI has been increasingly investigated as an alternative to PET in the evaluation of CP both in the initial diagnosis and in treatment follow-up [8]. Both contrast-enhanced and non-contrast methods utilizing diffusion weighted imaging (DWI) have shown promise in monitoring treatment response in CP patients [9, 10]. However, while both PET and MRI have shown success in CP diagnosis and treatment monitoring, head-to-head studies are lacking. The study by Kamper et al. [11] published in this issue of The International Journal of Cardiovascular Imaging is one of the first studies of its kind to compare both modalities in the evaluation of CP before and after treatment. Therefore, the authors of this study published in the current issue of The International Journal of Cardiovascular Imaging ought to be congratulated. In this study the authors demonstrate a significant decrease in apparent diffusion coefficient (ADC) post-treatment and a strong, statistically significant negative correlation as expected between ADC and standardized uptake values – max values, which supports that lower ADC values are associated with increased inflammatory activity. These findings suggest that MRI with DWI is useful in follow-up of CP with similar diagnostic performance compared to PET. This study adds nicely to the growing body of literature regarding the strengths of MRI in CP follow-up. Namely, the principle strengths of MRI in this setting include the lack of ionizing radiation as well the potential absence of intravenous contrast administration through the utilization of DWI (although contrast was used in in this study to confirm extent of disease). The lack of ionizing radiation should not be overlooked as these patients are subject to repeat follow-up scans to track treatment progress.

While studies like this demonstrate the value of MRI relative to PET in CP patients, another modality, contrast enhanced ultrasound (CEUS), deserves attention in this context. CEUS has shown utility in a growing number of vascular applications, both in aortic and non-aortic pathologies [12, 13]. CEUS has recently been described in monitoring treatment response in CP by monitoring periaortic tissue enhancement patterns representing adventitial vasa vasorum and reactive inflammatory changes [14]. In CP patients, aortic wall thickening and associated inflammatory tissue can be identified at grayscale ultrasound with enhancement of the peri-aortic tissue appreciated after contrast administration.

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Like MRI, CEUS could potentially offer a radiation-free alternative to following-up these patients during steroid treatment while not subject to contrast contraindications as CT and MR agents as the contrast agents from CEUS are excreted via the respiratory tract and therefore not nephrotoxic [13]. While current limitations of CEUS include limited availability and reduced image quality in certain settings (i.e. body habitus, bowel gas), experience with this technique is continuously growing.

Currently, no established guidelines exist regarding an imaging algorithm in CP patients, both for initial diagnosis but particularly related to the follow-up setting. A main limitation of the study by Kamper et al. and other published vascular imaging studies in this cohort of patients are the relatively limited samples sizes, which is due in part to the relatively low incidence of CP. Larger-scale multicenter prospective studies are needed comparing the major imaging modalities used in the CP cohort, namely MRI, CEUS, and PET. Furthermore, future work should also examine the ability of imaging to predict clinical outcomes by pursuing superior risk stratification of CP patients as well as cost effectiveness. As this information comes to light, more standardized and precise guidelines can be created in the near future with regard to CP diagnosis and follow-up.

Compliance with ethical standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical approval This editorial comment is compliant with ethical standards.

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