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THU0542

THE IMPACT OF GLUCOCORTICOID INITIATION ON THE DIAGNOSTIC ACCURACY OF ULTRASOUND IN GIANT CELL ARTERITIS: EXPERIENCES FROM A DISTRICT GENERAL HOSPITAL IN THE UK

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Background: Temporal and axillary artery ultrasound (US) has been recommended by EULAR as the first-line investigation in patients with suspected giant cell arteritis (GCA).¹ US is reported as having a 77% sensitivity and 96% specificity for GCA.¹ However, these figures have largely been derived from studies carried out in specialist centres where US was performed rapidly following the onset of symptoms. When performed by highly experienced sonographers, halos can still be detected on US weeks after initiation of glucocorticoid treatment.² Little is known about the relationship between the dose and duration of glucocorticoid and diagnostic accuracy of US in real-world experience.

Objectives: We evaluated the impact of glucocorticoid initiation on the diagnostic accuracy of US in patients with suspected GCA in routine clinical practice in a district general hospital.

Methods: This is a single-centre retrospective study of all temporal and axillary artery US performed since its inception in November 2015 until October 2019. Patients who were aged ≥ 50 years and assessed by a rheumatologist were included in the study. US was performed by either a musculoskeletal consultant radiologist, musculoskeletal sonographer or vascular sonographer. US was considered positive for GCA when a halo, occlusion or stenosis was seen. Patients' medical records and investigation results were reviewed in a systematic manner. The reference standard for GCA was the final clinical diagnosis after a minimum of 3-month rheumatology follow up.

Results: 311 US performed on 305 patients were included. 62% of the scans were requested by rheumatologists, the rest by ophthalmologists and general physicians. 57 of these episodes had a final clinical diagnosis of GCA. US had an overall sensitivity of 39% and specificity of 100% for GCA. Overall positive and negative predictive values were 100% and 88%, respectively. Sensitivity was 31% for US done in the first 2 years (n=160) which was lower than sensitivity of 45% in the latter 2 years (n=151) ($p=0.2663$). Specificity remained the same in the two periods. When performed on patients who were not on any glucocorticoids, US had a sensitivity of 89% which was significantly higher than sensitivity of 29% in those who had been treated with any dose or duration of steroids ($p=0.0007$).

Compared to US-negative GCA patients, US-positive GCA patients are older and more likely to have jaw claudication (Table 1).

Table 1 Characteristics of patients with a final clinical diagnosis of GCA

	All GCA (n=57)	US positive (n=22)	US negative (n=35)	p-value
Age, mean years	74	78	72	0.01
Sex, no of females	41 (72%)	13 (59%)	27 (77%)	0.15
Any head pain present, no of patients	49 (86%)	18 (82%)	31 (89%)	0.50
Jaw claudication, no of patients	26 (46%)	15 (68%)	14 (40%)	0.04
Ocular ischaemia, no of patients	8 (14%)	3 (14%)	5 (14%)	0.94
ESR, mm/hour,* mean	67	66	68	0.78
CRP, mg/L,* mean	85	85	84	0.96
Days of high-dose glucocorticoid pre-US, mean	5	4	6	0.11

* ESR was determined in n=55 patients and CRP in n=53 patients. ESR and CRP were measured before initiation of high-dose steroid treatment.

Table 2 Diagnostic accuracy of US stratified by duration of high dose glucocorticoid* pre-scan

Steroid duration	n	Sensitivity, %	Specificity, %	PPV, %	NPV, %
0-1 day	154	71	100	100	97
2-3 days	34 [†]	22	100	100	77
4-5 days	32 [†]	33	100	100	79
6-7 days	18	13	100	100	59
>7 days	41	33	100	100	72

* >30mg of oral prednisone or equivalent

[†] included episodes when patients were treated with intravenous methylprednisone

Conclusion: US has an 89% sensitivity and 100% specificity for GCA when performed before initiation of glucocorticoid. Its sensitivity rapidly decreases within a day of starting high dose steroid but up to one-third of GCA cases can still be detected after over 1 week of treatment.

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THU0544

MULTIMODAL PHOTOACOUSTIC/ULTRASONIC IMAGING SYSTEM: A NEW IMAGING METHOD FOR EVALUATING RA

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Background: Photoacoustic imaging (PAI), a new imaging technique which can be integrating with ultrasound (US) imaging, has shown potential in visualizing small joints. We have developed a multimodal photoacoustic/ultrasound (PA/US) imaging system, equipped with a handheld probe, which can provide dual-wavelength PA/US imaging to identify the micro-vessels of the inflamed articular regions and measure the oxygenation level of human inflamed synovium.

Objectives: To validate the potential value for RA of the imaging system.

Methods: A total of 32 RA patients received PA/US examination on seven small joints (MCP2, MCP3, PIP2, PIP3, MTP2, MTP5, and wrist of the clinically dominant side). The 0-3 score was used to semi-quantify the PA and PD signals of the inflammatory articular lesions, and the sums of PA and PD scores (PA-sum and PD-sum) were utilized. The relative oxygen saturation (SO₂) values of the inflamed regions were measured by calculating the ratio of PA signals at the wavelength of 750nm and 830nm. All the patients were classified to 3 PA+SO₂ patterns (Pattern 1: no or minimal PA signals; Pattern 2: evident PA signals and hyperoxia; Pattern 3: evident PA signals and hypoxia). The correlations between imaging scores and laboratory data, as well as clinical scoring systems were assessed.

Results: A total of 32 patients of RA were recruited aged from 25-71 years-old were examined. PD-sum had moderate correlation with the clinical scores ($r=0.529, 0.546, 0.490, 0.493$ for DAS28ESR, DAS28CRP, SDAI, CDAI), moderate correlations with TJC ($r=0.575$) and SJC ($r=0.491$), fair correlation with VAS ($r=0.239$), poor correlation with PGA ($r=0.153$), and moderate correlation with EGA ($r=0.457$). The PA-sum had substantial correlations with the clinical scores ($r=0.699, 0.746, 0.723, 0.736$ for DAS28ESR, DAS28CRP, SDAI, CDAI), substantial correlations with TJC ($r=0.787$) and SJC ($r=0.694$), moderate correlations with VAS ($r=0.544$) and PGA ($r=0.529$), and substantial correlation with EGA ($r=0.708$).

Ten patients were classified as Pattern 1, 12 as Pattern 2, 9 as Pattern 3. The PA+ SO₂ patterns presented substantial correlations with the clinical scores (DAS28ESR $r=0.690$, DAS28CRP $r=0.782$, SDAI $r=0.805$, CDAI $r=0.799$, SJC $r=0.647$, TJC $r=0.676$, respectively), substantial correlation with VAS ($r=0.714$), and moderate correlation with PGA ($r=0.476$) and EGA ($r=0.502$). Significant differences between those who were classified as hypoxia and hyperoxia with evident PA signals, were detected in VAS ($p=0.020$) and PGA ($p=0.026$).

Conclusion: The PA-sum scores and the PA+SO₂ patterns can be utilized as objective imaging parameters reflecting the disease activity of RA. PAI may serve as a supplement to conventional US examinations for RA patients.

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