

# Hypertrophic osteoarthropathy: Detecting periosteal inflammation using Doppler ultrasound

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A 69-year-old woman presented with a 2-month history of bilateral morning stiffness and arthralgia of the wrists, shoulders, and ankles in November 2016. She had undergone total hysterectomy and bilateral salpingo-oophorectomy for endometrial cancer 7 years ago and had subsequently undergone chemotherapy. However, her response to chemotherapy had been poor, and she had developed metastatic lung cancer 4 years later. A physical examination showed clubbed fingers and toes (Figure 1a, b), swelling of both ankles, and bilateral tenderness of the forearms and shins. Blood test results showed mildly elevated C-reactive protein and plasma vascular endothelial growth factor (VEGF) levels. The results were negative for rheumatoid factor, anticitrullinated protein antibody, and antinuclear antibody tests. A plain radiograph of the tibias showed periosteal thickening, and power Doppler ultrasound signals over the periosteum of the radius, ulna, and tibia indicated periosteal inflammation (Figure 2 a-d). Bone scintigraphy revealed the linear uptake of technetium-99m-labeled methylene diphosphonate in the radii, ulnas, and particularly, the tibias (Figure 3). Hypertrophic osteoarthropathy (HOA) associated with metastatic lung cancer was diagnosed. After treatment with a nonsteroidal anti-inflammatory drug and intravenous zoledronic acid, the pain in her joints and bones improved with reduction in Doppler signals. However, the metastatic lung tumors slowly enlarged, and the pain in her joints and bones progressively worsened.

Hypertrophic osteoarthropathy is a syndrome that manifests as clubbing of the fingers, polyarthralgia of the large joints, and ostealgia of the tubular bones; HOA is characterized by periosteal proliferation (1-3). HOA is usually associated with lung cancer and cyanotic heart disease. Its pathogenesis has not been elucidated, but the roles of platelet-derived growth factor produced by non-fragmented megakaryocytes that bypass the pulmonary vascular bed and prostaglandins and VEGF produced by lung cancer have been suggested (4, 5). Radiography and bone scintigraphy are conventionally used as diagnostic tools modalities to detect periosteal reactions. It is notable that Doppler ultrasound can detect periosteal inflammation, as was seen in the present case. Doppler ultrasound may be an alternative diagnostic tool, particularly in primary care settings, as it is an easy, cheap, and non-ionizing radiative procedure that can be beneficial for evaluating the efficacy of therapeutic procedures. In the management of HOA, treating the underlying disease is critical. When the underlying disorder cannot be treated, treatment with analgesics and bisphosphonates has been reported to relieve clinical symptoms (6).

Hypertrophic osteoarthropathy is a rare disease, but it can mimic an arthritic condition. If a patient presents with arthralgia and ostealgia with clubbed digits, physicians should suspect HOA and consider an underlying disorder such as an intrathoracic malignancy. Screening with plain radiographs of the chest and tubular



Cite this article as: Abe N, Kasahara H, Koike T. Hypertrophic osteoarthropathy: Detecting periosteal inflammation using Doppler ultrasound. *Eur J Rheumatol* 2018; *Eur J Rheumatol* 2018; 5: 151-2.

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Submitted: 6 April 2017

Accepted: 4 May 2017

Available Online Date: 25 October 2017

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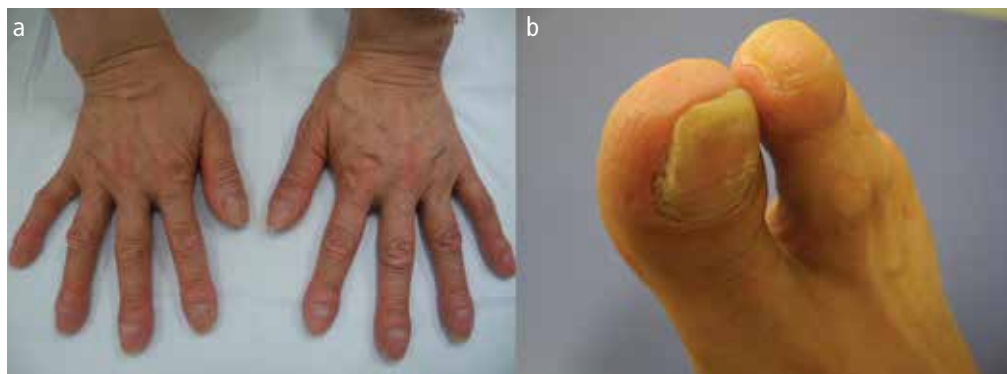
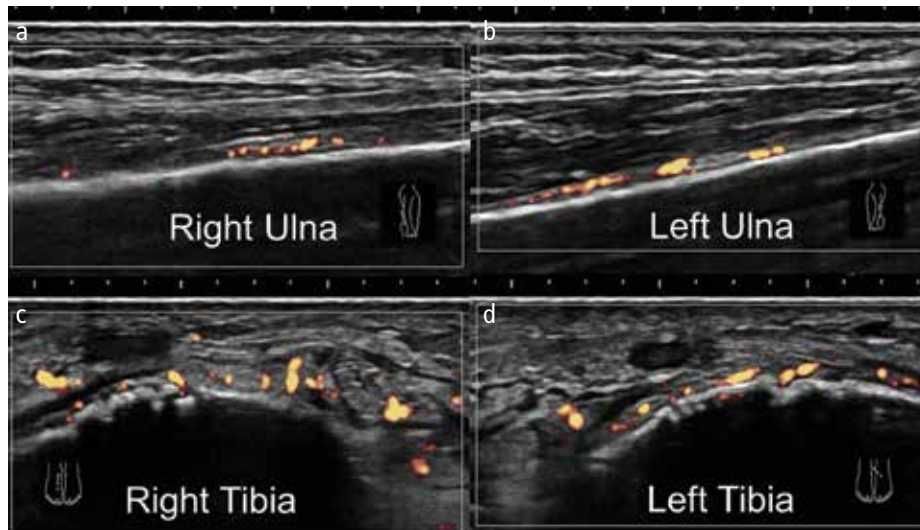


Figure 1. a, b. Clubbed fingers (a) and toes (b)



**Figure 2. a-d.** Periosteal inflammation highlighted by Doppler signals over the bilateral periosteum of the ulnas (a, b) and tibias (c, d) on ultrasonography in the longitudinal view

bones, as well as Doppler ultrasound to detect periosteal reactions and inflammation, may be helpful in the diagnosis of HOA.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept - N.A.; Design - N.A., H.K.; Supervision - H.K, T.K.; Resources - N.A., H.K., T.K.; Materials - N.A., H.K., T.K.; Data Collection and/or Processing - N.A.; Analysis and/or Interpretation - N.A., H.K., T.K.; Literature Search - N.A., H.K.; Writing Manuscript - N.A., H.K., T.K.; Critical Review - N.A., H.K., T.K.

**Acknowledgements:** The authors acknowledge Mts. Megumi Tachikawa and Rie Jounishi, department of

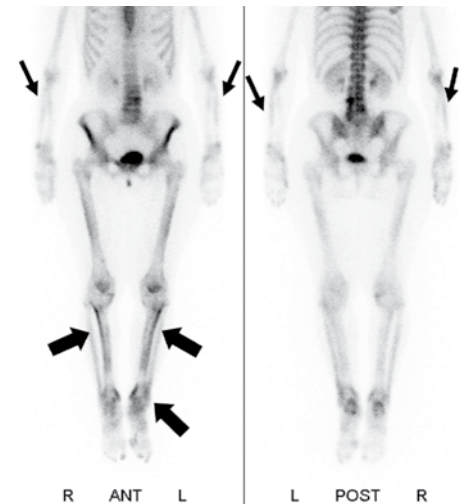
clinical laboratory, NTT Sapporo Medical Center, for performing the ultrasound examination.

**Conflict of Interest:** The authors have no conflict of interest to declare.

**Financial Disclosure:** The authors declared that this study has received no financial support.

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**Figure 3.** Bone scintigraphy revealing linear uptake of technetium-99m-labeled methylene diphosphonate in the radii, ulnas (thin arrows), and tibias (thick arrows)

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