



# Extravascular incidental findings in run-off CT angiography in patients with acute limb ischaemia: incidence and clinical relevance



A. Preuß<sup>a</sup>, T. Elgeti<sup>a</sup>, B. Hamm<sup>a</sup>, T. Werncke<sup>b,\*</sup>

<sup>a</sup>Department of Radiology, Charité – Universitätsmedizin Berlin, Campus Benjamin Franklin, Hindenburgdamm 30, 12203 Berlin, Germany

<sup>b</sup>Department of Diagnostic and Interventional Radiology, Hannover Medical School, Carl-Neuberg-Str. 1, 30625 Hannover, Germany

## ARTICLE INFORMATION

### Article history:

Received 22 December 2014

Received in revised form

7 February 2015

Accepted 20 February 2015

**AIM:** To evaluate the incidence and clinical relevance of extravascular incidental findings (EVIFs) in CT angiography of the abdominal aorta and lower extremities (run-off CTA) in patients presenting with acute limb ischaemia (ALI).

**MATERIALS AND METHODS:** In this institutional review board-approved, retrospective study, 141 run-off CTA examinations conducted between 2005 and 2013 of patients (67 women, mean age 80 years; 74 men, mean age 69 years) presenting with clinical symptoms of ALI were re-evaluated by two radiologists (2 and 7 years of experience in interpreting run-off CTA). Imaging was conducted using 16- and 64-section CT systems. Image acquisition ranged from the costodiaphragmatic recess to the forefoot. The medical history form of each patient served as the standard of reference for assessment of incidence of EVIFs. CT morphology was assessed to assign EVIFs to one of three categories of clinical relevance: (I) immediate, (II) potential, and (III) no clinical relevance.

**RESULTS:** Thirty-eight patients had category I findings, including four patients (2.8%) with previously unknown malignancy and 67 patients with category II EVIFs. In total 473 extravascular EVIFs were found in 141 patients: 52 category I, 163 category II and 258 category III.

**CONCLUSION:** EVIFs with immediate clinical relevance are very common in run-off CTA in patients presenting with acute peripheral artery disease. Therefore, it is important to evaluate all body regions included in a CT examination carefully, even if the clinical focus is on vascular evaluation. The adequate classification of these EVIFs is required to avoid possible unnecessary diagnostic work-up with associated risks and costs.

© 2015 The Royal College of Radiologists. Published by Elsevier Ltd. All rights reserved.

## Introduction

There has been a considerable increase in the detection and description of findings that are incidental to the indication of the imaging study that was ordered in recent years.<sup>1–3</sup> The increasing number and interest in incidental findings can be attributed to the rising number of imaging examinations including CT and their use as screening tools, the introduction

\* Guarantor and correspondent: T. Werncke, Department of Diagnostic and Interventional Radiology, Hannover Medical School, Carl-Neuberg-Str. 1, 30625 Hannover, Germany. Tel.: +49 511 532 3406; fax: +49 511 532 9421.  
E-mail address: [werncke.thomas@mh-hannover.de](mailto:werncke.thomas@mh-hannover.de) (T. Werncke).

of picture archiving and communication systems, and a higher number of law suits against radiologists.<sup>4–6</sup> Although patients benefit from the incidental detection of serious disease, every additional diagnostic test involves psychological stress, even if definitely benign lesions are followed up.<sup>7,8</sup> As an asymptomatic abnormality may not affect mortality and/or morbidity, there is also the issue of over-diagnosis to be considered.<sup>9,10</sup> Finally, unnecessary work-up of ultimately harmless abnormalities should also be avoided because it leads to extra healthcare expenditure.<sup>11,12</sup>

In patients presenting with acute limb ischaemia (ALI), prompt diagnosis and initiation of treatment are essential to prevent limb loss and preserve quality of life. Offering short examination times, high accuracy in stenosis detection, and rapid availability, non-invasive CT angiography of the abdominal aorta and lower leg arteries (run-off CTA) has increasingly become the imaging technique of choice especially in emergency situations.<sup>13</sup> In contrast to the reference standard, digital subtraction angiography (DSA) high resolution axial image datasets are primarily acquired and post-processed in run-off CTA to create a comparable DSA-like luminogram. Unlike DSA, run-off CTA also depicts the surrounding anatomy, and therefore, more commonly detects clinically relevant abnormalities outside the arterial vascular system.<sup>1</sup>

To date, there is only sparse literature regarding extra-vascular incidental findings (EVIFs) in run-off CTA of the abdomen and lower extremities.<sup>14–17</sup> Notably, these studies did not primarily focus on patients with ALI, but also on patients with chronic peripheral artery disease (PAD), aortic aneurysm, or on the renal arteries.

The nature and clinical relevance of incidental findings in patients presenting with ALI pose a challenge to radiologists and referring physicians, especially as standardized guidelines are lacking and only a few suggestions have been made on how to handle them.<sup>18,19</sup> Therefore, the aim of this study was to evaluate the incidence and clinical relevance of EVIFs in CTA of the abdominal aorta and lower extremities (run-off CTA) in patients presenting with ALI.

## Materials and methods

### Study population

This retrospective study was approved by the local ethics committee (EA4/058/13). Two general radiologists (2 and 7 years of clinical experience in interpreting run-off CTA) re-evaluated run-off CTA datasets of patients referred to the radiology department of a university hospital with clinical symptoms of ALI between March 2005 and October 2013, focusing on prior unknown extravascular findings. A total of 141 patients (67 women, mean age  $80 \pm 11$  years, range 53–96 years; 74 men; mean age  $69 \pm 10$  years, range 48–90 years) were included. The total cohort had a mean age of  $75 \pm 11$  years with a range of 48–96 years. Using the Fontaine classification, most patients had stage III PAD (75.2%,  $n = 106$ ), followed by stage IV (15.6%,  $n = 22$ ) and IIB (5%,  $n = 7$ ). A few patients had stage IIA disease (4.3%,  $n = 6$ ).

The most common cardiovascular risk factors were arterial hypertension in 112 (79.4%) patients, history of smoking in 60 (42.6%) patients, including nine (6.4%) former smokers, and hyperlipidaemia in 56 (39.7%) patients. Diabetes mellitus was known in 43 (30.5%) patients and renal impairment in 15 (10.6%) patients, with three (2.1%) patients needing chronic haemodialysis.

### CTA technique

Run-off CTA (with a scan range from the costodiaphragmatic recess to the forefoot) was conducted on a 64 section CT system in 109 (77.3%) patients (Somatom Definition, Siemens Healthcare, Forchheim, Germany). The following acquisition parameters were used: 120 kVp tube voltage, 120 mAs reference tube current–time product with tube current modulation CareDose4D, 0.33 s rotation time;  $2 \times 32 \times 0.6$  mm collimation, pitch = 0.75. In 32 (22.7%) of the patients, the CT examination was performed on a 16 section CT system (Somatom Sensation 16, Siemens Healthcare, Forchheim, Germany) using the following acquisition parameters: 120 kVp tube voltage, 120 mAs reference tube current–time product with tube current modulation CareDose4D, 0.75 s rotation time;  $16 \times 1.5$  mm collimation, pitch of 1.5.<sup>20</sup>

The patient was placed supine and prior to imaging, tourniquets were tied round each thigh to reduce venous return and improve image quality. Iomeprol (100 ml of 400 mg iodine/ml; Imeron 400, Bracco, Milano, Italy) followed by a 60 ml saline flush at a flow rate of 4 ml/s were injected using a dual-barrel injector (Stellant, Medrad, Volkach, Germany) via a 20 G or larger intravenous cannula placed in an antecubital vein. Arterial phase images were obtained 4 s after bolus detection in the suprarenal aorta (threshold = 250 HU, CareBolus, Siemens Healthcare). Images were firstly reconstructed for vascular assessment using a soft kernel (B25f) and a field of view of 330 mm with an effective section thickness of 1 mm (reconstruction interval of 0.7 mm) for 64 section CT and 2 mm (reconstruction interval of 1 mm) for 16 section CT. To display the whole patient, images were secondly reconstructed with a larger field of view adjusted to the patient size and using a section thickness of 5 mm (64 section CT) and 6 mm (16 section CT), respectively.

### Classification of incidental findings

Clinical relevance was analysed by evaluating morphological criteria of the EVIFs.<sup>18,21</sup> Conspicuous extravascular findings in the run-off CTA examination were classified into one of three groups following the procedures used in several earlier studies reported in the literature.<sup>17,22–25</sup> Category I findings have immediate clinical relevance, meaning that they need immediate further investigation or therapy because they are highly suspicious of malignancy, inflammatory disease, or other highly relevant cause of acute limb pain. An important differential diagnosis, spinal stenosis, was classified as follows: absolute spinal stenosis (sagittal diameter of bony spine <10 mm) was classified as category I, whereas relative spinal stenosis (sagittal

Download English Version:

<https://daneshyari.com/en/article/6190867>

Download Persian Version:

<https://daneshyari.com/article/6190867>

[Daneshyari.com](https://daneshyari.com)