Editorial

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Unlocking hidden clues: how ultrasound is transforming gout

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The usefulness of ultrasound (US) in diagnosing and managing crystal-induced arthropathies, especially gout, has become increasingly important in recent years. US stands out for its non-invasiveness, cost-effectiveness, and ability to provide immediate results. These attributes make it an ideal choice for both initial assessment and ongoing monitoring of patients. The integration of US in current clinical practice has remarkably increased in gout, particularly since it was included in the last recommendations for gout classification and diagnosis [1,2]. In the absence of microscopic evidence of synovial fluid crystals (the gold standard diagnostic test), US has proven highly valuable for gout diagnosis, allowing identification of urate deposition, through the detection of the double contour sign at cartilage surface and the presence of tophi [3].

In 2023, European Alliance of Associations for Rheumatology (EULAR) published the recommendations on imaging in diagnosis and management of crystal-induced arthropathies in clinical practice [4], which strongly advocate for the use of US in diagnosing gout, given its high specificity and sensitivity, as well as for monitoring inflammation and crystal deposits. In addition, they also underscore the importance of US in guiding therapeutic interventions and improving patient education. For instance, US can effectively identify tophaceous deposits and joint effusions, thus facilitating precise aspiration and injection procedures. This aspect is particularly beneficial in managing acute gout flares and in planning long-term urate-lowering therapy.

A few months later, EULAR conducted a systematic literature review to inform its recommendations for the use of imaging in crystal-induced arthropathies in clinical practice [5]. Regarding gout, this review found 23 studies supporting the diagnostic value of US, 12 supporting the ability of US for monitoring inflammation, damage and crystal deposition, and none supporting its ability to predict disease severity outcome. Additionally, they found three studies endorsing for the ability of US to predict treatment effect. Most of these studies were published after 2010. Overall, the majority of studies assessing US diagnostic utility reported a sensitivity and specificity of at least 80%. However, when US features were restricted to the double-contour sign, the number of studies reporting such high sensitivity dramatically reduces. This might suggest that examining additional US features (like tophi, erosions and synovitis) could increase sensitivity while maintaining high specificity. Furthermore, the review found no published studies regarding imaging-guided intra- or periarticular procedures or the use of imaging to improve patient education.

But what about the structural changes that produce pain in gout flares? Are there any US changes that correlate with pain? The 2023 EULAR recommendations for the use of imaging in crystal-induced arthropathies clearly stated that the presence of imaging evidence of crystal depositions may not always be related to clinical manifestations [4].

The current issue of Med Ultrason includes an interesting study titled *"The usefulness of ultrasound in identifying the underlying findings linked to pain in podagra patients"* by Du et al [6]. The study highlights the pivotal role of US in elucidating the pathological substrates of pain in gout patients. Podagra, characterized by acute and severe pain in the first metatarsophalangeal joint, according to the authors, remains a clinical challenge due to its

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episodic nature and the variability in pain presentation among patients. Traditional diagnostic modalities such as clinical assessment and biochemical markers often fall short in accurately capturing the severity and underlying causes of pain in podagra. In this context, the study by Du et al provides a valuable contribution by demonstrating how US, a non-invasive and readily accessible imaging technique, can bridge this gap. The study enrolled 205 patients and conducted a detailed US examination of the affected joint. The findings underscored that US features such as synovial thickness and color Doppler (CD) signals of both the synovium and tophi were significantly associated with pain intensity. These features, which actually denotes inflammation, were the only independent factors related to pain [6]. This perspective is useful for developing individualized treatment strategies, including intra-articular therapy, that precisely target the underlying inflammation and structural changes rather than focusing on symptom relief.

The clinical implications of these findings are significant. By incorporating US into the diagnostic and management pathways, clinicians can achieve a clearer understanding of the disease process, and also offer a patient-centered approach to gout management. This is particularly important in gout flares, where pain is the predominant symptom but can be difficult to quantify and assess accurately. By providing real-time, non-invasive evaluation, US allows clinicians to identify the underlying causes of pain more precisely, providing an objective measure that can complement patient-reported outcomes and biochemical markers. This can also enhance shared decision-making, as patients are able to better understand their condition through visual evidence, promoting adherence to treatment plans.

Looking to the future, there are several areas where further research and development are needed. One key area is understanding the relationship between US-detected changes and the clinical aspect and progression of gout. Investigating how these features correlate with pain intensity and clinical outcomes could improve our knowledge of their role in disease severity. Additionally, further studies are needed to assess the effectiveness of US-guided interventions in managing gout flares and improving patient outcomes. Finally, expanding research on the impact of using US (particularly US features related to pain) for patient education could improve adherence to treatment and lead to better patient outcomes.

To conclude, the integration of US in the diagnostic and therapeutic pathways of gout and other crystal-induced arthropathies represents a significant advancement in rheumatology. The current issue's featured study not only reinforces the clinical utility of US, but also highlights its potential in improving patient outcomes through precise and early intervention. As we continue to refine imaging techniques and protocols, the role of US will undoubtedly expand, offering deeper understanding of the pathophysiology of gout and enhancing the quality of care for patients affected by this potentially debilitating condition.

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